

# Sin and Pleasure: The History of Chocolate in Medicine

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**ABSTRACT:** In ancient Mayan texts cocoa is considered a gift of the gods: Pre-Columbian populations used chocolate as medicine, too. After the discovery of America, chocolate was introduced in Europe, but Christian Europe looked to this new exhilarating drink with extreme suspiciousness and criticism. From this reaction, the necessity derived to appeal to the reasons of health, with which doctors and scientists committed themselves to explain that chocolate was good for the body. However, during the Enlightenment, the road of therapy separated from that of taste, and chocolate mainly maintained its leading role of excipient, bearing the burden, over time, of a negative valence, being associated with obesity, dental problems, unhealthy lifestyle, and so forth. The rehabilitation of chocolate has arisen only in recent times, re-establishing that value that Linnaeus himself credited to chocolate, calling the generous plant *Theobroma cacao*, food of the gods.

**KEYWORDS:** *chocolate, cacao, history of medicine*

## ■ INTRODUCTION

Current research suggests chocolate can enhance health, but cocoa's history as a medicine dates back thousands of years: it is not by chance that in 1753, the famous Swedish scientist Carl Linnaeus named the "chocolate tree" *Theobroma cacao*, "food of the gods". As a matter of fact, to few natural products has been attributed the merit of treating such a wide-ranging variety of ailments as has chocolate, the main processed byproduct of the cacao beans, which is formed in the pods produced by the "chocolate tree".<sup>1</sup>

Chocolate's benefits were already known to the Mesoamerican civilizations: iconographic works, archeological data, but, above all, the reports of travelers and religious missionaries suggest that cacao was prepared in beverages and used in medical practice since the seventh century before Christ.<sup>2</sup>

The most common use of cacao by Mesoamericans was a chocolate drink, prepared with cacao powder or paste-cakes and water, which were often mixed with spices, and sometimes ground maize. Maize was the main food among the Maya and the maize god was involved in the most common myths of creation, in direct relationship with cacao: both foods were considered indispensable to sustain life.

Cacao, moreover, had a crucial role from a social and political point of view, as it was at the same time a physically stimulating beverage, an expensive foodstuff, and a method of exchange, which could also be used as currency. Cacao beans were preserved in apposite vessels, the forms of which evolved according to social contexts, confirming their value as symbols of power and social supremacy.<sup>3</sup>

The Spanish *conquistador* Hernán Cortés brought cocoa beans back to Spain in 1528, understanding their commercial value: very gradually, the custom of drinking the beverage prepared from this "brown gold" spread across Europe.<sup>4</sup>

With the passing of time, chocolate became then a fashionable drink, even if almost exclusively in the high society, as the cocoa beans were in short supply and consequently very expensive.

When the use of chocolate was introduced into Western Europe, there was probably some question about whether chocolate was a food: it was a food-like substance and it was necessary to see whether it was covered by the fasting laws or not.

Chocolate's invigorating and euphoriant effects were immediately evident: moreover, chocolate was regarded as an aphrodisiac, and rumors proliferated as to just how Montezuma prepared his drink before having sexual intercourse with his numerous wives.<sup>5</sup>

At first, the Church stated that anyone fasting who drank chocolate was considered to have broken his religious fast. It was only in 1662 that Cardinal Brancaccio declared that *liquidum non frangit jejunum* (drinking liquid chocolate does not constitute a break in fasting):<sup>6</sup> the involvement of religious orders in the cocoa trade had its influence on this statement.

## ■ CHOCOLATE AS MEDICINE

Besides Cardinal Brancaccio's affirmation, chocolate needed to have also the positive judgment of the medical class, which represented a powerful and influential viaticum to chocolate's consumption.

Thus, the medical use of chocolate in European countries had at least two main reasons: first of all, chocolate was rumored to be used also by the Mesoamericans as a therapy for many disorders and Western medicine needed to rely on new remedies.

On the other hand, the consent of the medical class could give good reason for drinking a very tasty beverage, which had exhilarating effects.<sup>6,7</sup>

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The reconstruction of the history of the therapeutic use of chocolate is a sort of journey through “time and geographical space”<sup>2</sup> and also through medical theories and prejudices.

