

An Impressive 17th-Century Viceregal Earthenware

New Research Perspectives from a Painting of Juan de Espinosa

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Abstract

Very little is known about the production of scientific instruments in the viceroyalties of New Spain and Peru between the 16th and 17th centuries, and even less about the use of ceramics in this area. Nevertheless, this was not the case for the *búcaros de Indias*. These beautiful artefacts were made in the Modern Age in Latin America, and those of Tonalá, a Mexican production active since pre-Columbian times, were the most famous. This essay explores the origin of hydromechanical artefacts in Spanish America, starting with analysing a still-life painting by Juan de Espinosa, recently sold at an auction. Espinosa's table fountain reveals some interesting facts. First, these objects were part of the Baroque representation of conviviality. Second, their creation came from research and experiments on air pressure. The best known were those described by Hero of Alexandria, Giambattista Della Porta and Cornelis Drebbel, the inventor of the "Perpetuum mobile."

Keywords

New Spain – earthenware – air pressure experiments

1 Introduction: Some Considerations on the Materiality of Science in the Viceroyalty of New Spain¹

Scholars have extensively researched the history of Latin America during the centuries of Spanish rule. However, one critical area that remains largely unexplored is the visual and material developments in the history of science within this region.² By delving into these aspects, researchers can gain valuable insights into the development and transformation of experimental knowledge across different regions of Latin America over time. Therefore, this study aims to lay the groundwork for further exploration of the material and visual dimensions of the history of science in the Spanish colonies of Latin America. This article focuses on analysing a painting by the Spanish artist Juan de Espinosa (active between 1628 and 1659), known for his expertise in the *bodegón* genre: iconographic works like Espinosa's painting are particularly valuable as they provide evidence of the presence and production of scientific artefacts in these territories. Consequently, examining such visual sources and compare the depicted instruments with other similar items can help us uncover the materiality of science within the intellectual and cultural context of the polycentric Spanish Empire.

Throughout the 17th century, the so-called “scientific revolution”³ led to advancements in natural philosophy that also arrived in New Spain's viceroyalty.⁴ Proof of this is the establishment of several important Jesuit colleges and universities, like the *Real y Pontificia Universidad de México*. This univer-

1 See American Visionary: The Collection of Mrs. John L. Marion, Master Paintings and Sculpture—Part II, Lot no. 527, Juan de Espinosa, “Still Life with a Tonalá Earthenware Vessel,” Sotheby's, New York. Auction closed on 27 January 2023, <https://www.sothebys.com/en/buy/auction/2023/master-paintings-and-sculpture-part-ii/still-life-with-a-tonala-earthenware-vessel>, accessed March 6, 2025.

2 Juan José Saldaña, “La historiografía de la tecnología en América Latina: contribución al estudio de su historia intelectual,” *Quipu, Revista Latinoamericana de Historia de las Ciencias y la Tecnología* 15, no. 1 (2013): 7–26.

3 On the subject, see Steven Shapin, *The Scientific Revolution* (Chicago: University of Chicago Press, 1996); Lawrence M. Principe, *The Scientific Revolution: A Very Short Introduction* (Oxford: Oxford University Press, 2011).

4 For a summary of the state of natural philosophy in Mexico during the seventeenth century, cf. Elías Trabulse, *Historia de la ciencia en México* (México: Fondo de Cultura Económica, 1994), 48–88. Regarding the context of the American colonies, cf. Antonio Barrera-Osorio, *Experiencing Nature: The Spanish American Empire and the Early Scientific Revolution* (Austin: University of Texas Press, 2006); José Cañizares-Esguerra, *Nature, Empire, and Nation: Explorations of the History of Science in the Iberian World* (Stanford: Stanford University Press, 2006).

sity was home to many active scholars, including those who did not follow the peripatetic tradition. Among them, we find the famous astronomer Diego Rodríguez (1596 ca.–1668), a native of Atitalac who held the chair of *Astrología y Matemáticas*.⁵

There are many studies regarding the production of scientific texts in the American viceroyalties,⁶ the role and presence of religious orders,⁷ and themes related to natural history.⁸ These studies trace their roots back to the acclaimed expedition of Doctor Francisco Hernández (1515–1587)⁹ and the study activities in the Spanish West Indies.¹⁰ However, with the partial exception of mining technologies,¹¹ there is still a lack of information regarding the local production of the instruments that supported these activities, particularly in physics and mechanics.¹² Nevertheless, there were undoubtedly specific locations, talented

- 5 Rodríguez supported certain heterodox positions, such as the corruptibility of the celestial world, which differed from the classical Aristotelian axioms in certain points. On this interesting figure, cf. Elías Trabulse, “Un científico mexicano del siglo XVII: Fray Diego Rodríguez y su obra,” *Historia Mexicana* 24, no. 1 (1974): 36–69.
- 6 Yari Pérez Marín, *Marvels of Medicine. Literature and Scientific Enquiry in Colonial Spanish America* (Liverpool: Liverpool University Press, 2020).
- 7 Thomas M. Cohen, Jay T. Harrison, and David Rex Galindo, eds., *The Franciscans in Colonial Mexico* (Norman: University of Oklahoma Press, 2022); Perla Chinchilla and Antonella Romano, eds., *Escrituras de la modernidad. Los jesuitas, entre cultura retórica y cultura científica* (México: Universidad Iberoamericana, 2008); Isabel Madaleno, “Medicinal Flora and the Jesuits in Latin America (xvi–xvii Centuries),” *Archivum Historicum Societatis Iesu* 84, no. 167 (2015): 111–147; María C. Torales Pacheco, “Los jesuitas novohispanos y la naturaleza en el siglo xviii,” in *El saber de los jesuitas, historias naturales y el Nuevo Mundo*, ed. Luis Millones Figueroa and Domingo Ledezma (Madrid: Iberoamericana, 2005), 195–224.
- 8 Sabina Brevaglieri, “Il cantiere del Tesoro Messicano tra Roma e l'Europa. Pratiche di comunicazione e strategie editoriali nell'orizzonte dell'Accademia dei Lincei (1610–1630),” in *Sul Tesoro Messicano e su alcuni disegni del Museo Cartaceo di Cassiano del Pozzo*, ed. Sabina Brevaglieri, Luigi Guerrini, and Francesco Solinas (Roma: Edizioni dell'elefante, 2007), 1–65; see also the numerous writings on the theme by Bruno Giovanni Parodi Callejo.
- 9 Francisco Hernández, *Quatro Libros de la Naturaleza y virtudes de las plantas y animales* (México: en casa de la viuda de Diego Lopez Davalos, 1615).
- 10 David Goodman, “Science, Medicine, and Technology in Colonial Spanish America New Interpretations, New Approaches,” in *Science in the Spanish and Portuguese Empires, 1500–1800*, ed. Daniela Bleichmar, Paula De Vos, Kristine Huffine, and Kevin Sheehan (Stanford: Stanford University Press, 2008), 9–34; José Cañizares-Esguerra, “On Ignored ‘Global Scientific Revolutions,’” *Journal of Early Modern History*, no. 21 (2017): 420–432.
- 11 On this subject, see José Cañizares-Esguerra, “Bartolomé Inga's Mining Technologies: Indians, Science, Cyphered Secrecy, and Modernity in the New World,” *History and Technology* 34, no. 1 (2018): 61–70.
- 12 A first attempt to write a compendium on the development of technology in Mexico was made by Ramón Sánchez Flores, *Historia de la tecnología y la invención en México*:

artisans capable of producing and selling these artefacts, as well as people who imported them from the other side of the Atlantic. To support this theory, we have evidence of rich collections of such objects, as confirmed by a passage in a letter written by Sister Juana Inés de la Cruz (1648–1695), which was repeatedly mentioned in a hagiographic key. In this letter, we discover that the scholarly Mexican nun owned musical and scientific instruments, of which we can see traces in her portrait dating back to 1713 (Fig. 1). After some disagreements arose with the ecclesiastical authorities, they forced her to donate these instruments to the Archbishop of Mexico City, Francisco de Aguiar Seijas y Ulloa (1632–1698). She requested him to sell them together with the volumes of her library and donate the proceeds to charity to symbolize her now total dedication to God.¹³

