

THE MICROSCOPIC SETTLER: SMALLPOX DISSEMINATION IN THE CONTEXT OF EUROPEAN NEW WORLD EXPLORATION


El colono microscópico: disseminación de la viruela en el contexto de la exploración europea del Nuevo Mundo

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ABSTRACT

The beginning of colonization in Spanish America is closely linked to biological and historical factors. From the moment the first Europeans landed in the Caribbean and interacted with the natives, biological differences were established, which were crucial for the beginning of one of the greatest episodes of demographic decline ever experienced by humanity. From the perspective of the History of Science, we seek to analyze the Spanish invasion of Mexican and Caribbean territory in an interdisciplinary way, by surveying written and pictorial documentary sources that express the impact of smallpox on high indigenous mortality rates. Once separated, Europe and America collided in one of the first global-scale events in history.

KEY WORDS: History of Science; Spanish America; Colonization.

RESUMEN

El inicio de la colonización en la América española está íntimamente ligado a factores biológicos e históricos. Desde el momento en que los primeros europeos desembarcaron en el Caribe e interactuaron con los nativos, se establecieron diferencias biológicas que fueron cruciales para el inicio de uno de los mayores episodios de decadencia demográfica jamás experimentado por la humanidad. Desde la perspectiva de la Historia de la Ciencia, buscamos analizar la invasión española al territorio mexicano y caribeño de manera interdisciplinaria, mediante el levantamiento de fuentes documentales escritas y pictóricas que expresan el impacto de la viruela en las altas tasas de mortalidad indígena. Una vez separadas, Europa y Estados Unidos chocaron en uno de los primeros acontecimientos a escala global de la historia.

PALABRAS CLAVE: Historia de la Ciência; Hispanoamérica; Colonización.



As of 1492, the continents geographically separated by continental drift collided and merged with the transport of countless natural elements that crossed the oceans in European ships. Trailblazers were responsible for reestablishing the interaction between different and distant regions of the globe. Without them, and their succeeding generations, systems of trade, conflicts, domination and contagion would never have been strengthened, brought together in a wide network of continental exchanges. These explorers were the “engineers of historic infrastructure”, responsible for opening the transatlantic routes that accompanied the internal expansion of Latin Christendom, the population and technological increase, in addition to the search for new resources that could be exploited (FERNÁNDEZ-ARMESTO, 2009).

The Spanish expansion during the transition from the 15th to the 16th century was motivated and depended on different variants of those already known throughout history, such as collapses and social tensions. At that moment, two other tensions, wars and epidemics, triggered conflicting consequences in the newly discovered territories. The war, which incited and boosted European innovation, shared space with the social collapse generated by the epidemic waves and their consequences, in a process of degradation of the New World civilizations. Factors such as the expansion of Latin Christianity, the opening of trade routes, the search for marketable products, the increase in the influence of the Hispanic crown, the domination of other territories, the personal enrichment of overseas adventurers, or any other factor that boosted the intercontinental flow, connected the four parts of the world. In this process, travelers were true vectors, carrying with them, even without full knowledge, a part of the microbiota of their places of origin (CROSBY, 1993; FERNÁNDEZ-ARMESTO, 2009).

Among the infinity of reports, letters, treaties and travel diaries produced by clerics, doctors, historians and natural philosophers, the records regarding the high native mortality rates were constantly related to infectious diseases resulting from contact with explorers. The main diseases linked with the European arrival in the newly discovered lands included smallpox, syphilis, measles, bubonic plague, typhus, cholera, and what were generically called fevers. However, among the pathogens brought to the New World, the *Orthopoxvirus variolae* virus had a prominent role in the descriptions, mainly involving the high number of deaths and contagion among Native Americans.

Central America and the demographic fall of Hispaniola

The first piece of continental land discovered played a crucial role in the context of European expansion towards the Atlantic, and determined the course of the history of native populations. The discovery of the American continent by the Europeans, in 1492, resulted in the opening of imperialism in American territory and represented a leap in the enrichment of European nations from exploration, mainly ecological, also allowing biological exchanges. On the one hand, this movement supported the expansion of European influences outside its own territory, and linked two continents separated by the Atlantic. But on the other hand, it perversely oppressed and decimated the great Native American civilizations (FERNÁNDEZ-ARMESTO, 2009, p. 199).

The European invasion of the American continent represented a double encounter: that of the men of the Old and New World who belonged to civilizations that were completely different in countless aspects; and the biological encounter of fauna, flora and microlife that had been separated millions of years ago. A collision that symbolically began with the Genoese navigator and explorer Christopher Columbus. His navy “en octubre del año 1492 (...) la tierra que primero vieron fue Guanahani, una de las ilas Lucayos, en la cual se tomó luego tierra, y la posesión de las Indias y Nuevo Mundo” (GÓMARA, 1979, p. 31-32). Currently, the “*ilas Lucayos*” comprises the Bahamas, located in the Antilles archipelago. The Spanish writer Gonzalo Fernández de Oviedo y Valdés (1478-1557), author responsible for producing the four tomes of the work *Historia General y Natural de las Indias* (1851), describes his entire journey in the Caribbean region around 1535 and tells how the “Isla Española” was found and its configuration, stating that:

En aquella isla que he dicho de Guanahani ovo el almirante é los que con él yban vista de índios é gente desnuda, é allí le dieron notiçia de la isla de Cuba. E como pareçieron huego muchas isletas que están juntas e en torno de Guanahani, comecaron los chripstianos á llamarlas Islas Blancas (...) baxó en tierra en la islã de Guanahani é la llamó Sanet Salvador, é tomó allí la possession (...) la islã Guanahani que tengo dicho, é otras muchas que allí hay, que se llaman islas de los Lucayos generalmente todas ellas, no obstante que cada una tiene su proprio nombre y son muchas; assi como Guanahani, Caycos, Jumeto, Yabaque, Mayaguana, Samaua, Guanima, Yuma, Curatheo, Ciguatéo, Bahama (que es la mayor de todas), el Yucayo y Nequa, Habacoa é otras muchas isletas pequenas que por allí hay (VALÉS, 1851, p. 25).

After the contact with the first groups, it was unimaginable what would happen. The famous bishop of Chiapas, or indigenous defender Bartolomé de las Casas (1484-1566), built his *Brevísima Relación de la Destrucción de las Indias*, illegally published in 1552, under complaint. Las Casas affirms that the first land found was Isla Española, and that it



was “muy grandes y inifinitas yslas las más pobladas e llenas de naturales, gentes yndios delas que se puede ser tierra poblada (...), la mayor cantidad de todo el linage humano” (LAS CASAS, 1991, p. 7). Opening the modern age, the first interaction of Spanish travelers with those lands “full of people”, represented a milestone in the beginning of the progressive indigenous genocide. The pathogens introduced by a relatively small European fleet had a significant potential for the destruction of large complex civilizations. Due to their experience on the islands of the Atlantic, Europeans found favorable conditions in America, similar to those they were used to. The portable biota coming from the expeditions expanded considerably in the territory, altering the ecological balance with a variety of plants, animals and microlife. Father Joseph de Acosta (1540-1600), who was in Peruvian lands between the years 1573-1574, 1576-1577 and 1578-1579, was the author of the *Historia Natural y Moral de Las Indias*, published for the first time in 1590, and noticed that none of the domesticated animals common in the Old World could be found in the tropics, stating that:

De todos estos generos de animales, si quisiéremos buscarlos en la Isla de Cuba, ó en la Española, ó en Jamaica, ó en la Margarita, ó en la Dominica, no se hallará ninguno. Con esto viene, que las dichas Islas con ser tan grandes y tan fértiles, no tenían antiguamente, quando á ellas aportaron Españoles, de esotros animales tampoco, que son de provecho; y ahora tienen innumerables manadas de caballos, de bueyes, y vacas, de perros, de puercos; y es en tanto grado, que los ganados de vacas no tienen ya dueños ciertos, por haber tanto multiplicado, que son del primero que las desjarreta en el monte ó campo (ACOSTA, 1894, p. 99-100).

As well as the biblical plagues, the Christian army also brought a variety of pulmonary, intestinal and venereal diseases, in addition to trachoma, typhus, leprosy, yellow fever and tetanus. Expanding medical studies and going beyond the analysis of texts and philosophical journeys, diseases and medical knowledge in this context were also related to cultural productions and their practices. In an intersection of factors, medicine, law, religion, politics and social dynamics were also important in the construction of knowledge during the 16th century (Slater; López-Terrada; Pardo-Tomás, 2016, p. 6-7).

As the Europeans advance into the territory, more the vulnerable populations were exposed to the diseases of the Old World (GALEANO, 1999; COOK; LOVEL, 1999; McNEILL, 1998). But the first, and most effective, weapon of all early European settlements in America was smallpox. Introduced by Columbus' first fleets, the disease was responsible for the disappearance of natives in the Caribbean islands (COOK, 2003, p. 63; BETHELL, 2018, p. 149-150). Due to isolation, close selection of pathogens and genetic susceptibility, almost all natives who interacted with the first European visitors contracted the disease, and even without exact numerical data, the spread of smallpox in the Caribbean was the

disease's gateway to America. The Franciscan missionary Toribio de Benavente Motolinía (1482-1569), in his work *Historia de los Indios de la Nueva España*, completed in 1541, states that “hirió Dios y castigo esta tierra y a los que en ella hallaron (...) con diez plagas trabajosas. La primera fue de viruelas” (MOTOLINÍA, 1985, p. 18). In the midst of his narrative involving the Aztec culture, the conversion to Christianity and descriptions of the American nature, the *fray* lists a series of violence practiced by the colonizers, during and after the conquest, in addition to high taxes, slavery of the natives and the condition of the enslaved in mines (BELLINI, 1995, p. 558).

The mortality of the natives was also described by Las Casas in his *Brevísima*, and he states that “havendo en la ysla española sobre tres cuentos de animas que vimos, no ay ou de los naturales di ella dozientas personas” (LAS CASAS, 1991, p. 8). Interestingly, these two characters who shared campaigns against the abuses practiced by the conquerors were adverse. After Motolinía, in Bartolomé's *Brevíssima* the so-called *Leyenda Negra* is founded, reporting the horrors of the Spanish conquest in tropical lands (BELLINI, 1995, p. 561). Thus, Las Casas conducted his reports with even more enthusiasm.