From a historic point of view, two main kinds of literary sources can be used, besides archeological evidence.

As a matter of fact, the first authors documenting the use of cocoa and chocolate also for therapeutic purposes described the experiences of the Mesoamerican inhabitants, basically reporting what they had witnessed among the natives.

The second approach was more theoretical as it was centered on the identification of the qualities of cacao and chocolate, within the context of the allopathic Hippocratic–Galenic medicine, considering the relationship between the balance hot/cold in the ingredients added to the medicinal preparations.

Diet, that is lifestyle, had to respect the so-called “six res non naturales”, that is, the fundamental parameters which could be adjusted by medical intervention: among them, “cibus” and “potus”, food and drink, had crucial importance. The quality of food had to be carefully investigated to administer a suitable feeding, which was considered a medicine in itself: chocolate, from this point of view, represented a special foodstuff, which could have interesting effects on human physiology.

To the first kind of approach belongs the Badianus Manuscript (dated to 1552), a primary source for information on Mexican medicinal use of cacao, which includes extraordinary paintings of medicinal plants and a rich text that provides a critical understanding of Mexican diseases, nutritional problems, and healing techniques.

The Badianus Manuscript (Codex Barberini, Latin 241) was the work of two Aztec Indians, Martinus de la Cruz, a native physician who composed it in Aztec, and another Indian, Juannes Badianus, who translated the text into Latin: this is the earliest treatise on Mexican medicinal plants and native remedies that has ever come down to us.<sup>8</sup> De La Cruz was a Mexican teacher at the College of Santa Cruz, founded by the Spanish around 1536 in Mexico City: the manuscript presents Mexican disease concepts and treatments, including the use of cocoa derivatives as nutrients or as a remedy in the case of angina, constipation, dental tartar, dysentery, dyspepsia, indigestion, weariness, gout, hemorrhoids.

Another text that takes on great importance from this point of view is the so-called Florentine Codex (dated to 1577), compiled by the Spanish monk Bernardino de Sahagún (1499–1590): Bernardino de Sahagún was a Franciscan friar, missionary priest, and pioneering ethnographer, who participated in the Catholic evangelization of colonial New Spain. He departed Spain for Mexico in 1529, and for the next decades collected extensive information on Mexican agriculture, botany, cultural practices, dietary patterns, and health and medical practices. Bernardino settled in Mexico alongside Spanish colonists and observed the world of the Aztecs with great consideration and respect, outlining their extraordinary history in 12 tomes written in two languages (Nahuatl and Castilian). Bernardino’s writings, however, were put on the King of Spain’s index and were seized, but the monk in charge of transporting the tomes handed over the collection to Ferdinando de’Medici (1549–1609), who was then Cardinal in Rome: when Ferdinando became Grand Duke of Tuscany (1587), the volumes were listed on the inventory of the Medici goods. For this reason, the manuscript is now preserved in the Biblioteca Medicea Laurenziana, in Florence.<sup>9</sup> In his colossal work, Bernardino de Sahagún reported the use for therapeutic

purposes that the Mexican populations did of beverages made with cocoa, carefully listing different types and dosages; he advised against excessive drinking of cocoa prepared from unroasted beans, which caused confusion and derangement, but recommended it, if used in moderation, as an invigorating and refreshing beverage.<sup>6</sup>

The interest of Ferdinando de’Medici in cocoa and chocolate is documented also by the report submitted to him in 1601 by the Florentine businessman and circumnavigator Francesco d’Antonio Carletti: Carletti wrote a detailed description of the cacao-growing and chocolate-making processes and stated that chocolate was a very strengthening mixture. This report, however, had limited influence, as it was not published until the beginning of the 18th century.<sup>10,11</sup>

Between the 17th and 19th centuries, a vast number of texts and accounts were written that advertised the medicinal properties of chocolate: however, the Court of Madrid, at that time capital of the Kingdom of Philip II, was the base from which chocolate would reach Europe.