Regarding the Mexican production of scientific works, we know even less about the philosophical-natural uses of terracotta. Nonetheless, there is an exception: the *búcaros* (or *barros*) *de Indias*. These clay objects, made by local artisans, became famous in the 17th century, when they were especially acclaimed for emitting a pleasant aroma through the water they contained; people could also heat this water with a flame on the bottom of the container. Due to their unique properties, they soon became highly sought-after throughout Europe and often appeared in the *Wunderkammer* of princes and collectors.¹⁴ We can see this already in 1695. That year, Lorenzo Magalotti (1637–

introducción a su estudio y documentos para los anales de la técnica (México: Fomento Cultural Banamex, 1980). However, the volume exhibits a compendious nature, adopting a nationalist and anti-colonialist perspective that extends the chronological boundaries of the work up to the revolution of 1911. Another exception to this theme is the essay by María M. Portuondo, “Cosmography at the Casa, Consejo, and Corte During the Century of Discovery,” in Bleichmar, *Science in the Spanish and Portuguese Empires, 1500–1800*, 57–77. Concerning clockmaking in New Spain, many useful information could be found in Ricardo Uribe Parra, “Indigenous Clockmakers, Schedules, and Quantitative Time in the Spanish Colonies (16th Century),” *Kronoscope* 23, no. 1 (2023): 145–176; id., “Indios anónimos en los albores de la sincronía global: Charcas, Tlatelolco y Zhaoqing en 1584,” *Revista do Programa de Pós-Graduação em História Universidade Federal do Rio Grande do Sul* 30, no. 1 (2023): 1–14.

- 13 Rocio Oviedo Pérez de Tudela, “Sor Juana Inés de la Cruz,” in *Diccionario Biográfico Español de la Real Academia de la Historia*, <https://dbe.rah.es/biografias/5466/sor-juana-ines-de-la-cruz>, accessed February 20, 2024; Kenneth Mills, William B. Taylor, *Colonial Spanish America. A Documentary History* (Lanham: Rowman & Littlefield, 1998), 203–213; Antonio Rubial García, “Las monjas se inconforman. Los bienes de sor Juana en el espolio del arzobispo Francisco de Aguilar y Seijas,” *Tema y variaciones de literatura*, no. 7 (1996): 61–72; Alfredo Aracil, *Juego y artificio. Automatas y otras ficciones en la cultura del Renacimiento a la Ilustración* (Madrid: Cátedra, 1998), 148.

- 14 On búcaros, see Davide Domenici, “Tasting Clay, Testing Clay. Medicinal Earths, Bucaro-



FIGURE 1

Juan de Miranda, *Retrato de Sor Juana Inés de la Cruz*, 1713. Oil on canvas, 198 × 132 cm

Note: In the background, the painter depicted Sor Juana Inés with a bookcase, where on the upper shelf, there are a mechanical clock and a glass ampoule filled with a greenish liquid, probably of alchemical origin. The composition is presented on a sheet that features calculations and geometric figures to indicate the studies and experiments she has conducted, also highlighted by the cartouche painted on the left.

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1712), a philosopher and scholar, second and last secretary of the Accademia del Cimento (1657–1667), wrote some letters to the Marquise Ottavia Renzi Strozzi where he talked about the term *búcaro*. According to Magalotti, the term imaginatively derived from the Oriental word “Bukar,” which he translated as “land of smell.” He believed that the term referred precisely to the *búcaro*’s characteristic of pleasantly perfuming the environment.¹⁵ In his letters, he also mentioned

phagy and Experimental Knowledge in Lorenzo Legati’s Museo Cospiano (1677),” *Cromohs*, no. 22 (2019): 1–16; Beatriz E. Rovira, Felipe Gaitán, “Los búcaros. De las Indias para el mundo,” *Canto Rodado*, no. 5 (2010): 41–80; María C. García Sáiz and María A. Albert de León, “Exotismo y belleza de una cerámica,” *Artes de México, nueva época*, no. 14 (1998): 34–49; Alberto Ruy Sánchez, *Tonalá: Sol de barro* (México: Banca Cremi, 1991).

¹⁵ Lorenzo Magalotti, *Varie operette con giunta di otto lettere su le terre odorose d’Europa e d’America, dette volgarmente bucheri ora pubblicate per la prima volta* (Milano: Giovanni

that some collections, like the Count of Oñate's¹⁶ vibrant one had a consistent amount of these pieces.¹⁷

Probably drawing upon the ancient tradition of Roman *terra sigillata*, *búcaros* were initially crafted in the Iberian world, particularly in Portugal and Spain, with notable production centres in Estremoz, Lisbon, Talavera, and Salvatierra de los Barros.¹⁸ The heart of the subsequent American production of this pottery was in the city of Tonalá, near Guadalajara, which is now part of modern Jalisco State in Mexico. This region has a long history of terracotta making dating back to ancient times, even before the conquest of Mexico (1519–1521) by Hernán Cortés (1485–1547), as shown by several archaeological discoveries. However, during the colonial period, pottery production was changed to suit the Spanish, who introduced new plastic models and techniques in clay processing: this period saw *búcaros de Indias* reach the peak of their glory

Silvestri, 1825), 223–279: “Ora tra queste io trovo il regno di Bukar con la città metropoli dell'istesso nome, posta sul fiume Indo: e trovando in Portogallo la voce *Pucaro* (dalla quale indubitamente la castigliana *Bucaro* e l'italiana *Bucchiero*) per nome d'un vaso di terra d'odore, anderei fantasticando se per avventura il regno potesse aver che fare col vaso in questo modo cioè: che Bukar fosse una voce composta di due dizioni; Bu kar e che volesse dire di, o, dell'odore: per modo che Bukar, regno o provincia, venisse a significare l'istesso che significherebbe in inglese Sent Land, cioè paese, o terra d'odore, o dell'odore: supposta questa denominazione, non avrei niente per improprio il crederla derivata dal trovarsi in quel paese molte vene di terre o di boli odoriferi, come vediamo trovarsene in diverse parti non meno d'Oriente, che d'Occidente, e che di queste in una corte di tanta ricchezza e di tanto lusso come quella del Mogol, si fosse introdotto il formarne diversi vasi di regalo per bere acqua, e per altri ministeri deliziosi.” In a second missive, he also made an interesting reference to supposed “pure elemental evaporations” and stated that the pleasant perfume that escaped would be the result of the interaction between the moisture of the water and the clay, thus representing a kind of primordial odour, second only to that of plants and flowers.