Christopher Columbus, in 1493, with his fleet composed of seventeen ships carrying 1200 to 1500 men (CROSBY, 1993), initially interacted with the Taínos¹, inhabitants of the islands of the Caribbean Sea. Extending interactions over the next three years, Columbus commanded military campaigns against the Dominicans indigenous (GALEANO, 1999, p. 18), equipped with horsemen, gunpowder weapons, and biological agents. Undeniably, the result of this contact between natives and Europeans was unfavorable for the New World inhabitants. The numerical disagreement regarding mortality rates and American demographic density (Table 01), in the first years of European arrival, results in a discussion among historians due to the lack of tangible data for analysis. However, it is clear that the interaction between the two worlds, previously separated, caused a decline in the Amerindian populations.

Table 01 - Estimated indigenous population Hispaniola in 1492

Source	Year	Estimative
Verlinden (1973)	1492	60,000
Amiama (1959)	1492	100,000
Rosenblat (1959, 1976)	1492	100,000

¹It is considered that the Taínos, inhabitants of the island of Hispaniola before the European arrival on the continent, formed a heterogeneous group. However, at the same time, there were groups of ciboneyes, ciguayos and mecorixes, inhabitants of the islands before the arrival of Columbus. These groups occupied the east coast of Venezuela, the Greater and Lesser Antilles, inhabited the present-day Dominican Republic since 3000 BC, and shared the Arawak linguistic group, or “Arawak”, with the Taínos being the best known.

Lipschutz (1966)	1492	100,000-500,000
Moya Pons (1987)	1494	377,559
Cordova (1968)	1492	500,000
N.D. Cook (1993)	1492	500,000-750,000
Moya Pons (1971)	1492	600,000
Zambardino (1978)	1492	1,000,000
Denevan (1992)	1492	1,000,000
Guerra (1988)	1492	1,100,000
Denevan (1976)	1492	1,950,000
Watts (1987)	1492	3,000,000-4,000,000
Borah & Cook (1971)	1492	7,975,000

Estimated indigenous population Hispaniola in 1492 In: Noble David Cook, "Enfermedad y despoblación en el Caribe, 1492-1518", 1999.

In 1492 more than a million *Arawak* natives inhabited the island of Hispaniola (present-day Haiti and the Dominican Republic). With the authorization of the Spanish King Ferdinand V allowing the use of African slave labor in the silver mines in 1510, in less than 10 years the more than 4,000 slaves imported from West Africa unwittingly contributed to the spread of smallpox. From 1519, with the reign of Charles I, the slave trade was further encouraged, and this change in the number of slave labor coming from Africa was directly related to protective actions in relation to Native Americans, moved by the Dominican Bartolomé de Las Casas, the Franciscan Toribio de Benavente Motolinía and other defenders. Questions involving the legitimacy, or condemnation, of the use of indigenous people in compulsory labor led to an increase in the number of slaves brought from Africa as a way to prevent the enslavement of natives. On the other hand, interaction with Africans further contributed to the spread of smallpox and other diseases. By 1518 about a third of the Native American population was dead (FINER, 2004, p. 27). In that year, with the circulation of African slaves in mines for the extraction of precious metals, the disease spread to Cuba and Puerto Rico, killing more than half of the native population (KOHN, 2007, p. 160)². Las Casas (1986), author of the three volumes of the *Historia de las Indias*, highlights in the third work that:

Acaeció más en esta isla por este tiempo del año 18 y 19, y fue que por la voluntad o permisión de Dios, para sacar de tanto tormento y angustiosa vida que los pocos de indios que restaban padecían en toda especie de trabajos, mayormente en las minas, y juntamente, para castigo de los que los oprimían, porque sintiesen la falta que les hacían los indios, vino una plaga terrible que casi todos del todo perecieron, sin quedar sino muy

² Kohn, *Encyclopedia of plague and pestilence: from ancient times to the present*, pp. 160.

poquitos con vida. Esta fue las viruelas, que dieron en los tristes indios, que alguna persona trajo de Castilla (LAS CASAS 1986, p. 469).

Resulting from the interaction of three continents, Gonzalo de Oviedo (1851) in *Parte Primera de Historia general y natural de las Indias* (1851) traces the damage caused by smallpox in the native Caribbean population. According to the Spaniard the disease almost depopulated the island of Cuba, and for the same reasons the Indians were absent on the island of Hispaniola, due to the fact that the pestilential disease of smallpox was unanimous in all the islands. “Quassi se despobló la isla de Cuba, é acabóse de destruir en se morir los índios, por las mismas causas faltaron en esta isla Española, é porque la dolencia pestilencial de las viruelas que tengo dicho fue universal en todas las islas”. On the Jamaican island the mortality rate was significant to the point that, according to the chronicler, “no se hallaron minas (...) como por la falta que ovo la gente, que assi se murrió é acabo como en la Española, é por las mismas ocasiones y viruelas pestilenciales” (VALDÉS, 1851, p. 581).