In 1570, in fact, Philip II dispatched his royal physician, Francisco Hernández (1517–1587), to find medicinal plants in the New World, where he led a naturalistic expedition, to study native flora, gathering information from the natives about herbs, trees, and medicinal plants. His aim was to learn their uses and the conditions for their cultivation, so that these plants could be also cultivated in Spain. Hernández came back in 1577: according to the selection of his manuscripts published by Nardo Antonio Recchi in 1651, royal doctor at the Court of Philip II, Hernández was among the first who considered the use of chocolate within the framework of humoral, allopathic medicine, which alleged health when the body and its elements were in balance.<sup>12</sup>

In circumscribing chocolate to the medical theories of the Old World, Hernández classified it as “cold and humid”: chocolate therefore had to be recommended to treat “hot diseases”. He mentioned that the administration of a cocoa liquid could cure patients suffering from fever and infirmities of the liver.<sup>13,14</sup>

Nevertheless, the medical use of cocoa needed to be further experienced within the framework of European medical knowledge of the time, which was still influenced by Hippocratic–Galenic medicine.

Spanish doctors played a great role in this debate. In 1618, Bartolomeo Marradon wrote a test in the form of a dialogue in which he listed the different uses of cocoa: cocoa was used as currency or as beverage, but it could be employed appropriately as medicine, in different forms. Anyway, Marradon did not overlook the negative features of chocolate, criticizing it as potentially “obstructive”.<sup>15</sup>

Contrary to Hernández’s opinion, Santiago de Valverde Turices, medical doctor at Sevilla University, separated the cold quality of cocoa from the hot and dry of chocolate, which had to be used for cold and humid diseases: Valverde Turices wrote an extensive treatise on chocolate in 1624 and argued that cacao was appropriate for patients suffering from “cold” or “wet” illnesses. According to him, chocolate should be called a medicine, because it changed the patient’s constitution. He affirmed that chocolate drunk in great quantities was beneficial for the ailments of the chest and was good for the stomach if drunk in small quantities. When people were healthy, the use of chocolate was subordinated to the adding of “cold” ingredients to balance its “hot” nature.<sup>16</sup>

In 1631, Colmenero de Ledesma published his treatise on chocolate, which was destined to be reprinted and translated into many editions.<sup>17</sup> Colmenero de Ledesma, who was a physician from Andalusia, is to be listed among the supporters of the medical use of chocolate, arguing that chocolate was a beneficial health drink, which could be fitted into his Galenic medical philosophy: the aim of his book was to find a response to some basic questions related to the nature and qualities of cacao and chocolate and the details of their uses.

According to Colmenero de Ledesma, cacao preserved health and made consumers fat, corpulent, and amiable: he also provided a recipe for drinking chocolate, which displays how Spanish consumers were progressively shifting the flavor of the original concoction by adding sugar and spices more congenial to their taste than the rather more bitter original flavoring.

Chocolate was then appreciated for its perceived healthy and nutritive qualities and for its pleasing taste, too. Then, from a general point of view, the numerous prescriptions, which dealt with the presumed merits and medicinal properties of cacao and chocolate, may be divided into three main groups: (a) to enable patients to gain weight; (b) to stimulate nervous systems; and (c) to improve digestion.

The geographical distribution of chocolate's supporters reflects the development of the economic interests of the different countries. The Anglo-Saxon authors, in fact, got involved in this debate at the time when Great Britain started conquering the New Continent. Henry Stubbe (1632–1676), Charles the II's doctor, wrote his monograph in 1662, dedicating it to his famous colleague Thomas Willis, the founder of brain anatomy, who had recommended chocolate to prevent apoplexy. Stubbe reported the use of chocolate according to the different authors and made a long list of the medical uses of chocolate, which was considered suitable to cure also the "hypochondriac melancholy", accompanied by stomach weakness and weight loss,<sup>18</sup> as stated also, in the same years, by the Roman physician Paolo Zacchia.<sup>19</sup>

According to Stubbe's observations, chocolate's use seemed extremely helpful as an expectorant, a diuretic, and an aphrodisiac. Stubbe was a Galenist, and he maintained that chocolate was of great value in restoring and preserving health, thanks to its capacity of purifying the blood and reestablishing the balance of body fluids.

To support his statements about cocoa's nutritional value, Stubbe used case histories drawn from the cacao's land, remarking that the British soldiers stationed in Jamaica lived mainly on cocoa paste, mixed with sugar, which was then melted in water.