16 Íñigo Vélez de Guevara (1597–1658), count of Oñate, was appointed as viceroy of Naples in 1648, a position he held until 1653. In 1884, his descendants donated the collection to the Museo Arqueológico Nacional in Madrid, from which it was later transferred to the Museo de Américas.

17 On the presence of American objects in Spanish collections, cf. Antonio Urquizar Herrera, “Imaginando América: objetos indígenas en las casas nobles del Renacimiento Andaluz,” *Historia y Genealogía* 1 (2011): 205–221; Marta Cacho Casal, “Imaginando América. Algunas lecturas y objetos americanos en las colecciones de pintores en Madrid,” in *América en Madrid. Cultura material, arte e imágenes*, ed. Luisa Elena Alcalá and Benito Navarrete Prieto (Madrid-Frankfurt: Iberoamericana Vervuert, 2023), 131–149. Additional valuable information can also be found in Cinta Krahe, *Chinese Porcelain in Habsburg Spain* (Madrid: Centro de Estudios Europa Hispánica, 2016).

18 On the different production sites of *búcaros*, see Alfonso Pleguezuelo, “Cerámicas para agua en el Barroco Español: una primera aproximación desde la literatura y la pintura,” *Ars Longa* 9–10 (2000): 123–138.



FIGURE 2

A Tonalá table fountain, Museo de América, Madrid

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and become a true symbol of the colonial Baroque.¹⁹ *Búcaros* come in various shapes, ranging from curvilinear vases with two richly decorated levels, like the one kept at the Metropolitan Museum in New York,²⁰ to simple pottery, bifurcate²¹ or circular flasks, colourful tibors and curious objects linked to water and the world of conviviality. A very fitting example of this last category is a table fountain now kept at the Museo de Américas in Madrid (Fig. 2). This

19 Gilda Hernández Sánchez, *Ceramic and the Spanish Conquest. Response and Continuity of Indigenous Pottery Technology in Central Mexico* (Leiden: Brill, 2012), 29–41; ead., “Indigenous Pottery Technology of Central Mexico during Early Colonial Times,” in *Material Encounters and Indigenous Transformations in the Early Colonial Americas. Archaeological Case Studies*, ed. Corinne L. Hofman and Floris W.M. Keehn (Leiden: Brill, 2019), 284–307; Patricia Fournier García and Cynthia L. Otis Charlton, “Postconquest Technological Innovation and Effect on Ceramic Traditions in Central Mexico,” in *Technology and Tradition in Mesoamerica after the Spanish Invasion*, ed. Rani T. Alexander (Albuquerque: University of New Mexico Press, 2019).

20 <https://www.metmuseum.org/art/collection/search/662163>, accessed July 17, 2023.

21 Interestingly, the lexicographer Sebastián de Covarrubias hypothesised that the term *búcaro* derived from the Greek word βουκερος, which referred to ox horns. See Sebastián de Covarrubias, *Tesoro de la lengua castellana, o española* (Madrid: Luis Sánchez, 1611), 154.

fountain, assembled from various ceramic pieces, consists of five distinct levels. The base—likely placed within a now-lost basin—is topped by three concave dishes interconnected by an internal pipe. The upper two dishes feature small holes designed to allow water to spout and cascade down to the lower dishes, driven by the pressure exerted by air on the water mass introduced into the fountain from above. In this way, a multisensory spectacle was created, engaging sight, sound, and smell, to the delight of the banquet participants.²²

Finally, the *búcaro* also left its mark in the literature and painting of the *Siglo de Oro*. One of the most famous appears in *Las Meninas* (1656), a masterpiece by Diego Velázquez (1599–1660): in the painting, the *Infanta* Margarita Teresa receives a brocchetta from her maid of honour, María Augustina Sarmiento de Sotomayor, on a small silver tray.²³ The *búcaro* was particularly popular among high aristocracy women during the *Siglo de Oro* due to the widespread belief that it possessed medical properties and could have portentous effects on the skin. This belief led to the “bucarofagia” trend, where people ingested fragments of potteries;²⁴ this practice was so widespread that Félix Lope de Vega (1562–1635) famously referenced it in his comedy *El acero de Madrid* (1618).²⁵

2 Earthenware and Natural Philosophy in Juan de Espinosa's *bodegones*

The still life genre in the Iberian area, known as *bodegón*, was the artistic field that celebrated Tonalá's ceramics the most.²⁶ During the 17th century, renowned artists such as Velázquez and Francisco de Zurbarán (1598–1664) created remarkable compositions in this style. Among the most famous, we have the Zurbaranean *Bodegón con cidras, naranjas y rosa* (1633) and the per-

22 Andrés Gutiérrez Usillos, *La Hija del Virrey. El Mundo Femenino Novohispano en el Siglo XVII* (Madrid: Ministerio de Cultura y Deporte, 2017), 429–432.

23 Byron E. Hamann, “The Mirrors of Las Meninas: Cochineal, Silver, and Clay,” *The Art Bulletin* 92, no. 1/2 (2010): 6–35.

24 Natacha Seseña, *El vicio del barro* (Madrid: Ediciones El Viso, 2009).

25 These are the verses written by Lope de Vega: “Niña del color quebrado, o tienes amor, o comes barro. Niña, que al salir el alba dorando los verdes prados, esmaltan el de Madrid de jazmines tus pies blancos; tú, que vives sin color, y no vives sin cuidado, o tienes amor, o comes barro.”

26 The *bodegón* was introduced to Spain at the end of the sixteenth century: Blas de Prado, a pupil of Alonso Berruguete, was the first to attempt this type of painting. On the *bodegón* genre, cf. Ingmar Bergström, *Maestros españoles de bodegones y floreros del siglo XVII* (Madrid: Insula, 1970); Trinidad de Antonio Sáenz, *La Belleza de lo Real. Floreros y Bodegones españoles en el Museo del Prado 1600–1800* (Madrid: Museo Nacional del Prado, 1995).

fectly symmetrical *Bodegón con cacharros* (1650 ca.). The first belongs to the former Contini-Bonacossi collection and is now located in the Norton-Simon Museum in Pasadena, while the second *bodegón* is instead on display at the Prado Museum: interestingly, the *Bodegón con cacharros* features a *búcaro* from Tonalá, the third of the four vases starting from the left.²⁷

Many painters then chose to specialize in still-life paintings, focusing exclusively on inanimate objects: it is precisely here that we often find terracotta artefacts. Among those painters there are Juan Sánchez Cotán (1560–1627), Juan Bautista Espinosa (1590–1641), Tomás Hiepes (1595–1674), Juan van der Hamen (1596–1631), Juan Fernández El Labrador (documented 1629–1657), Antonio de Pereda (1611–1678), and Juan de Espinosa, authors of numerous paintings with *búcaros*. Two paintings are especially important for the purpose of this article: *Naturaleza muerta con objetos de orfebrería* (1624) and *Bodegón con dulces y cerámica* (1627).²⁸ In the first work by Juan Bautista Espinosa, displayed at the Museo de Bellas Artes de Asturias, on the sides of the foreground table appear two Portuguese *búcaros* filled with water.²⁹ The second painting was instead made by van der Hamen, now at the National Gallery of Art in Washington: here, we find a terracotta flask with a particular circular shape.³⁰ This form was already present in pre-Columbian Mexican pottery, as evidenced by examples preserved in museums such as the National Ceramic Museum in Sèvres (inv. no. MNC 4474).³¹ Van der Hamen's flask is also hollow in the cen-

27 Tiziana Frati, *L'opera completa di Francisco de Zurbarán* (Milano: Rizzoli, 1973), 7 and images XX–XXI and XXIVb; Trinidad de Antonio Sáenz, “Zurbarán y la pintura de bodegones,” in *El bodegón*, ed. John Berger (Barcelona-Madrid: Galaxia Gutenberg-Círculo de lectores, 2000), 259–272.