The disease was also called *gran lepra* by the natives, “porque eran tantas las viruelas, que se cubrían de tal manera que parecían leprosos Llamaron los indios a este mal huizautl, que suena la gran lepra” (MOTOLINÍA, 1985, p. 18). And, “de la cual, como de cosa muy señalada, contaban después ellos sus años. Paréceme que pagaron aquí las bubas que pegaron a los nuestros” (GÓMARA, 2007, p. 194). The smallpox virus debuted on the American continent, killing a third of the native population in Hispaniola in 1519 alone. Its potential for contagion was able to affect all of Central America and later, Mexico (KOHN, 2007, p. 160), allying with the troops of Hernán Cortés (1485-1547) and Francisco Pizarro (1476-1541) in their search for domination of the great Aztec and Inca empires, respectively.

Invading Tenochtitlán: Spread of the Smallpox Virus in the Aztec Empire

Old World germs played a crucial role in Spanish colonization and victory, influencing several episodes of raids against the natives. Death rates increased rapidly as foreigners entered new lands. In this process, armed with the religious permissibility that legitimized domination, illnesses were seen as a divine gift (WATTS, 2003, p. 92). Furthermore, contagion only among natives was interpreted as punishment, corroborating the idea of European superiority and divine protection towards explorers. Referring to the period from 1492 to 1554, the Spanish chronicler Antonio de Herrera (1549-1626) in his *Historia General de los Hechos de los Castellanos en las Islas y Tierra Firme del Mar Océano*, published in 1601 to 1615, highlights the native attributes from Christian dogmas, describing them with



“ociosidad dando en el vicio de la carne, embriaguez, de donde les proceden muchas generales enfermedades (...) ansi viven poco, y la enfermedad de viruelas acaba muchos” (HERRERA, 1728, p. 11). Also under Christian influence, Toribio Motolinía (1985) affirms the gravity of illnesses as a divine punishment against the natives. For him, God punished the earth and its inhabitants with ten plagues:

La primera fue de las viruelas y comenzó de esta manera. Siendo capitán y gobernador Hernando Cortés, al tiempo que el capitán Pánfilo de Narvaéz desembarco en esta tierra, en uno de sus navios vino un negro herido de viruelas, la cual enfermedad nunca en esta tierra había visto, y a esta sazón estaba esta Nueva España en extremo muy llena de gente, y como las viruelas se comenzasen a apegar a los índios, fue entre ellos tan gran enfermedad y pestilência en toda la tierra que en las más provincias murió más de la mitad de la gente (MOTOLINÍA, 1985, p. 18).

Starting from the Caribbean islands, it is accepted that smallpox hitchhiked to Mexico in the undertaking of Pánfilo de Narváez (1490-1528). The Spanish conqueror landed first in Cuba, in an expedition competing³ with Hernán Cortés, who was already in the future *Nueva España*. In Narváez's armada, the African slave Francisco de Baguía⁴ had symptoms of the disease, and even without knowing about this powerful biological weapon, the conqueror sends him to Mexico, spreading the *Variola vírus* on the continent in May 1520 (BOLLET, 2004, p. 77; KOHN, 2007, p. 260). Still in the feverish stage of the disease, Francisco was accommodated in an indigenous dwelling and infected everyone in the house and neighbors. In ten days of lodging the sick, the city of Cempoallan (CASTILHO, 1955, p. 414; GÓMARA, 2007, P. 194) had almost total loss of its inhabitants, and those who fled from the disease ended up contributing to its spread in the neighboring *pueblos* (HARARI, 2016).

The news of the arrival of the disease spread among European travelers. Bernal Díaz del Castillo (1492-1584), famous soldier who accompanied most of the battles of conquest in Mexico, writes, during the sixteenth century, his *Historia verdadeira de la conquista en la Nueva España*, and affirms that “al Narváez e a un negro que traía lleno de viruela que fue

³ From Hispaniola the virus arrived in Cuba and Puerto Rico through infected slaves. In 1519 Hernán Cortés (1485-1547) traveled to present-day Mexico in search of gold and silver, but upon arriving in Tenochtitlán his troops were received with friendliness, since the natives believed that Cortés and his men were descendants of Quetzalcóatl (“serpent plumada” in Nahuatl). As a result of this passivity, Cortés imprisons Montezuma and demands a ransom in gold. In this maneuver, the conquistador was taken by surprise when he learned of the arrival of Panfilio de Narvaez (1490-1528) on the Mexican coast. Narvaez aimed to profit from the Monteczuma restate; see Finer, Kim (2004), *Smallpox Deadly Diseases and Epidemics*, New York. C. Chelsea House Pub.

⁴Authors also refer to him as Francisco de Eguía; see Harari, Yuval Noah, *Homo Deus: uma breve história do amanhã*, São Paulo, Editora Companhia das Letras, 2016.

para la Nueva España” (CASTILHO, 1955, p. 414). In *Historia de la Conquista de Mexico*, published by Francisco López de Gómara (1511-1566) in 1552, the chronicler also blames a black man belonging to the Spanish conqueror Pánfilo de Narváez for bringing “las viruelas”, and points out that many Native Americans died due to this new disease, never seen in those lands (GÓMARA, 2007, p. 375).

