

BIOGRAPHY OF CÉSAR RUBIO Y MUÑOZ (CÁCERES, 1858-MADRID, 1931), PRESIDENT OF THE 14TH INTERNATIONAL GEOLOGICAL CONGRESS (MADRID, SPAIN, 1926)

Octavio Puche Riart ¹, Luis Jordá Bordehore ² and José Eugenio Ortiz Menéndez¹

¹ Escuela de Ingenieros de Minas, Universidad Politécnica de Madrid, Ríos Rosas 21, 28003 Madrid, Spain.
Octavio.Puche@upm.es

² Geocontrol.

ABSTRACT

The mining engineer César Rubio, before joining the Geological Survey of Spain, worked in numerous Spanish mining districts, in which he introduced important innovations. His main contributions being the director of the Geological Survey of Spain was the research of the Catalanian potassium salts deposits and the organization of the XIV International Geological Congress, which took place in Madrid in 1926.

KEY WORDS: Geology, Mining, Metallurgy, ICG Congress.

RESUMEN

El ingeniero de minas César Rubio, antes de ingresar en la Comisión del Mapa Geológico de España, trabaja en numerosos distritos mineros españoles, donde realiza importantes innovaciones. Desde la Comisión, sus principales aportaciones fueron la investigación de la cuenca potásica catalana y la organización del XIV Congreso Geológico Internacional celebrado en Madrid, en 1926.

PALABRAS CLAVE: Geología, Minería, Metalurgia, Congreso Geológico Internacional.

STUDIES AND EARLY PROFESSIONAL BACKGROUND

César Rubio was born in 1858 in Cáceres (Extremadura), a region located in southwest Spain, close to Portugal. There are not many data about his childhood and what is only known is that his father was an outstanding mining engineer who worked in that region.

According to Maffei (1877), in 1876 he joined the *Escuela Especial de Minas* (Special School of Mines) as a first year student, and was graduated three years later (1880). He was a brilliant scholar, being the best student of his class (Encyclopaedia Espasa-Calpe, 1933).

He entered the Mining Engineers Corps and took charge of the phosphorite exploitation of Aldea Moret (Cáceres) although later on, he moved to the quicksilver mines and metallurgical settlement of Almadén (Ciudad Real, southern Spain). It is presumed that he taught in the Mining Overseas School of the latter locality. As a result of his knowledge and reputation, the main Spanish mining districts asked for his consultancy and expert-

ise, e.g. the coal basins of Asturias (northern Spain), the lead district of Linares and La Carolina (southern Spain), the lead-silver mines of the Alcudia Valley and the Jerez-Lanteira (Southern Spain) copper mines in which he introduced innovating furnaces. He also worked on lead extraction from Sierra Almagrera district (Almería, southeastern Spain) and the copper field of the Huelva province (southwestern Spain) (Marín, 1931).

There are some news about his activity in private companies, i.e. in 1883 he signed as Mining Director a descriptive report about the California Manchega mine in Almodovar del Campo (Ciudad Real).

THE CYANIDE PROCESS IS INTRODUCED IN SPAIN

He was also in Vera (Almería, southeast Spain) where, according to some authors he introduced the cyanide process to obtain silver in Spain, precisely in the Araucana smelting, Herrerías mines of this locality. In the 1896 issue of the Spanish Mining Review named "Revista

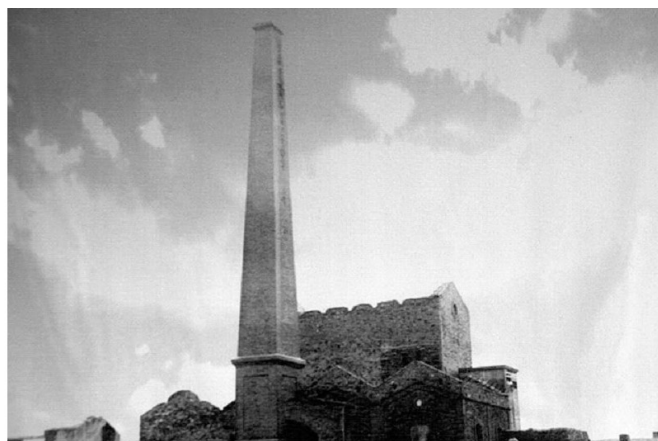


Figure 1. Phosphorite exploitation of Aldea Moret (Cáceres, southwestern Spain) at present (left) and in the past (right).

