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Andrés Manuel DEL RÍO's (1764 – 1849) Translation of LANGSDORF's *Hydraulik*, Freiberg, 1790

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Santiago RAMÍREZ, first comprehensive biographer of Andrés DEL RÍO (1764 - 1849), listed in 1891 all of his unpublished works about geology, mineralogy and mining: his *Arte de minas*, written ca. 1798, about mining technology; his translations of Johann Friedrich LEMPE's *Markscheidekunst*, started on 1802, and Abraham Gottlob WERNER's *Neue Theorie von der Entstehung der Gänge*, most likely worked in the 1790's.¹ A recent finding on the Archivo Histórico del Palacio de Minería shows that there was at least one important missing manuscript from the list.²

While still a student in Freiberg in 1790,³ DEL RÍO translated into Spanish Carl Christian von LANGSDORF's *Versuch einer neuen Theorie hydrodynamischer und pyrometrischer Grundlehren und deren Anwendung auf die Anlage Röhrenleitungen, Pumpenkünste, Wassersäulen und Dampfmaschinen*.⁴ The resulting work, *Ensayo de una nueva teoría hidrodinámica y pirométrica con su aplicación a las máquinas que se usan en las minas* is almost 100 paper folios long. DEL RÍO changed the scope lightly to a text specifically related to mechanics in mining. There are some addenda to the translation, some mathematical deductions not given by LANGSDORF are written down by DEL RÍO. There are even five new chapters written "by the translator" regarding discussions over water wheels and pumps for mines; the "expanded" translations were a specialty DEL RÍO's. For example Dietrich KARSTEN's *Mineralogische Tabellen* (Berlin, 1800; translation published in Mexico, 1804) in Spanish is twice as long as the German original, DEL RÍO included several minerals found in America and some chemical data obtained by himself.

The *Versuch* is DEL RÍO's earliest translation found to date and shows his mathematic and language skills, but also notes his interest on the water column machine, one of which was installed in Real del Monte (state of Hidalgo) in 1802. His marginalia on this section of LANGSDORF's work is worth a chapter.

There are also some pieces of paper with mathematical deductions written in German, which might have been part of the discussions held during the translation by DEL RÍO and some of his colleague students like Dietrich KARSTEN, even Alexander VON HUMBOLDT, or still with professor Johann Friedrich LEMPE. On a note by DEL RÍO we can see a table of data presented by LEMPE on his class.

The manuscript was miscataloged in our archive as if it was written in 1844 due to a paper folder stating its selling price on that date. It seems that DEL RÍO sold some of his books and papers a few years before his death and that the School of Mines bought it from a book seller in Mexico City. DEL RÍO believed that almost no one in Mexico was interested in mineralogy and because of that he considered in his will that all of his papers were valueless.

¹ Santiago Ramírez, *Biografía del Sr. D. Andrés Manuel DEL RÍO, primer catedrático de mineralogía del Colegio de Minería, México, Imp. Del Sagrado Corazón de Jesús, 1891.*

² A set of differential equations on a german manuscript drew the attention of Ruth LÓPEZ ALEJANDRE, historian of mathematics. She showed them to me and a brief analysis showed what the main content was.

³ The translation is signed "El 16 de mayo de 1790 a las 12 y ½ de la mañana. Río".

⁴ Carl Christian von LANGSDORF, *Versuch einer neuen Theorie hydrodynamischer und pyrometrischer Grundlehren und deren Anwendung auf die Anlage neuer Röhrenleitungen, Pumpenkünste, Wassersäulen und Dampfmaschinen*, Frankfurt und Leipzig, bey Krieger dem jüngern, 1787. LANGSDORF published several works on mechanics, hydraulics, mathematics and mineral salt extraction.

The mathematical knowledge required for the understanding of LANGSDORF's work was infinitesimal calculus. As DEL RÍO arrived in Mexico City on 1794, students at the School of Mines were taught algebra and geometry. He started writing his textbook *Arte de minas*, heavily based on DELIUS' *Anleitung zu der Bergbaukunst* (Vienna, 1773).⁵ Nonetheless he added mathematical formulas and deductions for waterpumps and other mechanical devices. By the time he studied in Freiberg, LEMPE included these subjects on his lessons and DEL RÍO had vast experience with them due to his *Versuch's* translation. This manuscript together with his 1802 translation of LEMPE's *Gründliche Anleitung zur Markscheidekunst* (Leipzig, 1782) show that after his arrival in Mexico, student's curricula in mathematics needed differential and integral calculus as a part of it.