28 On this painting cf. Jonathan Brown, “Still Life with Sweets and Pottery,” in *Spanish Paintings of the Fifteenth through Nineteenth Centuries*, ed. Jonathan Brown and Richard G. Mann (Washington: National Gallery of Art-Cambridge University Press, 1990), 84–86. Brown notes that the flask might be of German manufacture “a *loch*, made in the lower Rhineland,” as Colin Eisler suggested in 1977. However, Eisler himself was referencing a general piece of information he had received from Konrad Strauss. Considering the shape and coloration of the object, as well as the presence of other *búcaros*—likely Mexican—in the painting, it seems implausible that van der Hamen would have included a Rhineland ceramic in the composition.

29 Pleguezuelo, “Cerámicas para agua en el Barroco Español,” 134.

30 On van der Hamen's work, see the volume by William B. Jordan, *Juan van der Hamen y León and the court of Madrid* (London: Yale University Press, 2006).

31 Although these forms recur across different cultures and time periods—making any connection potentially arbitrary—some resemblances are nonetheless intriguing. On the one hand, there are some ring-shaped vases, such as the one likely from the Maya civilization kept in the Sèvres Museum, whose form derived from the sun, the principal deity of the Maya pantheon. On the other hand, there are the so-called stirrup spout vessels, typical

tre and with some shells in relief on its surface. The almost identical *búcaro* also appears in an interesting *Bodegón de flores y frutas* (ant. 1645) by Juan de Espinosa, currently kept at the Louvre in Paris. In this work, resting on a wooden cabinet with the terracotta flask, we find two shells with flowers coming out of one of their cavities, a peach, three rich grape shoots and two birds, one of which is pecking the berries.³²

Unfortunately, we do not have reliable information on this artist's historical background. Nevertheless, Juan de Espinosa should not be mistaken for Juan Bautista or another homonymous Tenebrist painter of religious subjects. According to historical records, during his time in Madrid from 1628 to 1659, Espinosa created some distinctive still lifes: they featured fruit (especially grapes) and came alongside Spanish West Indies terracotta, which is a distinctive feature of his artistic production.³³ One of them, *Bodegón con pájaro muerto* (1651), now in the Prado Museum, is especially interesting (Fig. 3). From left to right, we can observe a double vase in Tonalá terracotta with irregular shapes, a bunch of grapes, a dead goldfinch, and a shell with exotic shapes. Some art historians believe that the work refers to the anecdote of the grapes painted by the Greek painter Zeuxis, while others instead believe it is the allegory of the symbols of Passion.³⁴ In this interpretative key, the *búcaro* would allude to transubstantiation. In contrast, the composition may refer to the four elements: in this case, we could be looking at an attempt to know and repro-

of the Chavín and Moche cultures in Peru, whose handles' shape was likely of zoomorphic origin. These vases featured a circular section that culminated in a spout through which liquids were poured into the vessel. Regarding Moche production, they could also take on articulated anthropomorphic forms, as seen in the famous Moche erotic ceramics. Cf. Margaret A. Jackson, *Moche Art and Visual Culture in Ancient Peru* (Albuquerque: University of New Mexico Press, 2008), 49–132.

32 Eric Young, "New Perspectives on Spanish Still-Life Painting of the Golden Age," *The Burlington Magazine* 118, no. 877 (1976): 203–214.

33 Juan J. Luna, *El bodegón español en el Prado. De Van der Hamen a Goya. Catálogo de la exposición* (Madrid: Museo Nacional del Prado, 2008), 160.

34 Fernando Bouza et al., *Esplendores de Espanha de el Greco a Velazquez* (Rio de Janeiro: Arte Viva, 2000), 228: "La persistencia de elementos que los padres de la iglesia, la literatura, la emblemática y—en fin—la pintura emplean como símbolos religiosos hace pensar que este cuadro de Juan de Espinosa es—antes que una variante irónica de la anécdota de Zeuxis, como lo ha interpretado William B. Jordan en 1985—una alusión religiosa. De manera que el jilguero muerto, como símbolo de la Pasión y de la muerte de Jesús, se corresponde con las uvas, como fruta del vino de la eucaristía en el que se hace patente la transubstanciación, a la que también alude el búcaro mexicano de arcilla sigelada, con el que se aromatizaba el agua, bebida que también se empleaba en la celebración de la eucaristía."



FIGURE 3 Juan de Espinosa, *Bodegón con Pájaro muerto*, 1651. Oil on panel, 23 × 30 cm, Museo Nacional del Prado, Madrid
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duce the natural world in miniature.³⁵ According to this interpretation, the burnt red of the terracotta would represent the element of fire, the grape would represent the earth element, and the shell, likely from the West Indies, would represent the element of water. Finally, at the same time, the lifeless bird in the lower right corner of the painting symbolises air.

Another painting similar to *Bodegón con pájaro muerto* is *Bodegón ochavado con racimos de Uvas* (1646), still by Juan de Espinosa. The painting is from the Rosendo Naseiro collection, currently kept at the Prado Museum. It is an octagonal canvas divided into two sections: in the upper half, Espinosa painted hanging bunches of grapes, while in the lower half, there are various fruits, including a pomegranate and, again, a lifeless bird. Meanwhile, in the background, partially obscured by two apples, we can spot a red terracotta jug, possibly crafted in Estremoz or in the Mexican workshops of Nueva Galicia.³⁶

35 José R. Marcaida, *Arte y ciencia en el Barroco español* (Madrid: Marcial Pons, 2014), 35–43.

36 <https://www.museodelprado.es/en/the-collection/art-work/octagonal-still-life-with-bunches-of-grapes/01ae49ee-6b0b-4fc6-bd2b-774e8defba3e>, accessed January 20, 2024. On



FIGURE 4
 Juan de Espinosa, *Bodegón con fuente, flores y conchas*, 1645. Oil on canvas, 80 × 61 cm
 PRIVATE COLLECTION. PUBLIC DOMAIN

Lastly, we should highlight that the fountain was a characteristic element of Espinosa's production. We are aware of at least two other paintings of a similar nature, likely conceived as *cuadros de gabinete*, which combine both *naturalia* and *artificialia*: a first *Bodegón con fuente y flores*, and a second *Bodegón con fuente, flores y conchas* (Fig. 4). Regarding the second of these Espinosa's magnificent creations, now held in a private collection, it consists of shells from various molluscs arranged to form a fountain with six levels. The composition, also set against a dark background, features a large central valve. Branches of grapes, roses, and peaches emerge from the valve, along with gushing water, while other fruits are laid or hung on the shells below. The water eventually reaches a basin (or a jar) of red terracotta and we can only speculate that there is a ceramic shaft hidden by the various *naturalia* that would allow water to flow onto the shells.

this work, see Javier Portús, *Portrait of Spain. Masterpieces from the Prado* (Brisbane: Queensland Art Gallery, 2012), 162.