This was the evidence that chocolate and cocoa could be considered one of the main sources of maintenance. In his treatise about chocolate, which he refers to as the "Indian nectar", Stubbe criticized those who refused it on puritanical grounds.<sup>18</sup>

During the 17th century and in the first half of the 18th, the question about the medical use of chocolate became the subject of some degree theses at the Medical Faculty of Paris. In 1684, for instance, Franciscus Foucault discussed his dissertation, under M. Stephanus Bachot's presidency:<sup>20</sup> Foucault introduced the subject, dealing with the different kinds of foods and describing the use of chocolate. Despite the various methods of preparing and packing it, chocolate's taste was always so pleasing that the author concluded with an enthusiastic approval of the medical use of chocolate.

However, not all doctors were convinced of its beneficial effects, and detractors accused chocolate of causing health problems: in particular, this debate, between the favorable and the opposed, developed in Florence in the early 18th century.

The news about chocolate officially reached Florence starting from the end of the 16th century; the custom of drinking chocolate "to the use of Spain", however, dates back to 1668, according to the words of the doctor Antonio Cocchi,<sup>21</sup> but the first one to manipulate and sell chocolate in Florence as a heart medicament was an apothecary, named Tozzetti, at the time of the Grand Duke Ferdinando I<sup>st</sup> de'Medici (1587–1609).<sup>22</sup>

The Medici Grand Dukes and their family were fond of chocolate, as confirmed by private correspondence and official orders of purchase.

In a letter written by Father Ettore Ghislieri to Cardinal Leopoldo de'Medici in 1671, for example, Ghislieri thanks Cardinal de'Medici for a box of assorted chocolates, mentioning his preferred varieties as a citron-flavored one and one based on a Spanish recipe: Father Ghislieri had particularly appreciated this gift, as his doctors had recommended chocolate as a treatment for his flatulence.<sup>23</sup>

If the Spaniards had managed to turn the original spiced cocoa drink into a delicate, sweet drink aromatized with vanilla, musk, and amber, at the Medici court new recipes were developed.

Cosimo III de'Medici (1642–1723) set Florence's "exquisite gentleness" against "Spanish perfection": Francesco Redi (1626–1697), in fact, doctor and court scientist, who had condemned the use of chocolate as medicine in his poem *Bacco in Toscana*, created the recipe of a special jasmine-smelling chocolate, the preparation of which had been patented in a formula that listed ingredients, amounts, and procedure, under the name "Grand Duke's recipe".<sup>24</sup>

This recipe, however, which can be considered a sort of political tool, remained a state secret until 1712, as the Grand Duke had prohibited its disclosure in writing: it was possible to taste this drink only in Florence and, even here, only at the Court or in the houses of the noblest families.<sup>24</sup>

In Florence, chocolate was truly prized, influencing also market development. In the 18th century, a vivacious debate took place between two well-known persons, Doctor Giovan Battista Felici,<sup>25</sup> great chocolate enemy, and Francesco Zeti,<sup>26</sup> "the Hunchback of Panone", who had taken his nickname from the coffee-house where he worked.

Cocoa, according to Felici,<sup>25</sup> "has a loose, fat and viscous substance, which can easily contain the particles of the heat" ... it has a sort of "slow, long lasting fire", causing in the blood "significant fermentation which can spoil it", because "it produces an extraordinary motion in the animal instincts; so, when it gets into the stomach, it makes us more able to perform our doings with vivacity". Heart palpitations, intermittent pulse, convulsive movements, and apoplexy could be induced by the use of chocolate, to whose negative effects contributed also the ingredients with which it was mixed, affecting also the nerves and, as a consequence, the "animal instinct".