DEL RÍO's interest on mathematics and mechanics were the precedent to make Antonio DEL CASTILLO, his successor as professor of mineralogy in the School of Mines, to create a separate course on "Industrial mechanics" - although DEL RÍO disagreed with the idea - and to propose the creation of a "practical" School of Mines, which later on was founded on Fresnillo (State of Zacatecas) in 1853.

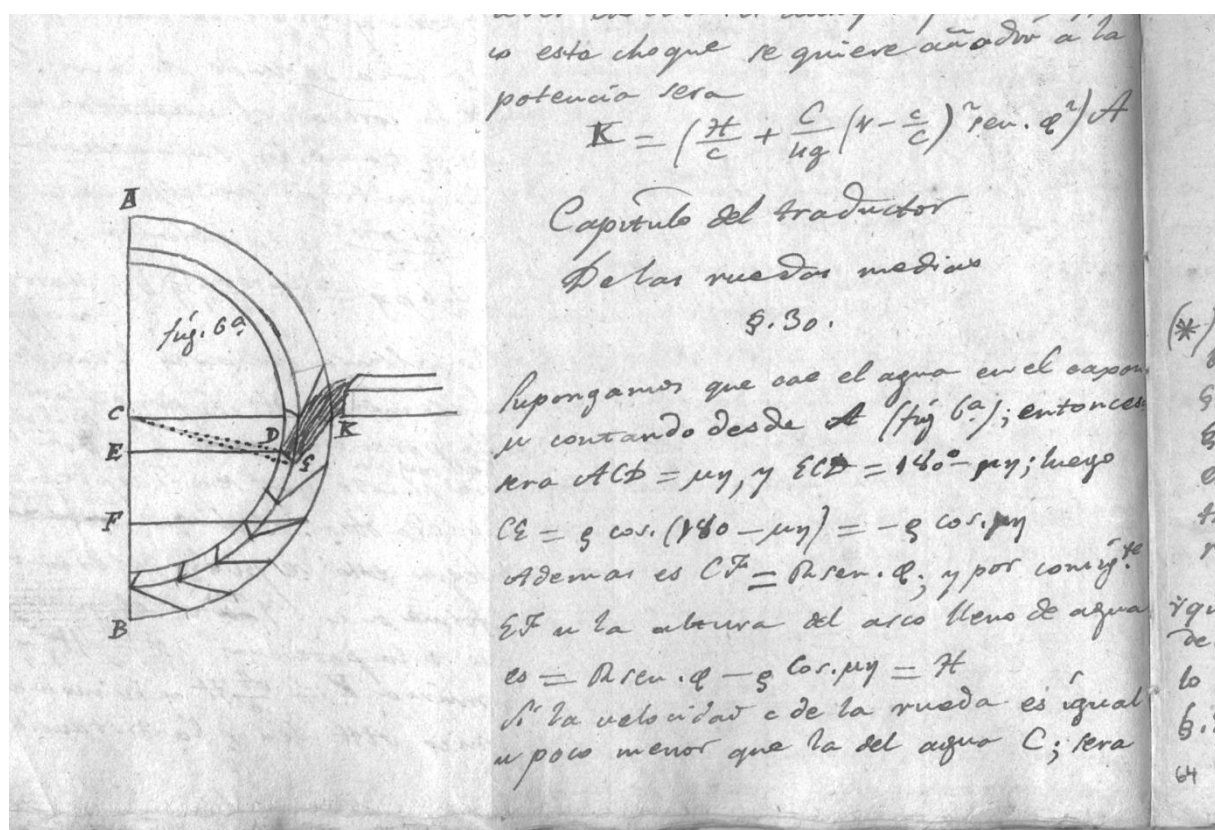


Fig. 1: Breastshot Water Wheel drawing and explanation in a chapter written by DEL RÍO

⁵ Omar ESCAMILLA, *Arte de minas*, an Unpublished Treatise by Andrés DEL RÍO, ca. 1800. Conference presented on the 11th Erbe Symposium, Mexico, 2011.

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