SOUTHERN BRAZILIAN JOURNAL OF CHEMISTRY
SOUTH. BRAZ. J. CHEM., Vol. 6, Nº 7, 1998

ANTONIO DE ULLOA, DISCOVERER OF PLATINUM

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ABSTRACT

Don Antonio de Ulloa, member of a distinguished Spanish family, was born in 1716 and died in 1795. He studied physics and mathematics and was a member of many scientific societies, including the Academy of Sciences of Paris and the Royal Society of London. He travelled widely in Europe and the Americas and occupied many important positions, including those of Frigate Captain, Commander of the Royal Squadron of the Spanish Armada, Governor of Huancavélica - Peru, Louisiana and Florida. In 1735, while member of a scientific expedition sent by the Spanish and French governments to South America to measure a degree of meridian in Quito, close to the equator, he discovered platinum in the mines of Lavadero or wash gold in the district of Chocó.

RESUMO

Don Antonio de Ulloa, membro de uma ilustre família espanhola, nasceu em 1716 e morreu em 1795. Ele estudou física e matemática e foi sócio de muitas entidades científicas, incluindo a Academia de Ciências de Paris e a Royal Society de Londres. Viajou extensivamente na Europa e nas Américas e ocupou muitos cargos importantes, entre eles, Capitão de Fragata, Comandante da Esquadra da Real Armada Espanhola, Governador de Huancavélica - Peru, da Louisiana e da Flórida. Em 1735, quando fazia parte de uma expedição científica enviada pelos governos da Espanha e da França à América do Sul para medir um arco de meridiano em Quito, perto do ecuador, descobriu a platina nas minas de Lavadero no Partido de Chocó.

KEYWORDS History of Chemistry, Platinum, Discovery of the Elements.

DOI: 10.48141/SBJCHEM.v6.n7.1998.4_1998_2.pdf

Contrarily to what is generally believed, many scientists that were born or lived in Latin America, made significant contributions to chemistry. Among them are Antonio de Ulloa (1716-1795), who was the first to take platinum to Europe and make this metal known in the Old World; Fausto and Juan José Delhuyar, discoverers of tungsten; Andrés Manuel Del Rio, discoverer of vanadium; José Luis Casaseca, founder of the Cuban Institute of Chemical Research; Alvaro Reynoso, father of modern sugar technology and Luis Frederico Leloir, Nobel laureate in chemistry. Notable contributions were also made by Horacio Damianovich in noble gas chemistry, Gustavo Fester and Xorge Alejandro Dominguez in natural products and Ernesto Giesbrecht in the chemistry of lanthanides.[1-10] More recently, in 1995, the Mexican chemist Mario Molina was awarded the Nobel Prize in Chemistry together with Paul Crutzen and F. Sherwood Rowland for their work dealing with the ozone layer.

Antonio De Ulloa, member of an illustrious Spanish family, was born in Seville in 1716 and died on the Island of León near Cadiz on July 5, 1795. He received a very good formal education and turned out a brilliant young physicist and mathematician. His first long travel was at the age of thirteen, when he participated in an expedition to Cartagena de Indias (Carthagena, Colombia). Upon his return to Cadiz in 1732, after passing successfully a series of examinations, he enlisted as a naval guard.

In 1735 the Academy of Sciences of Paris nominated two scientific commissions to perform measurements of degrees of meridians. The first one, that travelled to Lapland and was to make measurements near the North Pole was headed by Louis Moreau de Maupertuis (1698-1759) and the Swedish scientist Anders Celsius (1701-1744). The second one, formed by Charles Marie La Condamine (1701-1774), Louis Godin (1704-1760) and Pierre Bouguer (1698-1758) was sent to Peru and Ecuador to measure a degree of meridian near Quito, close to the equator.[11-17]

Louis XV solicited an authorization from Philip V, King of Spain, who not anly gave approval and support, but also appointed two young officers (Frigate Lieutenants) of the Spanish Armada to accompany the French Commission, assist with the observations and measurements and help obtain new scientific knowledge about the shape and the dimensions of earth.[14-17]