In the same work, Francisco López (2007) dedicates a chapter to *Mortandad por viruelas*. According to the author, a conflict in the territory of Nueva España cost Pánfilo de Narváez his honor and an eye, in addition to many lives of indigenous people who died, not from the iron, but from the disease. The author also explains that when the crew of Narváez’s vessel disembarked, a black man with smallpox also left. From the narrative of Gómara (2007) it is also possible to understand how the virus potentiated its dissemination, taking advantage of the social interactions between the natives. The disease started in a Cempoallan house, in the current state of Veracruz, and passed from one indigenous to another. As there were many and they slept, ate and drank all together, soon it spread in such a way that it began to kill all over that land. In the simplest houses all died, decimating half of several cities. Some lucky ones who survived ended up frightening those who had never seen the marks of scars on the skin, mainly on the face, hands and body, characteristics of the disease (GÓMARA, 2007, p. 194). Even with so much detail, it is worth mentioning that the *Historia de la Conquista* was not produced from the testimony of the Spaniard, but rather from the exchange of information with people who, in fact, were in the New World and witnessed, among so many European atrocities, the extermination of native populations by the contagion of smallpox.

Common among natives and considered harmful among Spaniards, it was customary to bathe several times a day. According to the European interpretation of dissemination, bathing was seen by many as an aggravating factor that contributed to the spread of diseases. Bartolomé de Las Casas (1986), in addition to being a defender of the Native Americans, also narrated about different customs and observed that:

Las cuales, como les nacían, con el calor de la tierra y ellas que son como fuego, y a cada paso ellos tenían de costumbre, si podían, lavarse en los ríos, lanzábanse a lavar con el angustia que sentían, por lo cual se les encerraban dentro en el cuerpo, y así como pestilencia vastativa, en breve todos morían” (LAS CASAS, 1986, p. 469).

As well as the missionary, López de Gómara (2007) also highlighted the habit of bathing, however, relating it to the belief in getting rid of illnesses: acostumbraban bañarse a todos males, bañábanse con ellas, y tullíanse; y aun tienen por costumbre o vicio de entrar

en baños fríos saliendo de calientes”, stating that such practice was deadly (GÓMARA, 2007, p. 194). Both descriptions associating baths, body cleaning and the aggravation of illnesses, have a medieval perception resulting from two scenarios that are connected: the perpetuation of the fear of contagion, mainly after the waves of plague and syphilis; and an alert relationship to the body. This second one, strongly anchored in ecclesiastical and civil structures, and linked to prostitution activities, as well as any other behavior of a sexual nature. In addition to these associations, baths were considered facilitators for the spread of diseases. And it was also believed that this practice stimulated the opening of porosity and left the body vulnerable to the miasms that caused the degradation of the body (POLÓNIA, p. 84-85).

Continuing on its journey into the American continent, the *Variola virus* traveled to the interior of Mexico and permeated its plateau (KOHN, 2007, p. 260), spreading frighteningly quickly in the territory. Besides taking advantage of native customs, genetic issues also favored the virus. The lack of previously acquired immunity, in previous contact with pathogenic agents, resulted in an inevitable native vulnerability. The first inhabitants of America had a more restricted immune system when compared to the European invaders, directly related to the interaction between animal germs. In addition to the geographic factor, the native genetic heritage had a more homogeneous composition, influencing the way in which the immune system responds to pathogen invasions (MANN, p. 2007, p. 111).

The results of the interaction of viruses with the human body produced the symptoms, so that the sick became vectors of the disease (DIAMOND, 2010). It is currently known that smallpox can be transmitted in two ways based on its symptoms: directly and indirectly. From direct contact with the patient, the viruses present inside the pustules under the skin spread thanks to the expansion and rupture of the superficial layer of the dermis. Another form of this type of contact is when the viruses reach the saliva, due to eruptions close to the mouth, where they take the shortcut provided by the mucous droplets that are expelled in speech, coughing or sneezing. Indirect transmission is facilitated by the characteristics of the virus. Because they are highly resistant, this *poxvirus* is able to survive in the objects used by the sick, in the dust of their homes and still resists in the environment even after the death of the infected person (OLDSTONE, 1998).

This effectiveness can be observed in the strategies for its proliferation. Germs have evolved different mechanisms to spread among human groups. The process of transmission of infections also depends on the relationship with the environment, configuring a series of

environmental factors that are not restricted only to the infectious agent or the host, and this includes the presence of reservoirs outside the human body, transmission vectors, and setting up a community or social group (YANG, 2002, p. 224). During this spread, the viral agent that is better disseminated will leave more offspring and will be favored by natural selection.

Most reports about the provinces describe a very high mortality among the natives. Motolinía (1985) narrates that in several regions entire families died of the disease. Since it was not possible to bury them all, and to remedy the bad odor that came out of the bodies, houses were thrown over them so that the house was the tomb (GÓMARA, 2007, p. 194; MOTOLINÍA, 1985, p. 18). The city of Cholula, near present-day Mexico City, received a visit from Cortés' troops. In his own narrative he tells that with his horses he slept "á la Ciudad de Cholula porque los naturales de ali deseaban mi venida; porque á causa de las enfermedad de las viruelas, que tambien comprehendió á los de estas tierras" (CORTÉS, 1770, p. 181). Visit also described by Gonzalo de Oviedo (1853):

Cortés con veynte dos caballo fue aquel dia á dormir á la ciudad de Chulula, porque los naturales della lo dessealian, porque á oailsa de la enfennedad de la viruelas i que tambien coinprehendio á los de aquellas tierras, como á los de estas nuestras islas), eran muertos muchos señores de allí, é querían que por mano de Cortés é con su paresçer se pusiesen otros en lugar de los defunctos. [...] los señores de la cibdad é provincia le fueron á hablar c decirle cómo Maxiscaçin, que era el señor principal de todos ellos, avia fallecido de aquella enfermedas de las viruelas; é que pues avia sido grande y especial amigo de Hernando Cortés (VALDÉS, 1853, p. 343).