Equally negative feedback was given to sugar, the viscosity of which was demonstrated by the use that painters made of it to blend colors.<sup>6,7</sup>

The muscles and the heart were also affected by this excessive contractile activity. However, in the case of hemorrhages, the use of chocolate had shown to be helpful: as a matter of fact, "Florentine ladies ... where (sic) healed from



the copious blood loss, by the constant use of chocolate, which they used as desiccant and astringent medicament".<sup>25</sup>

These were Doctor Felici's blames: Francesco Zeti's reply was published the following year.<sup>26</sup>

Zeti worked in a coffee-house, and he was worried that chocolate's opponents could cause a reduction of customers, and so feared the loss of his job. For this reason, he wrote a short book in defense of chocolate. He claimed to have commissioned an anonymous doctor for a sort of defense of chocolate, full of praise for the criminalized substance, to protect his own interests: regardless of its supposed quality of hot or cold substance, according to Zeti's observations, cocoa "is not replete of oleaginous and sulfurous parts" because "it maintains a milky spirit", which could have beneficial effects on the human body.

The debate went on for many years, involving also pharmaceutical factories, which were particularly active in cocoa processing, elaborating personalized formulas even for cosmetic purposes. Among them, there were the Grand-Ducal Apothecary and the Pharmaceutical workshop in Santa Maria Novella.<sup>27</sup>

The different opinions about cocoa and chocolate were summarized, a few years later, by Giovan Battista Anfossi, who surveyed the various authors' views. It is interesting to note that Anfossi referred to chocolate's employment even for a topical use, explicitly solving the question about the use of chocolate in treating hemorrhoids: the painful inconvenience could be cured using cocoa butter: "If haemorrhoids are aching and inflamed, the basic bleeding is convenient ... sweet oil, simple butter or cocoa butter..."<sup>28</sup>

The 18th century counts many other reports on the medical use of cocoa and chocolate, not last the one from Carl von Linné (Linnaeus, 1701–1778), in which are summarized chocolate qualities, as food and as therapeutic substance.<sup>1</sup> Linnaeus identified three kinds of syndromes in which chocolate could be used properly: loss of weight, as a consequence of lung and muscle diseases, hypochondria, and hemorrhoids, adding also that it was an excellent aphrodisiac, confirming the profound endurance of a tradition, which had its roots in Pre-Columbian culture.

Later, in Blancardi's work this affirmation was strongly reiterated: "Therefore, the use of chocolate is salubrious [for] it excites and strengthens with its warmth mild juiciness the bowels' inborn warmth and strength, it helps digestion, it fosters the spread of food and the secretion of the unnecessary, it accumulates fat, it's not an enemy to the brain, it's Venus' friend and very suitable for body and soul".<sup>29</sup>

Antonio Lavedan wrote his influential treatise, *Tratado de los Usos, Abusos, Propiedades y Virtudes del Tabaco, Café, Te, y Chocolate*, in 1796. This important work contained a treasure of medical-related information regarding the use of chocolate. Lavedan affirmed that chocolate was beneficial only if drunk in the morning, and he advised prohibition of chocolate drinking in the afternoon, as it was a stimulating foodstuff, particularly helpful for weak people: "Chocolate is a food that repairs and fortifies quickly and therefore it is better for phlegmatic persons that need stimulation...". Lavedan paid great attention also to health chocolate: "Health Chocolate made without aromas is better and has the properties to stimulate the appetite in those who do not usually drink it. Chocolate is good nourishment for those who usually drink it in the morning ... The chocolate drink made with lightly toasted cacao with little or no aromas, is very healthy for those who are suffering from tuberculosis and

consumption ... Chocolate is a food that reinforces and strengthens quickly and therefore it is better for phlegmatic persons that need stimulation ... Those who have weakness of the stomach because of diarrhoea or because of some purging substance will experience relief with the chocolate drink ... It vivifies the substance of the heart, reduces flatulence, takes away obstructions, helps the stomach, and stimulates the appetite, which is a sign of health for those that drink it. It improves virility, slows the growth of white hair, and lengthens life until feebleness".<sup>30</sup>

The general diffusion of chocolate, however, was still hindered by its price: alternative recipes had been also developed, replacing cocoa with other low-cost ingredients that offered the same aspect. An example was the work of Doctor Saverio Manetti who, in 1765, printed a book in which he suggested very cheap stratagems to cope with a recession due to poor harvest: people who could not afford to buy chocolate could use roasted flour, milk, sugar, and egg yolks to obtain a beverage that at least looked like chocolate.<sup>31</sup>

