

Agustín de la Torre and the beginning of Physics in Venezuela: a historical approach to the beginnings of technical and scientific thought in Venezuela

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Abstract: Tracing the beginning of development scientific thought in Venezuela, particularly in Physics, allow to account imperative need to preserve academic-scientific formation of Venezuelan society in 21st century. The studies of the Venezuelan historians Rafael Balza and Yajaira Freites (Balza 2017) (Freites 1997) allow to account efforts of Agustín de la Torre to insert, in Venezuelan society of 18th century, teaching, research, divulgation and application of modern physical sciences initiated in Europe, marking the beginning of development of eighteenth-century Venezuelan technical and scientific thought. It should be noted that the historical study of Agustín de la Torre is a complicated due to scarce documentation and cultural complexity of eighteenth-century Venezuela. The contribution of the present study is to show the difficult origins of the physical sciences in Venezuela and the importance of their preservation today. If we observe the innumerable and tireless efforts of Agustín de la Torre to develop the study and application of research and teaching of experimental physics in Venezuela, and the Venezuelan physics success in the 20th and 21st centuries, we can understand the current importance of preserving physics in Venezuela. Unfortunately, Science in Venezuela is currently at risk. The historical analysis about Agustín de la Torre's contributions gives an account of the origin of physics studies in Venezuela and of the complex situation experienced in the the scientific and social context of the country to develop Science.

Keywords: De la Torre, Physics, Venezuela, Scientific thought.

1. Introduction

Mathematics is for Newton the language of nature that organizes the physical experience of the world. This Newtonian idea is followed by Agustín de la Torre (1750-1804) in his *Economic Speech: love of letters, agriculture and commerce* (1790) presented at the University cloister as rector of the Royal and Pontifical University of Caracas. In this speech, De la Torre show the importance of mathematics for the efficient mastery of the physical knowledge of the world. Now, what motivates Juan Agustín de la Torre to introduce scientific knowledge, namely physics and mathematics in the Venezuelan Society of the eighteenth century? A lot has to do with the motivation of man in doing science: the immanent desire for knowledge to respond to different problems.

2. Physics in Venezuela and its beginnings. Century XVIII

In the collection of “Medieval History Issues” by Gerardo Rodríguez (2015, p. 20) the ideas of French historian Jacques Le Goff are collected who argues that European Middle Ages does not culminate in 1500, otherwise continues until beginning of the Industrial Revolution around 1750. Following these ideas, we find as example the periphery of Spain’s colonial empire in Americas, namely, provinces of Venezuela or Caracas, Nueva Andalucía or Cumaná, Margarita, Guayana, Trinidad and Maracaibo where the development in physics and mathematics start late.

This languid interest, for knowledge of Science, is aroused in landowners and merchants for their search for useful knowledge for agricultural and commercial development of Venezuelan provinces. Rafael Balza (2017, pp.3-36) establish that beginnings of physics in Venezuela are of a purely experimental nature, oriented only to satisfy demands in the commercial, agricultural and economic activity. In this sense, physics as disciplinary study, found strong obstacles to be incorporated in eighteenth century inside of academic institutions of Caracas colonial culture, such as Royal and Pontifical University of Caracas, Franciscan Convent of Caracas or Academy of Geometry and Fortification. These institutions was under scholastics teachings.

Thus, for example, at Royal and Pontifical University of Caracas, the chairs taught were ethics, law, grammar, rhetoric, music, Latin and theology following the ideas of Aristotle, St. Thomas and Don Scouts. The teaching obeyed the orders of Dominicans and Franciscans where physics and mathematics were not part of instruction. In this way, the first university students, although knew Latin and Spanish grammar, and graduated in law or medicine, had few notions of mathematics and physics (Freites 2000, pp. 9-37).

This reaffirms the “ideological” and institutional context of 18th century Venezuela, where Catholic Church has academic-university power, Aristotelian-Thomistic study dominates the curricular contents around what is taught as *Physica*, and Spanish Crown has political-social control deciding what type of educational institution can be created (Balza 2017, pp. 3-36). However, we can distinguish two factors that minimize the intrusion of religion on issues of physical nature: 1) the new political project promoted by Bourbons and the critics of scholastic thinking, and 2) interest of some professors of Royal Pontifical University of Caracas in usefulness of experimental physics, promoted by presence of mathematical and physical studies at Academy of Geometry and Fortification of Nicolás de Castro (1710-1772) and greater access to modern or illustrated literature through specialized books or encyclopedias, knowledge and “construction” of technical instruments under physical principles (Kuethe 2018).

In this way, at end of 18th century, modern or enlightened thinking was gaining strength within university disputes. In many cases displacing the Aristotelian-Thomistic authority and taking distance from scholastic philosophy and religion. Thus, we find two facts that reaffirm this turn: 1) in 1763 the cloister authorized the doctor Lorenzo Campíns y Ballester (1726-1785) to found the first chair of Medicine, and 2) Carlos III in October 21, 1765 decreed the creation of the chair of mathematics. Although it was not established (due to problems of financial resources) the opening towards the incorporation of studies in science had taken a first step.