Prior to the Spanish invasion of the Mexican capital of Tenochtitlán, the metropolis was the administrative center of a complex political and socioeconomic cluster. Most of the domains of the central plateau and regions of the current Mexican states of Hidalgo, Morelos, Guerrero, Puebla, Veracruz, Oaxaca, Tabasco and Chiapas were subjected to the metropolis (BETHELL, 2018, p. 59). The soldier Bernal Díaz (1632) tells that "volver a Teztuco, y los de Chalco de dijeron nue querian ir (...) y llevar consigo dos hijos del señor de aquella provincia, que habia pocos dias que era fallecido de viruelas" (CASTILLO, 1955 p. 501). In that region, cases of smallpox increased in proportion to the attempts of Spanish alliance with the native inhabitants. The more the troops interacted with the *pueblos*, the more their inhabitants were affected by the virus.

Spanish wanderings and alliances around the capital spread smallpox (PRESCOTT, 1847, p. 340). Cortés and his troops interacted with natives exchanging metal objects, clothing and all kinds of supplies (CORTÉS, 1770, p. 150). Introduced in Tenochtitlán in June 1520, during the battle between the Aztecs and the Spaniards, the death toll of the



episode went beyond the countless people hit by European steel that, even though it was not successful in the first attack, left a powerful biological weapon, fundamental for the subsequent domain of the capital. Two weeks after the battle, the smallpox virus remained in the infected bodies of allied Spaniards or Indians, developing a variety of the disease and the resulting increase in death rates. In August of the same year, about half of majestic Tenochtitlan was killed by smallpox in just 70 days. In September, the disease spread across the central highlands to the Chalco from Mexico (CASTILLO, 1955, p. 501; KOHN, 2007).

The *Variola virus* was Cortés' most effective weapon. In August 1521, upon returning to the capital with his small army, he found the city devastated, facilitating the final blow to the empire's dominance (BOLLET, 2004, p. 77)⁵. Probably, one of the causes of the devastation that Cortés found upon his return was due to the ability of the virus to remain active, and also to the completion of its cycle, killing those who had been infected. In addition to the production of written reports, European and native authors also produced numerous pictographic documents, recording the devastation of the disease through illustrations. In the *Codex en Cruz* (1553) (figure 01), produced with the purpose of remembering the events that occurred in the cities of Texcoco and parts of Tenochtitlán, Tepetlaoztoc and Chiautla during the 15th and 16th centuries XV e XVI (NUNES, 2015), an infected native was represented.

Figure 01 - One of the first pictographic records produced by Native Americans that makes reference to smallpox, present in the Codex in Cruz.

⁵ Bollet, *Plagues & Poxes: The Impact of Human History on Epidemic Disease*, pp. 77



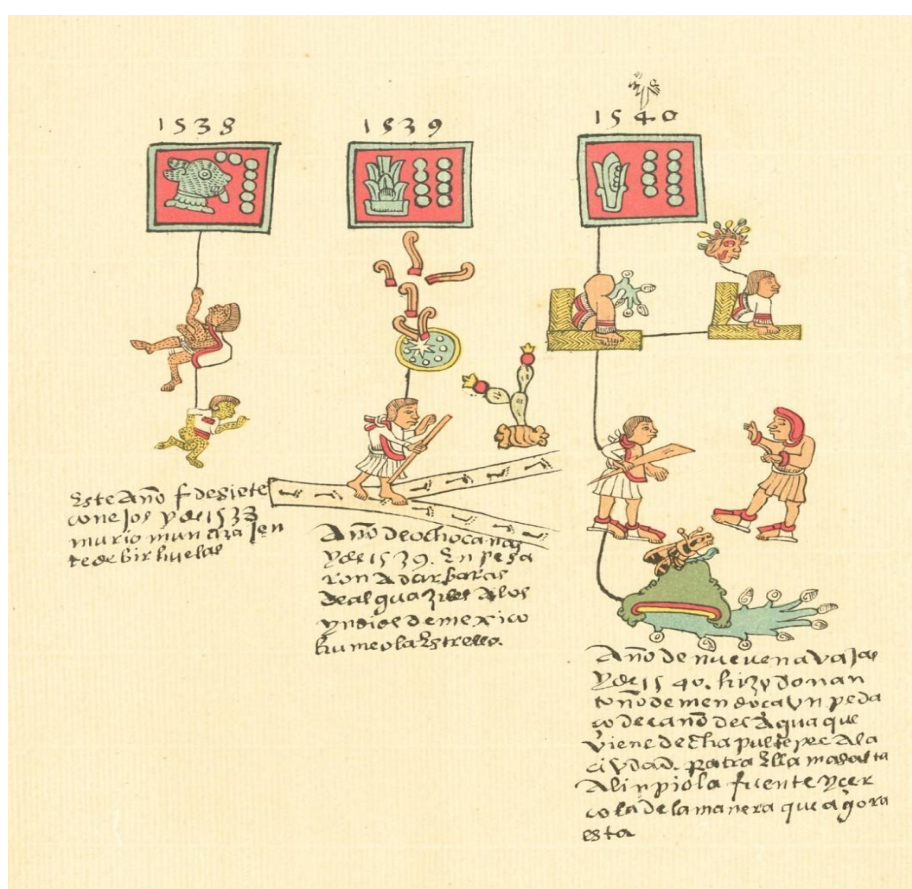
Figure 01 - Suzanne Austin Alchon, *A pest in the land: New World epidemics in a global perspective*, New Mexico, University of New Mexico, pp. 65, 2003.