3 An Extremely Rare Tonalá Table Fountain in a Juan de Espinosa's Painting

The terracotta shown in Espinosa's painting is unique among the still-life scenes featuring *búcaros* (Fig. 5). It is far more complex and intricate than the simple pitchers, basins, or pots filled with water to perfume the environments we see in other paintings. In this work, Espinosa portrayed a table fountain within a composition between a *bodegón* and a *florero*: this remarkable hydromechanical artefact was a decorative element that—unlike the one kept in the Museo de Américas, which had to be refilled each time—could continuously flow water or wine.³⁷ These unusual instruments complemented the baroque depiction of conviviality, often appearing in the banquets of the most famous and influential European courts. The roots of such devices can be traced back to the ancient mechanical scholars who built automata: famous were the works of Al-Jazar, and especially Hero of Alexandria's *Pneumatica* and *De automatis*.³⁸ These foundational texts significantly influenced engineers of the early Modern Age, as we can see in the works of Lucio Russo and Matteo Valleriani.³⁹ Consequently, we can contextualize the manufacture of table fountains during the first half of the 17th century within this rich intellectual tradition. As another useful term of comparison, we might look at the two table fountains of the Accademia del Cimento, one made of glass and metal and the other in glass and majolica, reusing a rich-decorated Renaissance basin.⁴⁰

Some similarities are also to be found in a particular instrument used by the same group of scholars in some experiments on air pressure, depicted in pen in the Academy's diary.⁴¹ Additionally, staying in a viceregal context, a similarly significant artefact is a yellow-copper table fountain “con arteficio dentro” (with a contrivance inside) mentioned in the 1658 inventory of Marco

37 Stephen N. Fliegel, “The Cleveland Table Fountain and Gothic Automata,” *Cleveland Studies in the History of Art*, no. 7 (2002): 6–49.

38 Silvio A. Bedini, “The Role of Automata in the History of Technology,” *Technology and Culture* 5, no. 1 (1964): 24–42; Aracil, *Juego y arteficio*, 32–67.

39 Lucio Russo, *La rivoluzione dimenticata. Il pensiero scientifico greco e la scienza moderna* (Milano: Feltrinelli, 2001), 156–168; Matteo Valleriani, *Galileo Engineer* (Dordrecht: Springer, 2010), 155–178.

40 <https://catalogo.museogalileo.it/oggetto/Fontana.html>, accessed February 25, 2024; https://catalogo.museogalileo.it/oggetto/FontanaSuAlzata_no1.html, accessed February 25, 2024.

41 Biblioteca Nazionale Centrale di Firenze (BNCF), Florence, Fondo Manoscritti Galileiani, Vol. 261, 13^v.

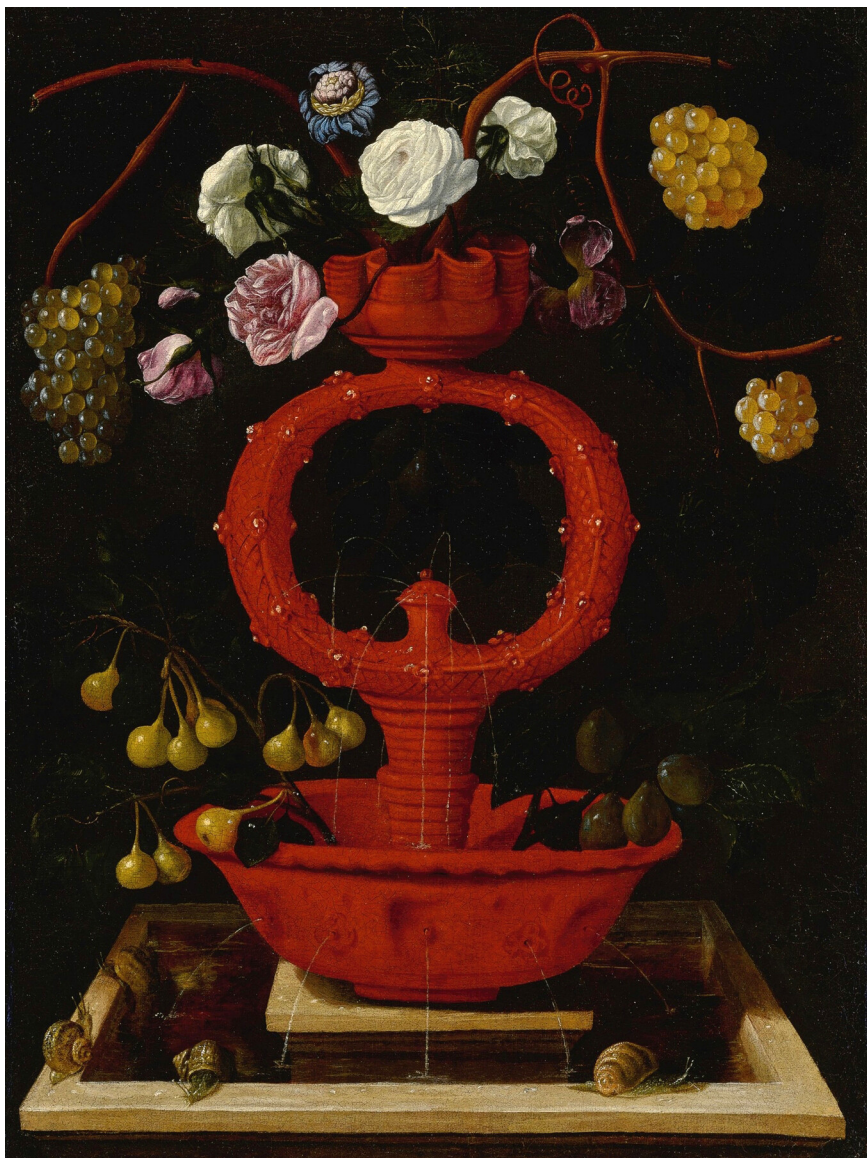


FIGURE 5 Juan de Espinosa, *Bodegón con Fuente de barro de Tonalá*, n.d. Oil on canvas, 80×61cm
PRIVATE COLLECTION. PUBLIC DOMAIN

Gezio's (1584–1658) collection.⁴² Gezio, who was a prominent figure in 17th-century Palermo's intellectual context, had a vibrant collection of paintings, sculptures, scientific books and *mirabilia*. Among the *artificialia*, there certainly stood out a wooden automaton attributed to Albrecht Dürer (1471–1528), another automaton resembling Hero's birds,⁴³ optical illusions painted by the famous Sicilian artist Pietro Novelli (1603–1647), and a table fountain weighing about 14 kg, capable of spraying a jet of water over four meters high. It is also intriguing to note that Gezio's library contained the illustrated 1594 Venetian edition of Hero's *Spiritualium liber*, strengthening the link between the work of the Alexandrian mathematician and the creation, ownership, and use of table fountains in the 17th century.⁴⁴

Focusing now on the table fountain in Espinosa's painting, it stands out for its geometric features, although it is not an imaginative assemblage of *naturalia* as in the case above. At the centre of the composition, there is a single red terracotta element that rests on a rectangular tub made of stone or white marble, with snails crawling on it. The artefact is structured vertically on three levels, mirroring the design principles of Hero's fountain.⁴⁵ On the first level of the fountain, there is a perforated basin decorated with floral motifs that contain pear twigs that extend outward: from these pinholes water flows into the tank. The second level, which is the primary mechanism of the artefact, consists of a circular body resembling the flask depicted by van der Hamen, set atop a conical pedestal with a protuberance filled with tiny flowers. Water gushes from this level in very thin jets into the basin below, creating a delicate and continuous flow that would have been both visually and aurally pleasing. The third and final level of the fountain showcases a small cup shaped like a shell, adorned with colourful flowers and grape vines. Interestingly, Juan de Espinosa preferred to use grapes in his still-life paintings, as we have already seen.