The two young naval officers were Jorge Juan Santacilia (1713-1773) and Juan Antonio De Ulloa. The two left Spain in May 1735 and arrived in Cartagena on July 1, where they met the French scientists. They travelled together to Portobelo, Guayaquil and Quito and collaborated doing various types of astronomical measurements and observations. Ulloa worked mainly with La Condamine and Bouguer. Soon afterwards, in May 1736, the two young Spanish officers received secret military assignments and classified scientific tasks from the Viceroy of Peru that they performed for about eight years, when they

returned to Quito and engaged in astronomical observations at the Pueblo Viejo de Mira Observatory. Part fo the discoveries and observations made during the nine years of exploration have been described in the monumental work published by the two of them in Madrid in 1748. This work also includes the first description of platinum given below.[14]

"En el Partido del Chocó, habiendo muchas minas de *Lavadero,* como las que se acaban de explicar, se encuentran también algunas, en donde por estar disfrazado, y envuelto el *Oro,* con otros cuerpos metálicos, Jugos y Piedras, necesita para su beneficio el auxilio del *Azogue;* y tal vez se hallan minerales, donde la *Platina* (Piedra de tanta resistencia, que no es fácil romperla, ni desmenuzarla con la fuerza del golpe sobre *Yunque de Acero*), es causa de que se abandonen; porque ni la calcinación la vence, ni hay arbitrio para extraer el *Metal* que encierra, sino a expensas de mucho trabajo y costo" **.

** ***Relación Histórica del Viaje a la América Meridional hecho de orden de S. Mag. para medir algunos grados del meridiano terrestre y venir por ellos en conocimiento de la verdadera figura y magnitud de la Tierra, con otras observaciones astronómicas y físicas:*** **Por Don Jorge Juan, Comendador de Aliaga en el Orden de San Juan, socio correspondiente de la Real Academia de Ciencias de París y Don Juan Antonio de Ulloa, de la Real Sociedad de Londres: Ambos capitanes de Fragata de la Armada. Impresa de orden del Rey Nuestro Señor en Madrid por Antonio Marín. Año de MDCCXLVIII - Primera Parte Tomo II. p. 606.**

ANTONIO DE ULLOA (1716-1796)

SPANISH PHYSICIST, MATHEMATICIAN, NAVAL COMMANDER, DISCOVERER OF PLATINUM, GOVERNOR OF LOUISIANA AND FLORIDA, EXPLORER OF THE AMERICAS.

Mary Elvira Weeks in her book "*Discovery of the Elements*"[18] states the following:

> In the preface to his "Astronomical and Physical Observations," Jorge Juan said that Ulloa regarded platinum as a peculiar metal and anticipated that there must be special mines of it just as there are of gold and silver."
>
> De Ulloa described it as follows: "In the district of Chocò are many mines of Lavadero, or wash gold . . . several of the mines have been abandoned on account of the platina; a substance of such resistance that, when struck on an anvil of steel, it is not easy to be separated; nor is it calcinable; so that the metal, inclosed within this obdurate body, could not be extracted without infinite labour and charge . . . "

Apparently, the discovery of platinum in the district of Chocō on the Pacific Coast of present day Colombia occurred in 1735, during the initial part of the expedition from Cartagena to Quito and both scientists were very much aware of its importance.[11]

In May of 1745, after completing the military and scientific missions, the two officers made arrangements to return to Spain. In order to avoid the risk of loosing the results of the scientific work, they embarked separately and Jorge Juan arrived safely in Europe. On the other hand, Antonio De Ulloa travelled on the French frigate *Dēlivrance* that was captured by the British. Some of the more compromising documents in De Ulloa's possession were thrown in the sea; the rest were confiscated by the British and he was made prisoner. He only returned to Madrid on July 25, 1746. Apparently, he was treated well and was presented to Martin Folkes, president of the Royal Society. When he petitioned the Admiralty for the return of his papers, the Duke of Bedford affirmed that war between nations should not hinder the progress of science and he was allowed to travel to London and receive back his documents.[11,18]

After his return to Spain, De Ulloa did not devote much effort to platinum. The studies were continued by Fausto Delhuyar (1755-1833) and Pierre Francois Chabaneau (1754-1842) and gave Spain a practical monopoly of this metal for many years.[11-13]

Besides the British, many other scientists became interested in platinum. They included Scheffer, Bergman, Berzelius, Baumē, Buffon, Lavoisier, Macquer, Marggraf and others.