Even lacking technical details in the records, the black dots spread across the body deliver the trademark of smallpox. The first signs of the disease are manifested in the mouth and the rest of the face, later on the forearms, trunk and legs. Initially, the marks on the skin are formed by small dots of pink to reddish color, called macules. These macules are denser on the palms of the hands and soles of the feet, as well as on the face, arms and legs. Then the macules turn into pink pimples called papules, which in two or three days swell with pus and are called pustules. The pustule stage is characteristic of smallpox, completely transforming the skin of the infected person. They are extremely painful and their expansion and accumulation of pus generates pressure and often the rupture of the superficial layer of the skin, promoting a burning sensation. If the patient manages to go through the stage above, the fluid present in the lesions is absorbed and they are found, completing about two weeks of the development of the eruptions. Finally, the scabs fall off and mark the skin with deep depigmented scars, which are the result of interaction with the sebaceous glands (FINER; ALCAMO, p. 2009, 58-59). And as they are more numerous in the face region, a person who was affected by the disease, and survived the virus, shows the signs of pustules in his dermis and bones. It is noteworthy that among a geographically isolated group, the viruses respond differently than compared to groups that have already had experience with the disease, and may present symptoms more quickly and more severely.

The year 1538 is highlighted in the Codex Telleriano-Remensis (Figure 02). Produced in the mid-16th century in central Mexico, it is a manuscript composed of writings in Latin and Nahuatl, together with pictographs (MONTORO, 2013, p. 160). It was the “año siete del conejo pois en 1538 murió gente de biruelas”, the image represents the smallpox epidemic that devastated the Mexican region. Two native men following a rope carry different dark spots on their bodies, referring to the disease.

More about the original text and showing in the image the smallpox epidemic that devastated the Mexican region. Two native men following a rope carry different dark spots on their bodies, referring to the disease.

Figura 2 - Códice Telleriano-Remensis (1538)



Códice Telleriano-Remensis (1538), Germany: ed. F de Lubat, Universitätsbibliothek Rostock, f. 45, 1901.

Not restricted only to the first years of contact between the men of the Old and New Worlds, the disease had numerous epidemic waves, related to the European colonization movement in America. The increase in the transatlantic flow linking the continents meant the introduction of European pathogens in a geographically isolated environment, establishing a network between America, Africa and Europe (Figure 03).

Figure 03 - Map of the worldwide spread of smallpox over the centuries

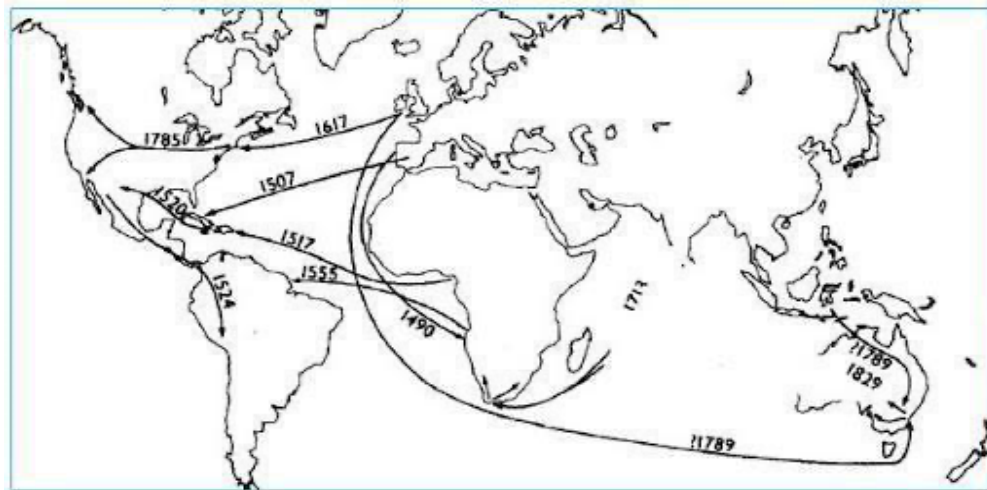


Figure 03 - By the World Health Organization.