42 Antonino Morreale, *Libri, quadri e "artificiose machine."* *L'inventario di don Marco Gezio Cappellano della Cattedrale di Palermo* (Palermo: Ilà Palma, 1990), 80. The notary recorded: "Una fonte di rame giallo con arteficio dentro che per vento recluso butta in aria un belvedere di acqua all'altezza di p[iedi] quindici di peso l[ibre] ventinove et onze tre."

43 Ibid., 74. "Sei uccelli di piume naturali sopra sei piedistalli che artificiosamente bevono quantità d'acqua."

44 Ibid., 128. "Heronis Alexandrini Spiritualium liber cum figuris Viridarium philosophium aut. Joe Tindolo Venetijs anno 1594."

45 The fountain built by Hero of Alexandria operated as follows: water was poured into the upper cup, and through a small tube, it flowed towards the second level of the artefact. At this point, the water compressed the air inside it, which was then pushed through a second tube into the ampoule above: the air exerts a force on the water that flows through a small nozzle and gushes into the cup. In the end, the fountain's operation continues until the bottom ampoule is fully filled.

The painting's chromatic profile clearly reveals the influence of Spanish tenebrists such as Sánchez Cotán and Francisco de Zurbarán on the *bodegón* genre. The background of the painting is indeed entirely black, while light illuminates the foreground: it gives the painting a metaphysical character, entirely detached from the convivial moment for which the fountain was initially intended.⁴⁶ As a result, the light games emphasize the red of the terracotta, as well as the bright colours of the flowers located high next to the translucent grapes, and the white of the tub where the *búcaro* is.

4 From West to East Indies: Portuguese Resemblances

Two extraordinary blue and white ceramic artefacts, now kept at the Museu Nacional de Arte Antiga in Lisbon, show precise similarities to the table fountain painted by Juan de Espinosa, providing us with a compelling point of comparison (Fig. 6).

These two objects, alternatively identified as flowerpots or incense burners in the museum's records, also date to the first half of the 17th century and were incorporated into the collection through the inventories of the ancient Franciscan monasteries of the city of Lisbon. Unlike Espinosa's fountain, composed of several terracotta components glued together at a later stage, the one at the Museu Nacional is a single piece of majolica. Just above the base is a circular section, topped below by a pinecone-shaped protrusion quite similar to that of the *búcaro*, and, almost symmetrically to the latter, by a cup at the top. The outer surface of the circumference features a decoration of small leaves and hooked-shaped ornaments that give the artefact an upward dynamic. In this case as well, small holes can be seen on both the protuberance and the lower part of the circular section, from which water was likely to gush out scenically. However, this time it was not the terracotta that perfumed the water, which was probably distilled with flowers before being poured into the artefact. Additionally, other flowers could have been placed at the top of the object, similarly to what we can see in Espinosa's painting.

At that time, Portugal, too, following the Iberian Union (1580–1640), was governed by a viceroy appointed by Madrid, thus becoming part of the viceregal world. However, even in artistic production, it maintained its specificities, also derived from the encounter with the cultural traditions of the East Indies. In

46 Norman Bryson, *Looking at the Overlooked: Four Essays on Still Life Painting* (London: Reaktion Books, 1990), 60–135.



FIGURE 6 Two Portuguese ceramic table fountains, Lisbon, first half of the 17th century. 32×22 cm and 31,5×21,9 cm. Inventory numbers 85–86 Cer
COURTESY OF THE MUSEU NACIONAL DE ARTE ANTIGA

this regard, some interesting similarities can be identified with certain Indo-Chinese ceramics, not only in terms of colour but also in terms of shape. On the one hand, the Indian Museum in Kolkata houses an earthen glazed flower vase that closely resembles the table fountains at the Museu Nacional de Arte Antiga. Indeed, there is a protrusion at the base of the circular section of the artefact, which extends up to the neck of the object, forming a sort of vase encased within another vase.⁴⁷ On the other hand, the perforated pinecone shape in terracotta or, more commonly, in bronze is a typical form of Chinese hill censers. These, however, were composed of two pieces, allowing for its emptying. Similarly to what happens in table fountains with water, the holes in the lid allowed the fragrant smoke to escape from inside the artefact.⁴⁸ Following these considerations, it is finally possible to trace the original function of the two artefacts: the Portuguese artisans, in crafting table fountains, combined classical knowledge on air pressure with techniques and forms partially borrowed from Oriental ceramics.

5 Between Hero's *Pneumatics* and Cornelis Drebbel's "Perpetuum mobile"

Moving back to the Western world, it would now be helpful to examine the operational mechanics of these table fountains. The mechanisms rely on the effects of air pressure on the water mass. In the first level of the fountain, the water slowly flows into the tank below through the holes due to the air pressure. On the second level, there is a circular structure with geometric designs and raised floral shapes painted in white. The air pressure pushes the water upwards in the cone, possibly through hidden tubes, and then the water gushes from the raised perforated element. At the same time, the remaining water mass maintains equilibrium in the circle's cavity, gradually decreasing in volume. As the water gushed from the various holes, the liquid level in the shell placed on top decreased gradually and, once the water had ceased to spill from the ledge at the bottom of the circle, it would be topped up from above, ensuring the flow would not stop. Moreover, if the artefact were placed inside a basin, as in the case of Espinosa's painting, it could avoid being refilled repeatedly. In fact, according to Boyle's law, as the volume of

47 <https://indianculture.gov.in/artefacts-museums/flower-vase-62>, accessed September 10, 2024.

48 <https://www.artic.edu/artworks/12069/mountain-shaped-incense-burner>, accessed September 10, 2024.

water in the fountain decreased, the air pressure also decreased, increasing its volume in the circular section, and vice versa. This, in turn, caused the water to rise from the basin, resulting in a balance between air pressure and liquid volume approximately at the level of the higher holes, above which the water did not rise. Thanks to this mechanical device, guests could constantly experience the fragrance that had made *búcaros* famous across the world.

Firstly, we could at this point note a significant resemblance between the table fountain painted by Juan de Espinosa and the illustration engraved on page 19 of the *Spiritualium liber* (1575) by Federico Commandino (1509–1575) (Fig. 7).⁴⁹ It shows an Heronian artefact, while the book is the first Latin translation of the *Pneumatics* by Hero. In the paragraph “De sphaera concava,” the humanist and mathematician explained that the instrument was made of a glass ampoule which was moist inside and pierced at the top to allow the insertion of a small tube. Two curved tubes were placed above it, forming a single tube of circular shape together with a third component on which a nozzle was placed. Then, after clogging the upper terminal of the artefact, it was infused by a further hole on the left side of the vitreous sphere of the air inside it. At that point, the pressure of the air concentrated inside the sphere caused the humidity to rise rapidly, gushing scenically from the top of the instrument. However, the key distinction from Hero’s fountain is that the water in Espinosa’s creation flowed from top to bottom, with the cycle continuing until the lower ampoule was empty. Indeed, this design was intended not only to astonish observers, like Gezio’s table fountain, or to measure air pressure, as with the Cimento’s instruments, but rather to pleasantly perfume the surrounding environment. This comparison also underscores how the principles from Hero’s studies were adapted to diverse purposes during the 17th century.