A special analeptic chocolate was also sold in Florence in the middle of the 19th century, where "potato flour" was added to cocoa of Caracca, cinnamon of Ceylon, and sugar of Avana. It could be blended with milk, cream, and coffee spirit to prepare a very pleasing drink for those people who suffered from weakness and chronic lung catarrh and for the victims of serious acute ailments.<sup>32</sup>

Many other writers dedicated their works to chocolate, as the Italian anthropologist Paolo Mantegazza (1831–1910), who, in his book about the physiology of love, reaffirmed the role of chocolate as an aphrodisiac, explaining that nervine foods, such as tea, coffee, and chocolate, are absorbed by the body very quickly and stimulate the nervous system, providing a long-lasting restoration.<sup>33</sup>

In the same period, a great change occurred in the production of chocolate: as a matter of fact, in 1847, a form of solid chocolate was made by Joseph Fry & Sons, who discovered a system to make a solid chocolate bar, and 20 years later Nestlé's preparation, based on condensed powdered milk by evaporation, began completely shifting the taste of chocolate.

The history of the medical use of chocolate had reached its top, but it was destined to collapse.

As a matter of fact, the 19th century experienced a great increase in manufacturing larger quantities of chocolate, thanks to the evolution of chocolate processing but, at the same time, concern grew over the substances and fillers that were added to chocolate, reducing or annulling chocolate's natural medical benefits.

Therefore, it became necessary to check the pureness of sugar and milk, too.

A new chapter in the history of chocolate for a therapeutic use had started, and chocolate became a sort of excipient to mask the unpleasant, bitter taste of medicines.<sup>5</sup>

On the one hand, milk chocolate had become the chocolate variety of choice, but, on the other hand, sugar and milk had paved the way to a negative opinion of chocolate itself, as milk chocolate contains sweeteners and hydrogenated oils, added as a filler as well as a preservative.

For this reason, during the 20th century, chocolate was criticized for its high sugar content and its relationship to obesity, tooth decay, and gum disease, unhealthy lifestyle, and so forth.<sup>6</sup>

However, as chocolate provides a moral improvement and it works as an energy boost when operating in physically demanding situations, during the 20th century, it was introduced as an essential constitutional in soldiers' rations by Ancel Keys (1904–2004), the doctor who discovered and advertised the benefits of the so-called Mediterranean diet, who had included chocolate in the ration for paratroops, named, after him, the K ration.<sup>34</sup>

The concept of chocolate as food seemed to have overcome its concept as medicine.

However, in recent times, chocolate has recovered its place in the “Polymeal”, a diet-based method developed as a natural alternative to the “Polypill”, a multidrug-based approach for reducing heart disease.<sup>35</sup> Biomedical research has then found the evidence of chocolate's benefits, demonstrating from a scientific point of view what medical practice had been anticipating for centuries, coming up against cultural bias and economic matters.<sup>36</sup> Studies on the potential health benefits of dark chocolate have been plentiful in recent years, demonstrating the beneficial effects of cocoa polyphenols on human health, especially with regard to cardiovascular and inflammatory diseases, metabolic disorders, and cancer prevention, but also to the function of the brain.<sup>37</sup>

The old question about the nature of chocolate has only slightly shifted: chocolate as food or as medicament?

Surely, chocolate is a functional food, which can have a potentially positive effect on health, beyond basic nutrition: as a matter of fact, chocolate is a “medi-food”, a foodstuff, which provides additional benefits, that may reduce the risk of disease or promote optimal health.<sup>38</sup>

Quite rightly, chocolate therefore has positively regained the interest of scientific journals, reestablishing that value that Linnaeus himself attributed to chocolate, naming the generous plant *Theobroma cacao*, “food of the gods”.