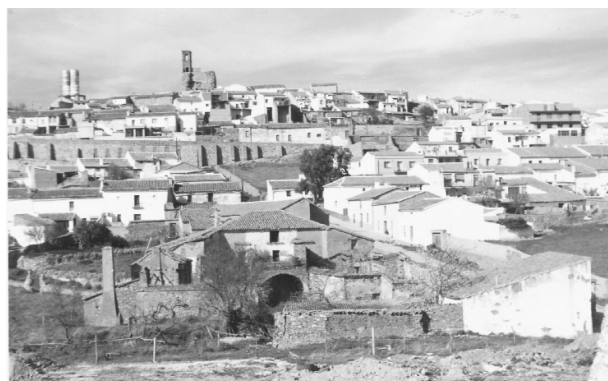


Figure 2. The Hole Mine (left) and the Castle Mine (right) of Almadén from the 18th century (Ciudad Real).

Minera, Metalúrgica y de la Ingeniería” there was an article about “Extracción de oro y plata por cianuros alcalinos” (Gold and silver extraction by alkaline cyanides) in which it is quoted that this process was developed by the engineer M. Netto from the Mazarrón Mining Company, constituting a pioneer application in Spain.

As César Rubio pointed out in 1896, this method was “applied and invented in a certain way for Spanish minerals. The essays used ore from Hiendelaencina, Carras-coy, Herrerías, Almagrera, etc...”. It was just nine years before that John Mc Arthur, together with Robert and William Foster, patented a new industrial gold-silver extraction process with alkaline cyanides. That method consisted in mixing the crushed ore with an alkaline solution of sodium cyanide. The cyanide dissolves gold or silver, which can be recovered by using zinc for their precipitation (Castillo Martos and Lang, 1995). According to César Rubio (1896), Netto applied this method to low grade ores in Spain. Thus, Netto introduced the cyanide method in Spain and César Rubio was one of the pioneers on its application.

In 1839, an important vein of galena was discovered in El Jaroso, close to Sierra Almagrera. Sánchez Picón and Pérez de Perceval (1999) indicated that Rothschild’s bank created the Compagnie d’Aguilas (1881), being one of its objectives to manage the mines and control the production of Spanish lead. At those times César

Rubio was professor at the Mining Overseas School in Vera.

CÉSAR RUBIO IN THE IBERIAN PYRITIC BELT

At the beginning of the 20th century he settled in the province of Huelva, where he reached the degree of Mining District Chief Engineer (Marín, 1931). In 1902 César Rubio published an article about “The new copper smelting in Riotinto” in an issue of the journal “Revista Minera, Metalúrgica y de la Ingeniería”, in which he described the application of the Bessemer converter to copper roasted ores. This technology displaced the former primitive “Castellanos” furnaces.

He pointed out that there was no doubt about that the Riotinto mining district was facing a period of extraordinary progress. Due to his efforts, the United Alkali Company was established in Huelva (López de Azcona y Messeguer Pardo, 1964). The British company was founded by the Irishman James Musprat (1793-1886) in 1823, being the company’s main field of activity the production of chemical products such as: alkali, caustic soda, ash sulphuric acid, ammonium nitrate, sodium cyanide, etc. The United Alkali bought in 1904 the polymetallic Sotiel Coronada mine (southeastern Spain) in order to have their own pyrites, and to avoid buying the expensive Riotinto’s ones (Carvajal, 2000).

According to Agustín Marín (1931) “He was a very complete engineer, due to his multidisciplinary knowledge, i.e, he was able to develop a whole mining process from the early beginning prospecting phase to the operative production. Thus, he planned the exploration and first mining works supported on his geologic background, he was also capable of developing a full exploitation scheme founded in the mining art, and he could even study the most economically efficient method for the ore processing under the basis of metallurgy. Wherever he was, he engraved his mining genius”.

ENGINEER IN THE COMMISSION FOR THE GEOLOGIC MAP OF SPAIN, WORKS AND HIS PARTICIPATION IN SOME CONGRESSES

On 23 April 1902 he joined as an engineer the Commission for the Geological Map of Spain (Marín, 1931), where contributed with many services.