Secondly, Espinosa’s fountain resembles certain characteristics of another famous scientific air-pressure instrument of the 17th century, the “Perpetuum mobile.” It was a renowned artefact created by the Dutch engineer Cornelis Drebbel (1572–1633).⁵⁰ The main point of contact between the two objects lies precisely in their shape, especially in that central circular section. As revealed by the very name of “Perpetuum mobile,” here the water was in a state of slow but constant movement without there being external mechanical stresses to

49 Federico Commandino, *Heronis Alexandrini Spiritualium liber* (Urbini: Frisolini, 1575), 19.

50 For a biography of Drebbel, cf. Lawrence E. Harris, *The Two Netherlanders: Humphrey Bradley and Cornelis Drebbel* (Leiden: Brill, 1961), 119–224; Gerrit Tierie, *Cornelis Drebbel (1572–1633)* (Amsterdam: H.J. Paris, 1933).

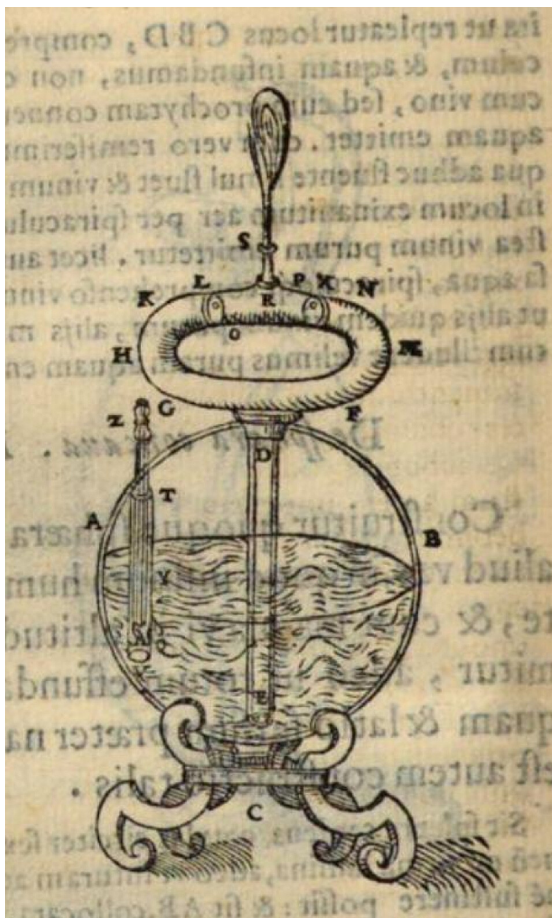


FIGURE 7
Federico Commandino, *Heronis Alexandrini Spirituum liber*
(Urbini: Frisolini, 1575), 19

cause it. Several paintings depict Drebbel's instrument, but the most famous is attributed to the Flemish painters Jan Brueghel the Elder (1568–1625) and Hieronymus Francken II (1578–1623).⁵¹ The device consisted of a metal sphere, sometimes equipped with a quadrant to create a barometric clock. The sphere was in the middle of a circular glass duct and was connected to it by a small tube in its left half. Finally, a hole was drilled on the opposite side of the duct to

⁵¹ *The Archdukes Albert and Isabella Visiting a Collector's Cabinet* (ca. 1621–1623), artwork held at the Walters Art Museum in Baltimore. Other pictorial representations of the “Perpetuum mobile” can be found in some paintings by Willem van Haecht, such as *Interior of the Salon of the Archduchess Isabella of Austria* (1621) or *The Gallery of a Picture Collector* (1630). Regarding the instrument representations in the *cuadros de gabinete*, see also Marcaida, *Arte y ciencia en el Barroco español*, 75–80.



FIGURE 8

Willem van Haecht, *Interior of the Salon of the Archduchess Isabella of Austria*, 1621. Oil on panel, 93 × 123 cm. Norton Museum of Art, West Palm Beach. On the left side of the painting, van Haecht portrayed two noblewomen observing a “Perpetuum mobile” with a quadrant

PUBLIC DOMAIN

allow communication with the outside air. Water was then pumped into the circular part of the duct until it was half-filled: once half of the sphere was full, the volume of air inside changed due to temperature and atmospheric pressure changes, which caused its rarefaction and condensation (Fig. 8). The volume change in the air caused a chain of reactions that determined the movements of the liquid, similar to what happened in the inverted-glass experiment, a well-known experimental proof of the Modern Age, first found in the *Magia naturalis* (1558) by Giambattista Della Porta (1535–1615). In the second of the four books, the Neapolitan philosopher described how a glass ampoule with a long neck was heated, then turned upside down and immersed in a container full of water. When the air inside the ampoule condensed and cooled, the water slowly began to rise up the neck of the flask, thus keeping itself in a constant state of motion as temperatures and pressure changed.⁵²

52 On the subject, see the works of Arianna Borrelli, “Giovann Battista Della Porta’s Construction of Pneumatic Phenomena and his Use of Recipes as Heuristic Tools,” *Centaurus* 62,

After all these considerations, we now have a clearer picture of the fountain depicted by Juan de Espinosa. The rediscovery of Hero and subsequent research and experiments on the effects of air pressure on liquids have resulted in creating an artefact that can provide a delightful multisensory experience for participants at banquets. This new knowledge has led to a secondary interpretation of the painting: it may have been an interpretation of the five senses rather than an allegory of the four elements, like the Prado still life. According to this viewpoint, the snails on the white tank might represent the sense of touch instead of a *memento mori*, as is also the case in a painting attributed to the workshop of another master of the *florero* during the 17th century, Juan de Arellano (1614–1676).⁵³ At the second level, the gushing of water would involve the sense of hearing, while the hanging fruits would appeal to the sense of taste. The eye of the observer would be drawn to the harmonious geometry of the composition and the circular section, in a play of appearances infused with the scent of damp terracotta and that of the flowers placed on the shell.

6 Conclusion: A Baroque Interconnected Science in the Iberian World?

The table fountain portrayed by Espinosa is genuinely an outstanding artefact, almost unique in the current state of research. Moreover, it encourages us to further reflect on the different facets of natural philosophy in the Iberian world. The fountain's probable exotic origins in the American viceroyalties make it a great example of a product that astonished the people of the Iberian Peninsula while still fitting effortlessly into the visual culture of the Baroque period. So, it is an object that is the unquestioned protagonist of the painting. This character-

no. 3 (2020): 406–424; ead., “Giambattista Della Porta's Neapolitan Magic and its Humanistic Meteorology,” in *Variantology v. Neapolitan Affairs*, ed. Siegfried Zielinski, and Eckhard Füllis (Köln: König, 2011), 103–130; ead., “The Weatherglass and its Observers in the Early Seventeenth Century,” in *Philosophies of Technology. Francis Bacon and his Contemporaries*, ed. Claus Zittel, Gisela Engel, Romano Nanni, and Nicole C. Karafylliseiden (Leiden: Brill, 2008), 67–130.