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### Notes

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## REFERENCES

- (1) Von Linné (Linnaeus), C. *Om Chokladdryken*; Fabel: Stockholm, Sweden, 1741.
- (2) Dillinger, T. L.; Barriga, P.; Escarcega, S.; Jimenez, M.; Salazar Lowe, D.; Grivetti, L. E. Food of the gods: cure for humanity? A cultural history of the medicinal and ritual use of chocolate. *J. Nutr.* **2000**, *130*, 2057–2072.
- (3) Christopher, H. Cacao's relationship with Mesoamerican society. *Spectrum* **2013**, *3* (Fall), 48–60.
- (4) Henderson, J. S.; Joyce, R. A.; Hall, G. R.; Hurst, W. J.; McGovern, P. E. The dawn of chocolate. *Proc. Natl. Acad. Sci. U. S. A.* **2007**, *104*, 18937–18940.
- (5) Wilson, P.; Jeffrey Hurst, W. *Chocolate as Medicine: A Quest Over the Centuries*; Royal Society of Chemistry: Cambridge, UK, 2012.
- (6) Lippi, D. History of the medical use of chocolate. In *Chocolate in Health and Nutrition*; Watson, R. R., Preedy, V. R., Zibadi, S., Eds.; Humana Press: New York, 2012; pp 11–21.
- (7) Lippi, D. Chocolate and medicine: dangerous liaisons? *Nutrition* **2009**, *25*, 1100–1103.
- (8) de la Cruz, M. *Libellus de medicinalibus Indorum herbis*; Codex Badianus, Biblioteca Apostolica Vaticana, Ms. Barb. Lat. 241, 1552, mss.
- (9) Sahagun, B. *Historia General de las Cosas de Nueva Hispania*; Biblioteca Medicea Laurenziana, Palatino 220: Firenze, Italy, Vol. III, pp 1575–1577, mss.
- (10) *Chocolate. History, Culture and Heritage*; Grivetti, L. E., Shapiro, H.-Y., Eds.; Wiley: Hoboken, NJ, USA, 2009.
- (11) Carletti, F. *Ragionamenti sopra le cose da lui vedute ne' suoi viaggi si delle Indie Occidentali e Orientali come d'altri paesi*; Nella Stamperia di Giuseppe Manni, Per il Carlieri, Firenze, Italy, 1701.
- (12) *Nova plantarum, animalium et mineralium Mexicanorum historia, a Francisco Hernandez... primum compilata, dein a Nardo Antonio Reccho in volumen digesta, a Jo. Terentio, Jo. Fabre, et Fabio, Columna Lynceis notis, and additionibus longe doctissimis illustrata. Cui demum accessere, aliquot ex principis Federici Caesii frontispiciis Theatri naturalis phytosophicae tabulae...* Romae 1651, Sumptibus Blasij Deversini & Zanobij Masotti Bibliopolarum, Typis Vitalis Mascardi.
- (13) *The Mexican Treasury: The Writings of Dr. Francisco Hernández*; Varey, S., Ed.; Stanford University Press: Stanford, CA, USA, 2000.
- (14) Chabrán, R. Dr. Francisco Hernandez and Denmark: the presence of the Mexican treasury in the work of ole worm. An introduction. *Colo. Rev. Hisp. Stud.* **2009**, *7*, 169–183.
- (15) Marradon, B. *Curioso tratado de la naturaleza, los daños y provechos que el tempo y experiencia an descubierto de sus efectos, y del chocolate, y otras bevila, que en estos tempo se usan; Interlocutores un medico con un indiano, y un ciudadano*; Gabriel Ramos: Seville, Spain, 1618.
- (16) De Valverde Turices, S. *Un Discurso del Chocolate*; J. Cabrera: Seville, Spain, 1624.
- (17) Colmenero de Ledesma, A. *Curioso Tratado de la Naturaleza y Calidad del Chocolate*; Francisco Martinez: Madrid, Spain, 1631.
- (18) Stubbe, H. *The Indian Nectar, or, a Discourse Concerning Chocolate [sic]: The Nature of the Cacao-Nut and the Other Ingredients of that Composition is Examined and Stated according to the Judgment and Experience of Indian and Spanish Writers*; J. C. for Andrew Crook: London, UK, 1662.
- (19) Zacchia, P. *De'Mali Ipocondriaci*; Vitale Mascardi: Rome, Italy, 1644.
- (20) Bachot, E. *An Chocolatae Usus Salubris?*; Affirm. Diss. Inaug. Resp. Fr.: Foucault, Parisiis, 1684.
- (21) Lippi, D. Chocolate in health and disease. *Maturitas* **2010**, *67*, 195–196.
- (22) Targioni Tozzetti, A. *Corso di Botanica Medico-Farmaceutica e di Materia Medica*; Batelli: Firenze, Italy, 1847.
- (23) Florence State Archive, Mediceo del Principato 5574 fol. XX; available online at <http://www.archiviodistato.firenze.it/nuovosito/> (accessed May 13, 2013).
- (24) Vallisnieri, A. *Dell'Uso e dell'Abuso delle Bevande e Bagnature calde, o fredde. Terza impressione cui evve annessa Una erudita Dissertazione del Celebre suo Zio, intitolata De potu Vini Calidi, autore Johanne Baptista Davini Serenissimi Raynaldi, I. Mutinae, Regii, Mirandulae, & c. Ducis, Medico*; Felice Mosca: Napoli, Italy, 1727.
- (25) Felici, G. B. *Parere Intorno All'uso Della Cioccolata Scritto in Una Lettera dal Conte Dottor Gio. Batista Felici All'illustriss. Signora Lisabetta Girolami d'Ambra*; Appresso Giuseppe Manni: Firenze, Italy, 1728.
- (26) Giuntini, G. *Altro Parere Intorno Alla Natura, ed All'uso Della Cioccolata Disteso in Forma di Lettera Indirizzata All'illustrissimo Signor Conte Armando di Woltsfeitt*; Si vende allato alla chiesa di Sant'Apollinare: Firenze, Italy, 1728.
- (27) Targioni Tozzetti, G. *Notizie Degli Aggrandimenti Delle Scienze Fisiche in Toscana nel Corso di Anni IX del Secolo XVII*; Si vende da G. Bouchard: Firenze, Italy, 1780; pp 221–222.
- (28) Anfossi, G. B. *Dell'uso ed Abuso Della Cioccolata del Dottore Gio. Battista Anfossi Romano a sua Eccellenza Pier Vettore Pisani Procurator di S. Marco*; Appresso Francesco Locatelli a S. Bartolommeo: Venezia, Italy, 1779.
- (29) Blancardi, S. *Lexicon Medicum Tripartitum, Renovatum*; Schwickert: Lipsiae, Germany, 1777.
- (30) Lavedan, A. *Tratado de Los Usos, Abusos, Propiendades y Virtudes del Tabaco, Café, Te y Chocolate*; Imprenta Real: Madrid, Spain, 1796.