In 1906 the Ministry of Economy sent him to Almadén cinnabar mines, together with two important Spanish mining engineers Luis Mariano Vidal and Ramón Adán de Yarza. The underground workings were in bad conditions and thus, the engineers were asked to examine and to inform about their needs of organisation and reforms. These three engineers met in Madrid the 13 June and moved immediately to Almadén, where they remained from 15 to 20 June. Later on, they elaborated a report that they transmitted to the Ministry in 1 of November (Gómez Alba, 1992). The pointed out an excess of personnel and bureaucracy, as well as the poorly exploitation labors, that were increasing the cost: “The cost per ton exploited mounted to 148 pesetas, whether the cost in mines of pyrite, a mineral as hard or even harder than that of Almadén, oscillated between 7 and 12 pesetas; and in lead lodes the cost ranged between 12 and 22 pesetas...” They proposed reforms in the mine, in metallurgy and other technical aspects, but they refused the previous solution, which consisted on selling or renting the mine (Vidal *et al.*, 1907). The report was strongly discussed in the Parliament without reaching an agreement (Gómez Alba, 1992). However, the proceedings proposed in this study were not applied and the mines deteriorated still more.

In 1905 the Government entrusted the Commission of the Geological Map of Spain (later the Spanish Geological Survey) to study the underground waters of Spain, in order to use it for agriculture and other purposes (Royal Order of 15 July). In 1902 with the Gaset planning, it was already arranged the profit of the water surface resources (Puche Riart, 2000). The engineers of the Commission began the work and César Rubio was encharged of the hydrogeological study in various zones: in the Madrid province, in the area around the Madrid-

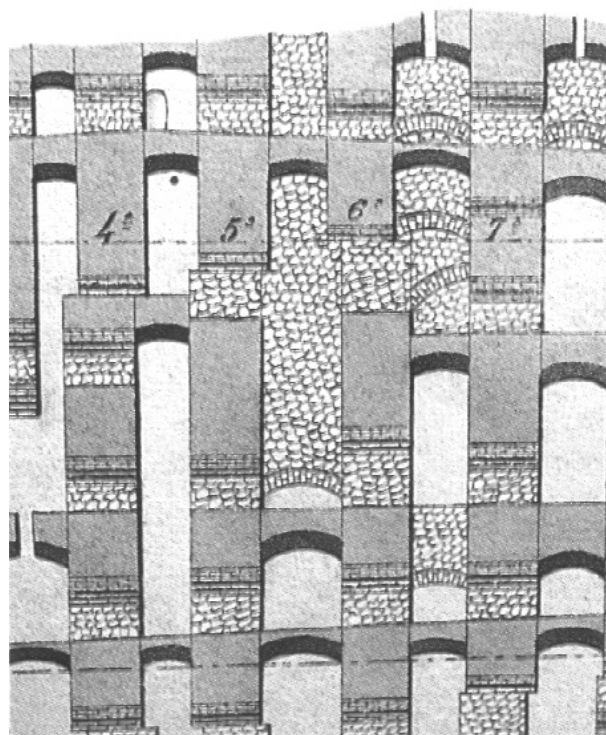


Figure 3. Larrañaga's method to exploitation of Almadén's mines (19th century).

Northern Spain railway line and in the Madrid-Zaragoza one (together with García del Castillo, 1906), in the Toledo province, in the Alberche river catchment area and Guadarrama (with Villasante and Kindelán, 1908), in the Barcelona's plain (also with Kindelán, 1909), as well as in Villajoyosa (Alicante province). As a consequence of all this studies, he presented an oral communication to the IX International Hydrological Congress in 1913 entitled: “Legislative conditions to preserve the exploitation of medical and underground waters”.

In 1911 he participated, together with Ramón Adán de Yarza (Professor of Geology in the Madrid School of Mines), in the XI International Geological Congress of Stockholm from 18 to 25 August, presenting a report from the engineer Luis Mariano Vidal (1910).

In 1911 César Rubio published a geological and mining study of the Guelaya deposits from Marocco, in which the 1910 inspection of the mining engineers Luis Adaro and Alfonso del Valle is related. He complemented this former work with some other data.

In those times he also studied the iron ore deposits of the Murcia province (southeastern Spain).

DISCOVERY OF THE POTASSIUM DEPOSITS IN CATALONIA AND OTHER WORKS

The first Rubio's paper about the Catalonian Potassium deposits appeared in 1913. Marín (1931) pointed out that: “I have been nominated in the Commission to investigate these deposits together with the engineer co-author of this study (César Rubio). It occurred after

the potassium salts in Suria (Catalonia, Spain) were discovered. I will never forget the happiness he showed, the patriotism when commenting the matters of the visit and sightseeing the enormous wealth it could bring to Spain. With astonishment we examined these deposits, which we reached by a ruinous cable...". After evaluating the deposit and divulging these studies, finally, the Enrique mine concession was obtained. This mine was sold in the 1970's to Potassium of Alsace and later on to Explosives Ríotinto (Antonio Ramírez, pers. comm.).