53 It refers to the work *Alegoría del sentido del tacto*, a composition based on the series of engravings by Maerten de Vos and Adriaen Collaert and preserved in the Colección Masaveu in Madrid. On the bottom right of the painting, a monkey is holding a snail in one hand while other snails descend from a stone seat. In this case, the burr released by the land mollusc on the monkey's fingertips represents the sense of touch. Cf. María J. López Terrada, “La serie de los cinco sentidos de Maerten de Vos y Adriaen Collaert como fuente iconográfica,” *Saitabi*, no. 48 (1998): 311–333.

istic highlights another crucial aspect: the collector's dual possession. He owns the painting, the fountain's abstract world and microcosm. In a clever game of illusions, as the observer looked at the meticulously depicted terracotta, he would witness a dematerialization of the ceramics, which lost their original function of banquet ornament to shift instead to the metaphysical side.⁵⁴

Furthermore, Espinosa's work enabled us to know an object that did not survive up to the present day. The reason is simple and lies in its forms and materials' fragility and complex articulation. The same thing also happened to the "Perpetuum mobile" by Drebbel: no example of "Perpetuum mobile" from the 17th century survived intact, mainly due to the fragility of the circular glass section. However, thanks to its painted and printed depictions, we can fully understand its importance in Europe's philosophical-natural and collector-scholarly context of the early Modern Age. From this point on, the similarities between the sophisticated *búcaro* on one hand, and the Heronian artefacts and the "Perpetuum mobile" on the other hand, offer us valuable insights into the fame and circulation of these instruments. One might only hypothesise that scholars and artisans in the Viceroyalty of New Spain knew about the "Perpetuum mobile," perhaps through the *cuadros de gabinete* and the printed descriptions of some European wonder-rooms. What is more certain is that they knew about experiments and studies on the effects of air pressure on liquids. By observing the tripartite shape of the terracotta fountain, we can indeed speculate a Mexican reception—filtered or not from the one in place in the Iberian Peninsula between the end of the 16th and the first half of the 17th century—⁵⁵ of the Latin translations of the *Pneumatica* of Hero of Alexandria, such as the one from which the above figure was taken, the work of Commandino. Another very interesting aspect linked to this point is that Espinosa's work would prove—together with the fountain kept in the Museo de Américas—the existence of specialised ceramic workshops in New Spain: here lived unidentified artists with very good technical and philosophical-natural knowledge and capable of making complex instruments such as articulated table fountains.⁵⁶ Thus, arti-

54 José Ramón Marcaida and Juan Pimentel, "Dead Natures or Still Lives? Science, Art, and Collecting in the Spanish Baroque," in *Collecting Across Cultures: Material Exchanges in the Early Modern Atlantic World*, ed. Daniela Bleichmar and Peter Mancall (Philadelphia: University of Pennsylvania Press, 2011), 99–115.

55 On this argument cf. Nicolás García Tapia, "Privilegios de invención," in *Técnica e Ingeniería en España 1, El Renacimiento. De la técnica imperial y la popular*, ed. Manuel Silva Suárez (Zaragoza: Prensas Universitarias, 2008), 669–699.

56 Concerning the topic of artisanal identity in the seventeenth century, cf. Steven Shapin, *A Social History of Truth. Civility and Science in Seventeenth-Century England* (Chicago: University of Chicago Press, 1994), 355–407; Pamela H. Smith, *The Body of the Artisan. Art*

sans in the Viceroyalty of Mexico created scientific earthenware beyond the pharmacopoeia and the containers used for such purposes.⁵⁷ Built upon centuries of accumulated knowledge and techniques developed in the renowned pottery centres of Tonalá, these master craftsmen were able to innovate by integrating hydromechanical principles and decorative arts, producing items that were not only functional but also aesthetically sophisticated. It should be noted, however, that while this remarkable creation was probably destined for Madrid, the same did not necessarily happen for other undiscovered instruments used to support the philosophical-natural field in those territories, both from a theoretical and an experimental point of view.

However, the popularity of this type of hydromechanical artefacts did not wane during the Baroque period. In fact, their forms and models persisted in a specific popular production still connected to the viceregal sphere: the folk majolica of Caltagirone (Sicily) from the late 18th to the early 19th century. A notable example is an anthropomorphic fountain almost identical to those previously described. Painted in manganese, blue, yellow, and green, it depicts a woman in traditional attire surrounded by birds and standing atop a concave shell. The shape and mechanism of the fountain closely resemble those of the *búcaro* and the Portuguese artefact. Floral reliefs also decorate the circular section, while shells adorn the small, shell-shaped basin. Yet, in this piece, water, rather than gushing from a protuberance at the base of the circular section, provocatively flowed from the woman's nipple, as she is depicted baring one breast. A skilfully crafted hole near her left foot allowed the fountain to recirculate the water.⁵⁸

In conclusion, to truly understand the technology's development in the American viceroyalties, we need to go beyond the studies conducted up to this point, to concentrate more on the materials, their protagonists, and the instruments produced by them. Sometimes, these could also have reflections

and *Experience in the Scientific Revolution* (Chicago: University of Chicago Press, 2004); ead., *Artisan/Practitioners and the Rise of the New Sciences, 1400–1600* (Corvallis: OSU Press, 2011); Cristiano Zanetti, "A Telescopic Paradox: The Artisans of the Accademia del Cimento, their Instruments and their (In)Visibility," *Annals of Science* 80 (2023): 1–50. With specific regard to the artisanal epistemology in the Iberian world cf. A. Sánchez Martínez, "Practical Knowledge and Empire in the Early Modern Iberian World. Towards an Artisanal Turn," *Centaurus* 61 (2019): 268–281.

57 Many interesting references about earthenware's medical applications in the Viceroyalty of Mexico can be found in: Juan de Esteyneffer, *Florilegio medicinal de todas las enfermedades* (México: por los herederos de Juan Joseph Guillena Carrascoso, 1712).

58 Antonino Ragona, *La maiolica siciliana dalle origini all'Ottocento* (Palermo: Sellerio, 1986), 366.

in the figurative arts, as in the case of the table fountain painted by Espinosa, an artefact whose meaning is fully understandable only within the perspective of Baroque science interconnected between the heart of the Spanish Empire and its outskirts.⁵⁹ While this article has sought to explore certain ceramic forms and their functions across the Iberian world, strengthening the studies on viceregal technologies, Espinosa's table fountain—especially if compared to other hydromechanical artefacts like Gezio's or the Portuguese ones—not only enriches our understanding of Baroque art but also serves as a testament to the complex scientific and cultural exchanges that characterized the viceroyalties. By studying such objects, we gain insight into the interconnected nature of Baroque science and the pivotal role played by material culture in shaping the intellectual and social landscapes of the early modern Iberian world.⁶⁰

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59 On transfers of knowledge in the Spanish Empire, cf. Helge Wendt, "Competing Scientific Cultures and the Globalization of Knowledge in the Iberian Colonial World," in *The Globalization of Knowledge in the Iberian Colonial World*, ed. Helge Wendt (Berlin: Edition Open Access of the Max Planck Institute for the History of Science, 2016), 7–27.

60 For information on the transfers of knowledge between the Iberian Peninsula and the Viceroyalties in the field of figurative arts, see Stephanie Porras, *The First Viral Images. Maerten de Vos, Antwerp Print, and the Early Modern Globe* (Centre County: Pennsylvania State University Press, 2023).