Antonio De Ulloa devoted his time to other activities. He travelled widely in Europe on scientific missions. For example, in 1755, he visited Sweden and was elected member of the Swedish Academy. He reorganized the teaching of medicine in Spain, established the textile industry, improved the arsenals and the mining of mercury. In 1758 he was named Governor of Huancavēlica, Peru and superintendent of the mercury mines. In 1765 he was named Governor of Louisiana, in 1766 Governor of Florida and in 1772 Commander of the Spanish Fleet.[19-21]

In 1750, Brownrigg sent a sample of a mineral containing *"Platina di Pinto"* to Sir William Watson of the Royal Society. Brownrigg had obtained the sample from the metallurgist[11,18] Charles Wood during a trip to Jamaica, West Indies. It was contraband from Carthagena, Colombia. Sir William Watson analyzed the sample and presented the results to the Royal Society on December 13, 1750. A copy of the page of the *Philosophical Transactions Abridgement* containing Watson's communication and Brownrigg's letter is given below.

XXXIII. 1. I take the freedom to incloſe to you an account of a ſemi-metal called *Platina di Pinto*; which, ſo far as I know, hath not been taken notice of by any writer on minerals. Mr *Hill*, who is one of the moſt modern, makes no mention of it. Preſuming therefore that the ſubject is new, I requeſt the favour of you to lay this account before the *R. S.* to be by them read and publiſhed, if they think it deſerving thoſe honours. I ſhould ſooner have publiſhed this account, but waited, in hopes of finding leiſure to make further experiments on this body with ſulphureous and other cements; alſo with Mercury, and ſeveral corroſive *menſtrua*. But theſe experiments I ſhall now defer, until I learn how the above is received. The experiments which I have related were ſeveral of them made by a friend, whoſe exactneſs in performing them, and veracity in relating them, I can rely on: however, for greater certainty, I ſhall myſelf repeat them.

Several Papers concerning a new Semi Metal, called Platina; communicated to the Royal Society by Mr Wm Watſon, F. R. S. N°. 496. p. 584. Nov. &c. 1750. Read Dec. 13. 1750. Extract of a letter from Will. Brownrigg, M. D. F. R. S. to Wm. Watſon, F. R. S. Dated Whitehaven, Dec. 5, 1750.

2. Although the hiſtory of minerals, and other foſſil ſubſtances, hath been diligently cultivated, eſpecially by the Moderns; yet it muſt be acknowledged, that, among the vaſt variety of bodies which are the objects of that ſcience, there ſtill remains room for new inquiries.

No wonder that, among the great, and almoſt inexhauſtible varieties of ſalts, ores, and other concretes, new appearances, and mixtures before unknown, ſhould daily be diſcovered: but that, among bodies of a more ſimple nature, and particularly among the metalline tribe, ſeveral diſtinct ſpecies ſhould ſtill remain almoſt wholly unknown to Naturaliſts, will doubtleſs appear more ſtrange and extraordinary.

Gold is uſually eſteemed the moſt ponderous of bodies; and yet I have ſeen, in the poſſeſſion of the late Profeſſor *s'Graveſande*, a metalline ſubſtance, brought from the *Eaſt-Indies*, that was ſpecifically hea-

Memoirs of a Semi-metal called Platina di Pinto, found in the Spaniſh Weſt Indies. Ibid. p. 585.

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In many chemistry books written in English, Sir William Watson is considered the sole and exclusive discoverer of platinum.

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