In the same year 1913, César Rubio also participated as a chairman in the International Congress on Hidrology, Climate and Geology hold in Madrid between 15 and 22 October. His communication was entitled: "Mining Hygiene related to the characteristic of the minerals and the working systems in mines" (Mining Review: Revista Minera, Metalúrgica y de la Ingeniería, 1913, p. 506)

Between 1922 and 1925 he was the director of the Instituto Geológico y Minero de España (Geological Survey of Spain), although he previously was a member of its Executive Commission during several years. Likewise, he was elected President of the Mining Council (September 1924-June 1925). When he was elected, the engineers and assistants of the Institution invited him to have lunch at the Ritz Hotel (Revista Minera, Metalúrgica y de la Ingeniería, 1924), which is the most classical and glamorous hotel in Madrid.

ORGANISATION OF THE XIV INTERNATIONAL GEOLOGICAL CONGRESS (1926) IN MADRID

In 1922 the XIII International Congress of Geology was hold in Belgium, in which César Rubio participated as a Spanish delegate and was invited (in the name of the Spanish King) to organize the next Congress to be hold in Madrid in 1925, which was accepted and approved, although it was finally delayed to 1926. In this year the Geological Survey of Spain moved to its present's settlement.

César Rubio elected President of the XIV International Geological Congress, not only by his mining and geological knowledge but also by his sympathy and wide language skills. The General Secretary was Enrique Dupuy de Lome, another well known mining engineer. A total of 1123 participants from 52 different countries joined the Meeting (it is the record up to now). There were also 14 field trips to the most interesting stratigraphic and tectonic sites of Spain, as well as to the main mining districts. These field trips were to:

1. Gibraltar
2. Serranía de Ronda (ultrabasic rocks).
3. Lead deposits of the Linares and Huelva pyritic

Belts.

4. Tectonic alignment of the Guadalquivir valley.
5. From Sierra Morena to Sierra Nevada mountain ranges.
6. Continental Tertiary deposits of Burgos.
7. Volcanoes of the Canary Islands.
8. Almadén quicksilver district.
9. Sierra de Guadarrama mountain range.
10. Continental Tertiary deposits of Aranjuez (Madrid basin).
11. Coal basins in Asturias.
12. Iron deposits of Bilbao, Basque country.
13. Potasses in Catalonia and East Pyrenees range.
14. Balearic Islands.

A total of 21 geologic field guides were published, including each trip and landscapes of the main railway tour in which the participants travelled (such as Irún-Madrid in Northern Spain, and Madrid-Sevilla in the Southern part).



Figure 4. César Rubio, Director of the Geological Survey of Spain (1922-1925).

The opening discourse of the congress was pronounced in French by Mr. Joseph Lebacqz, who was the President of the previous International Geological Congress. During the first days, important relationships and workshops were made, such as one related to the geological map of Africa: the French commission went ahead with the idea of developing a whole geologic map, involving all the countries with colonies in the con-

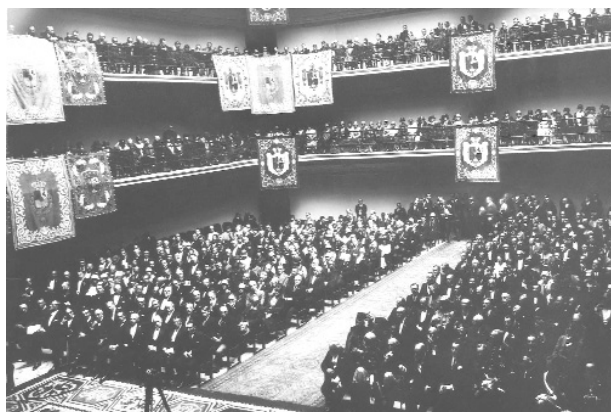


Figure 5. Celebration of the XIV International Geological Congress.

continent. The previous basic geological map of Africa performed by the Belgium geologists was very important at the beginning

The Congress included several topics:

1. World reserves of phosphates and pyrites.
2. Geology of the Mediterranean Sea.
3. Cambrian and Silurian fauna.
4. Geology of Africa and its relation with Europe.
5. Tertiary vertebrates.
6. Hercynian folds.
7. Tertiary Foraminifera.
8. Modern theories on Metallogeny.
9. Vulcanism.
10. Geophysical research.
11. Various.