(31) Manetti, S. *Delle Specie Diverse di Frumento e di Pane Siccome Della Panizzazione: Memoria del Dottor Saverio Manetti; Pubblicata Sotto gli Auspici Dell'illustriss. sig. Andrea Ginori...* Attualmente Presidente dell'Imperial Società Fisico-Botanica Fiorentina; Nella Stamperia Moucke: Firenze, Italy, 1765.

(32) Cattaneo, A. Cioccolata analettica di polvere alimentare, preparata coi pomi di terra. *Giornale di farmacia-chimica e scienze accessorie o sia raccolta delle scoperte, ritrovati e miglioramenti fatti in farmacia ed in chimica* **1841**, 18, 333–334.

(33) Mantegazza, P. *Fisiologia dell'amore*; Bernardoni: Milano, Italy, 1873.

(34) Tracy, S. W. The physiology of extremes: Ancel Keys and the International High Altitude Expedition of 1935. *Bull. Hist. Med.* **2012**, 86, 627–660.

(35) Franco, O. H.; Bonneux, L.; de Laet, C.; Peeters, A.; Steyerberg, E. W.; Mackenbach, J. P. The Polymeal: a more natural, safer, and probably tastier (than the Polypill) strategy to reduce cardiovascular disease by more than 75%. *BMJ* **2004**, 329, 1447–1450.

(36) Wilson, P. K. Chocolate as medicine: a changing framework of evidence throughout history. In *Chocolate and Health*; Paoletti, R., Poli, A., Conti, A., Visioli, F., Eds.; Springer Verlag Italia: Milano, Italy, 2012; pp 1–16.

(37) Messerli, F. H. Chocolate consumption, cognitive function, and nobel laureates. *N. Engl. J. Med.* **2012**, 367, 1562–1564.

(38) Lippi, D. Chocolate in history: food, medicine, medi-food. *Nutrients* **2013**, 5 (5), 1573–1584.