The main differences between the groups of Native Americans and Old World Europeans, which promoted the victory of the latter in the colonization process of the American continent, can be explained from biological exchanges, mainly following an analysis of the development of microlives. Until the agricultural revolution, which broke out in the fertile crescent, just over 10,000 years ago, the development of *Homo sapiens* was guided by their relationship with the environment, developing techniques and skills that broke the difficulties imposed by the environment. Assuming the heterogeneity of different parts of the world, it is concluded that each region, based on its own demand, would lead to different histories and developments when comparing groups from different parts of the world (DIAMOND, 2010, p. 60). Human ingenuity and its ability to survive was tested in the most varied adversities, whether in the coldest climates of the Arctic Circle, inhabited by the Eskimos; or in the *Atacameña* cultures of the Atacama Desert, man was able to adapt following the willing nature, contributing to the emergence of the most diverse patterns of behavior and cultural diversification (JULIEN, 2014).

With the variability of environments around the planet, the diversity of microlife consolidating in a unique way, and the success of hunter-gatherer communities boosted migration and colonization of other places. The maintenance of territories and population growth were related to the supply of food in the region, and the ability to obtain it. The constant search for food increased dispersion and territorial disputes, and the environment itself dictated the rules for a reorganization of social dynamics (NAVARRO, 2006, p. 2).

In several regions of the globe, hunting and gathering activities were developed for animal husbandry and agriculture, allowing man to constantly enjoy animal and plant products, which reduced the risks of territorial disputes and environmental hostilities, and significantly increased birth rate and cluster density. Sedentism, the consequent formation of urban clusters; the population increase; commercial development and craft activities; in addition to cultural exchanges, these are some of the manifestations that constitute complex societies (JULIEN, 2014), a process that ancient civilizations considered “developed” had already experienced. All this movement was only possible thanks to the Neolithic Revolution. Thus, with the environment dictating the dynamics and limiting man's relations with the environment, geographic characteristics were relevant in the spread of human settlements, inferring in the stages of structural development of societies in a heterogeneous and even unequal way.

In this apparent growing development, pathogenic microorganisms have accompanied European societies since contact with the first domesticated animal, since the vast majority of diseases share pathogens with some degree of relatedness with the same pathogens of animal origin (McNEILL, 1998). Unfortunately, pre-Columbian America had few domesticated animals. There were no horses, cattle, ovine or goats. Even if Central and South American dog; the guinea pig, llama and alpaca of the Andes; the Mexican turkey; and the South American Muscovy duck, were subjected to domestication processes, they did not achieve similar performance when compared to the large mammals of the Old World (MANN, 2012, p. 72).

The lack of animals with potential for domestication, observed by Acosta (Acosta, 1894), can also be attributed to the disappearance of large species. At about the same dating as the Clovis civilization (13.500 B.C.-13.000 B.C.), almost all major species became extinct (DIAMOND, 2010, p. 24). The mismatch of large mammals with early American civilizations permanently altered the American environment, served to the advantage of groups of European explorers, and gave the natives a vulnerability to the fleet of Old World germs. Before the Pleistocene, 11,700 years ago, America had three species of horses and camels, among other mammals that could offer sources of protein. In addition to the nutritional advantages, contact with these animals could have created zoonotic diseases, opening up the possibility of equity in the encounter of pathogens from both continents (MANN, 2007, p. 170).

Conclusion

With the reconnection of the continents, mainly due to the exchange of natural articles during the Modern Era, these exchanges of elements were undeniably unfavorable to pre-Columbian natives, evidencing the impact of geographic isolation when interacting with the pathogens that accompanied the colonizers of the Old World. The first interaction with the groups that inhabit the Canaries, even before the discovery of the *Nuevas Indias*, worked as a preview for what would later happen in the Caribbean islands, in the current Mexican territory and in the Andean region of South America. Even without the intentional use of biological weapons, smallpox served in favor of the Spanish troops. Smallpox's first contact with Native Americans decimated great empires and weakened group structures and social dynamics. Added to the intrinsic perversity involved in the dynamics of imperialist domination, the biological factors also conferred advantages that determined the destiny of the entire history of America.

Faced with a group that had never had any experience with pathogens, any cold would prove fatal. In the case of epidemics on land never before contacted by the European invader, the contamination was extreme. In epidemics on virgin soil, the supply of the community was also affected. The lack of labor in the plantations, maintenance of the herds and in the distribution of basic articles for survival is compromised, leading the sick population to conditions of malnutrition (CROSBY, 1993, p. 90). The exploitation and sale of Native Amerindians as slaves in Europe; the constant fear and resistance to Spanish domination; physical and psychological wear and tear caused by battles; added to the battalion of unknown germs brought by their vectors, ended up leading to the inevitable collapse of the civilizations of the New World, facilitating the colonization of America.

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SOURCE OF THE ARTICLE

Not applicable.

FUNDING

Not applicable.

ACKNOWLEDGMENTS

Not applicable.

IMAGE CONSENT

Not applicable.

ETHICS COMMITTEE APROVAL

Not applicable.

CONFLICT OF INTEREST

There is no conflict of interest.

PREPRINT

This paper is not a preprint.

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PUBLISHER

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EDITOR

Alexandre Busko Valim.

HISTORY

Received on: July 24, 2024

Aproved on: May 10, 2025.

How to cite: ALMEIDA Gabrielle Legnaghi de; SANTOS, Christian Fausto Moraes dos. The microscopic settler: smallpox dissemination in the context of european New World exploration. *Esboços*, Florianópolis, v. 32, p. 1-20, 2025.