The Congress was closed with solemnity on 31 May. According to Marín (1931), César Rubio “was enthusiastic from the very beginning to the end of the event: in those days, when pusillanimous, pessimists and sceptics prognosticated a downfall in the enterprise, he continued, thanks to his eternal youth, with optimism and confident genius. The Congress was inaugurated with this atmosphere of internal fights and desires. It was a complete success for Spain and for the mining Engineers corps...”. The directive Committee of Congress was compensated by a Royal Claim on 26 June.

LATE YEARS OF HIS LIFE

At the end of 1926, he pronounced a speech during Saint Barbara (the patron of miners) Day in the Madrid School of Mines. He then became the dean of the Mining Engineers Corps, and taking advantage of his position, he asked the King Alfonso XIII and the Ministry of Public works and transport, for a new Mining Code (the ancient was from 1868), as César Rubio said: “It is an obligation of a patriot to point out to our Ministry the actual state of business, its pains and possible solutions to undertake...”. We find in this and other discourses regenerative ideas, in the same style as other colleagues, such as Lucas Mallada.

Besides being enough recognized in Spain, he was also member of International Societies, as the Geologi-

cal Society of London, the Keiserlich Deutsche Akademie der Naturforscher in Halle, Germany, and honorific member of other various Scientific Societies. In Spain he obtained the Great Cross of Isabel “The Catholic” (The Queen who supported Christopher Columbus) and the National Association of Mining Engineers opened a subscription to economically support the medal. According to the journal “Revista Minera, Metalúrgica y de la Ingeniería”, more than 1900 pesetas were obtained for this purpose in 1926. Antonio Marín wrote about César Rubio, in 1931, that “his actions and thoughts were involved by modesty and simplicity; in such a way that they were sometimes even unnoticed. If these thought were well presented and with the scenery some other intellectuals had, César Rubio could have easily reached the summits of the social ostentation...”. He died at age of 72 on 21 February 1931.

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BIBLIOGRAPHY OF CÉSAR RUBIO

- Rubio, C. 1883. Procedimiento Manchés para el cobre. *Revista Minera, Metalúrgica y de la Ingeniería*, 34, 9, 29, 59, 65, 70 and 86.
- Rubio, C. 1883. *Provincia de Ciudad Real. Término municipal de Almodóvar del Campo. Coto minero La California Manchega. Ingeniero Director D, César Rubio. Memoria descriptiva*. Imp. Fortanet. Madrid, 50 pp.
- Rubio, C. 1894. Ensayo para la venta de minerales de cobre. *Revista Minera, Metalúrgica y de la Ingeniería*, 45, 84.
- Rubio, C. 1896. Extracción del oro y de la plata por los cianuros alcalinos. *Revista Minera, Metalúrgica y de la Ingeniería*, 47, 77-80.
- Rubio, C. 1902. Nueva fundición de cobre de Riotinto. *Revista Minera, Metalúrgica y de la Ingeniería*, 53, 363-365, 375-377, 387-389, 415-416 y 427-439 (figures in 387 and 415).
- Vidal, L.M., Adán de Yarza, R. and Rubio, C. 1906. Establecimiento minero de Almadén. Resumen y conclusiones del informe emitido, en 1906, por los ingenieros Sres.: Vidal, Adán de Yarza y Rubio (D. César). *Revista Minera, Metalúrgica y de la Ingeniería*, 57, 489.