In 1788, the new philosophy or modern science arrived at University of Caracas through Chair of Philosophy that was governed by the religious Baltasar de los Reyes Marrero (1752-1809). Marrero studied philosophy and obtained his Doctor of Theology degree from the University of Caracas. He introduced, as part of studies of philosophy, the notions of arithmetic, algebra and geometry because they were considered indispensable so that students could intelligently face the studies of physics and theology. Soon Marrero's teachings aroused suspicion.

In 1789 he was involved in a complaint against the scholastics of the University who accused him of teaching doctrines contrary to the King and of not explaining the physics of Aristotle in accordance with the provisions of the constitutive acts of the University. Also, the against of the parents of his students denounced him and sued him before the King for explaining strange and incomprehensible matters. According to historical reconstructions made by Leal (1963, pp.144-151) and collected by Y. Freites (2000, pp.9-37), Caracas University was divided between those who considered that Marrero should teach mathematics as a prerequisite to understand modern philosophy, and those who thought that he should do it faithfully to Aristotle. At the same time, the usefulness or not of mathematics for the knowledge of philosophy was discussed.

The litigation against Marrero ended when the King of Spain determined in 1791 that the notions of algebra, geometry, and arithmetic were taught to students who wished to receive them. However, Marrero had separated from the Chair in 1789. His successors Francisco Pimentel, Rafael Escalona and Alejandro Echezuria continued with their ideal of making known the philosophical ideas of modern thinkers, studying mathematics and physics, and to familiarize Venezuelan students with the scientific instruments of the time (Limardo 1949, p.345). At same time, the rector of University of Caracas between 1790-1791 the Dr. Juan Agustín de la Torre (1750-1804), proposed the idea of creating or in any case re-founding a chair of mathematics. De la Torre wrote in 1790 a speech that constitutes one of the earliest manifestations of enlightened thought in Venezuela. In that speech, Torre said that "... no nation has made progress of consequences for weapons, for the arts, agriculture and commerce until it has been delivered to the indispensable cultivation of science" (De la Torre 1790).

3. Juan Agustín de la Torre and Experimental Physics in Venezuela

Juan Agustín de la Torre was born in 1750, at the beginning of the Industrial Revolution in a remote city west of the Province of Venezuela, called San Juan Bautista del Portillo de Carora (founded in 1569). Son of a native of Tenerife, Don Juan de la Torre Sánchez and a native from the first settlers and conquerors of Tierra Firme, Mrs. Juana Paula de Urrieta. On several occasions he held the position of Ordinary Mayor of the city. It was kept with two small farms of smaller cattle or also called "cattle of the poor". Very young he was sent to Caracas to study at Seminary of Santa Rosa. In 1766 he wore the scholarship for five years. In June 1772, Dr. Domingo de Berroterán requested for him to Rector of the Royal and Pontifical University of Caracas, one of the tassels (badge for graduates) only for the students that show virtue, poverty, literature, and acquaintance quality. When

he took possession of Rectorate of the University of Caracas in 1789 he defended the creation of new chairs based on the revolutionary ideas of Descartes (1596-1650), the experimental inductive method proposed by Francis Bacon in the *Novum Organum* (1620), the proposal for unification of physics of Galileo and Kepler by Isaac Newton (1642-1727). Following his ideas, De la Torre proposed the creation of a Mathematics Academy to teach useful sciences. On April 25, 1790, Dr. Juan Agustín delivered his very famous economic speech, "Love of Letters in relation to Agriculture and Commerce" (De la Torre 1790), sharing the most advanced ideas with Baltasar de los Reyes Marrero. Stresses De la Torre, the idea that the University educates people for functions other than priesthood and jurisprudence. He sustained the need to consider the different vocations of young students in the province who saw their study possibilities limited to the traditional careers. This argument was useful to propose the study of mathematics in the University.

4. Juan Agustín de la Torre and the Royal Consulate of Caracas: Establishment of Experimental Physics in Venezuela

The Royal Consulate of Caracas was created in 1785 but began operating in 1793. It was part of the administrative reforms of the Bourbons in Venezuelan territory. It was composed of merchants and landowners from the provinces of Caracas. This alliance - owners and merchants - led to the search for useful knowledge aimed at economic progress, which resulted in the institutionalization of experimental physics in Venezuela. Among many of its functions, the Consulate was responsible for improving communication channels for internal and external trade, monitoring the existence of skilled labor and tools for cultivation and land improvement. These issues raised that the Consulate had to face problems whose solution was associated with the domain and application of knowledge. In this way, some of the ideas raised by De la Torre in 1790 were well received (Freites 1997, pp.165-191). De la Torre was appointed by the King as Legal Advisor of the Royal Consulate of 1793-1801. In the Consulate Acts it is possible to see the concerns about the search for techniques and their use. The interest is focused on the management of tools and / or the knowledge of processes of elaboration of sugar cane and cotton products. These documents show the different instruments designed under physical principles, for example:

- a) request by the landowner Don Domingo Ascanio of a series of experiments on the methods of sugar cooking, under the construction of burners according to the method adopted in the West Indies
- b) in 1797, the Consulate convened those who used cotton presses in order to know details of the operation and learn about the qualities of the product
- c) the Consulate agreed in 1810 to build a water lift machine designed by the engineer Juan Pirés. (Leal 1954, pp.83-167)

The lack of men with useful knowledge, made that the members of Consulate considering creating an institution where youth were instructed in Mathematics and communicating the necessary knowledge related to agriculture, fortification, etc. Humboldt's visit to Caracas in 1799 would have helped the members of Consulate to give a definitive form to the idea of creating a math academy through several arguments in a letter written in January 1800 and addressed to Dr. José Antonio Montenegro. The letter dealt with the Consulate's project to financially support a mathematics chair, presented to the King. Humboldt indicated that, given the natural wealth of the province of Caracas, youth not only had to be instructed in mathematics, but also should be trained in knowledge related to agriculture and the arts, hence argues the need to include physics and chemistry. Later, Humboldt says that, given the needs of the province, the professor of chemistry and physics would be more necessary than that of mathematics. Finally, Humboldt advises that the best-known scientific instruments be bought in Europe without which the knowledge of the new professors would be useless. At the end of 1804, the Consulate asked the King to approve the creation of the Academy. In April 1805, the sovereign denied the request, based on the insufficient funds of the Consulate. The King did not ignore the importance of the Academy. What reason then the negativity? According to Freites, the King's behavior was due to the possible rivalry with another colonial institution: the Royal and Pontifical University of Caracas, which had a monopoly on knowledge and was not willing to lose it (Freites 1997, pp. 165-191). The failure of the project of Academy of Mathematics and Physics and Chemistry has been explained by many historians (Arcila Farías, Yajaira Freites and I. Leal). On the one hand, as a product of the game of intrigues and rivalries between colonial institutions, and on the other as a manifestation of different perceptions about education by the elite. Already at the end of the 18th century, the Enlightenment was perceived by the Spanish Crown as a double-edged sword. Carlo IV was a King who acted cautiously in following the reformist policies carried out by his father Carlos III, but at the same time he saw with restlessness the revolutionary events in neighboring France. Finally, in 1830, the Military Academy of Mathematics (1830-1870) was founded to study the applications of mathematics to civil works and the science of war. Its first director was Juan Manuel Cajigal (1803-1856) who had studied at the Alcalá de Henares Academy, thus forming the first engineering school in Venezuela, and starting the first technical elite in the country.

Bibliography

- Balza, R. (2017). "La Física Moderna en la Sociedad Caraqueña de finales del siglo XVIII entre la matemática y la técnica". *Revista Electrónica Latinoamericana de Estudios Sociales, Históricos y Culturales de la Ciencia y la Tecnología*, 1, pp. 3-36.
- Blanco, R. (1956). *El conquistador español del siglo XVI*. Madrid: Edime.

- Cañizales, F. (2007). "Vida y pensamiento de Juan Agustín de la Torre", in Torres H. (Comp.), *Juan Agustín de la Torre, un ilustrado venezolano: esbozo biográfico*, Barquisimeto: Universidad Centroccidental Lisandro Alvarado.
- Cortés, L. (2007). *El universo conceptual del Doctor Juan Agustín de la Torre (1750-1804)*, in Torres H. (Comp.), *Juan Agustín de la Torre, un ilustrado venezolano: esbozo biográfico*, Barquisimeto: Universidad Centroccidental Lisandro Alvarado.
- Cortés, L. (1997). *Del Colegio La Esperanza al Colegio Federal Carora (1890-1937)*. Carora: Buría.
- De la Torre, J. (1790). *Discurso económico, amor a las letras en relación con la agricultura y el comercio*. (1790). Leal I. (Comp.) *El primer periódico de Venezuela y el panorama de la cultura en el de siglo XVIII*. Caracas: Academia Nacional de la Historia.
- Freites, Y. (1997). "El problema del saber entre hacendados y comerciantes ilustrados de la provincia de Caracas-Venezuela (1793-1810)". *Dynamis*, 17, pp. 165-191.
- Leal, I. (2002). *El primer periódico de Venezuela y el panorama de la cultura en el de siglo XVIII*. Caracas: Academia Nacional de la Historia.
- MacIntyre, A. (2001). *Tras la virtud*. Barcelona: Crítica.
- Picón, G. (1968). *Nacimiento de Venezuela intelectual*. Mérida: Universidad de Los Andes.
- Picón, M. (1987). *De la conquista a la Independencia y otros estudios*. Caracas: Monte Ávila Editores.
- Unamuno, M. (1945). *En torno al casticismo*. Buenos Aires: Espasa-Calpe.