- Rubio, C. and García del Castillo, J. 1906. Estudios hidro-geológicos. Provincia de Madrid. Zona del ferrocarril del Norte y del de Madrid a Zaragoza. *Boletín de la Comisión del Mapa Geológico de España*, XXVIII, 9-29.
- Rubio, C., Villasante, E. and Kindelán, A. 1908. Estudios hidro-geológicos. Provincia de Toledo. Zona del Alberche y Guadarrama, en la cuenca del Tajo. *Boletín de la Comisión del Mapa Geológico de España*, 29, 139-325.
- Rubio, C. and Kindelán, A. 1909. Contribución al estudio hidro-geológico de la cuenca del Tajo. *Boletín de la Comisión del Mapa Geológico de España*, 30, first issue, 11-27.
- Rubio, C. and Kindelán, A. 1909. Apuntes para la Hidrogeología subterránea del Llano de Barcelona. *Boletín de la Comisión del Mapa Geológico de España*, 30, second issue, 1-10.
- Adán de Yarza, R. and Rubio, C. 1910. Congreso Internacional de Geología celebrado en Estocolmo en 1910. *Boletín de la Comisión del Mapa Geológico de España*, 31, 3-185.
- Rubio, C. 1911. Notas para el estudio geológico-minero de Gueyaya (Marruecos). *Boletín de la Comisión del Mapa Geológico de España*, 32, 33-165
- Rubio, C. 1913. Medidas legislativas que deben proteger la explotación de aguas medicinales y subterráneas en general. *Revista Minera, Metalúrgica y de la Ingeniería*, 64, 513-516, 525-527 and 537-540.
- Rubio, C. 1913. Sales potásicas de Cataluña. *Boletín de la Comisión del Mapa Geológico de España*, 34, 173 pp. (There is also an abstract of this paper printed by Imp. Antonio Marzo. Madrid. 62 pp.).
- Rubio, C. 1917. Extracto del informe de la investigación de sales potásicas en la zona reservada al Estado en las provincias de Barcelona y Lérida. *Boletín Oficial de Minas y Metalurgia*, sep. 1917, 35-53.
- Rubio, C. and Marín, A. 1918. Sales potásicas de Cataluña. *Boletín de la Comisión del Mapa Geológico de España*, 39, 1-36.
- Rubio, C. and Marín, A. 1919. *Katalinische Kalisalze, von César Rubio und Agustín Marín*. Übersetzt von Dr. Willy Mayer. Druck von R.S. Herman, Berlin, 38 pp.
- Rubio, C. 1922. Ilmo Sr. D. Luis Mariano Vidal. *Memorias del Instituto Geológico*. Tomo IV.
- Rubio, C. 1930. *Prefacio y bibliografía geológica de España*. XIV Congreso Geológico Internacional. París, junio de 1930.
- Rubio, C. and Piña, S. 1930. Criaderos de estannina en la provincia de Cáceres. *Boletín de la Comisión del Mapa Geológico de España*, 52, 52 pp.

REFERENCES

- Anonymous 1924. Obsequio a d. César Rubio. *Revista Minera, Metalúrgica y de la Ingeniería*, 75, 641.
- Anonymous 1925. La Presidencia del Consejo de Minería, y Conferencia de D. César Rubio. *Revista Minera, Metalúrgica y de la Ingeniería*, 76, 434
- Anonymous 1926. La Asociación de Minas y D. César Rubio. *Revista Minera, Metalúrgica y de la Ingeniería*, 77, 314, 343, 361, 389, 409, 437, 457, 568, 601 and 665.
- Anonymous 1926. R.D. de gracias al Presidente, Secretario y Vocales de la Junta del Congreso Geológico, y R.O. sobre asistencia de los ingenieros de minas al Congreso Geológico. *Revista Minera, Metalúrgica y de la Ingeniería*, 77, 157 and 388.
- Anonymous 1933. *César Rubio y Muñoz*. Apéndice Encyclopaedia ESPASA, 1933, Tomo IX, 474-475.
- Carvajal Quirós, J. and Carvajal Gómez, D.J. 2000. *Crónicas y curiosidades de cuatro generaciones mineras*. Ed. Col. Ingenieros Técnicos de Minas de Huelva. Punta Umbría, Huelva, 437, 71-72.
- Castillo Martos, M. and Lang, M.F. 1995. *Metales preciosos. Unión de dos mundos. Tecnología, comercio y política de la minería y metalurgia iberoamericanas*. Ed. Muñoz Moya Montraveta, Sevilla-Bogotá, 324 pp.
- Gómez Alba, J. 1992. *Luis Mariano Vidal (1482-1922). Selección de obras. Biografía*. Ed. Generalitat de Catalunya (Dirección Gral. de Energía)-Museo Martorell-ITGE. Barcelona, 178 pp.
- López Azcona, J.M. and Messeguer Pardo, J. 1964. *Contribución a la historia de la geología y de la minería españolas*. Instituto Geológico y Minero de España, Madrid.
- Maffei, E. 1877. *El centenario de la Escuela de Minas*. Ed. Escuela Especial de Ingenieros de Minas, Madrid.
- Marín, A. 1931. D. César Rubio y Muñoz. *Revista Minera, Metalúrgica y de la Ingeniería*, 82, 88-90.
- Puche Riart, O. 2000. La ciencia y la tecnología del agua subterránea. In *Historia de la Tecnología en España* (Ayala Carcedo, F., Ed.). Ed. Valatenea. Barcelona, I, 192-202.
- Sánchez Picón, A. and Pérez de Perceval, M.A. 2001. *El plomo en la minería española del siglo XIX. Evolución del sector y panorama empresarial*. Fundación Empresa Pública, Madrid.