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## Cabeza de Vaca and the Introduction of Disease to Texas

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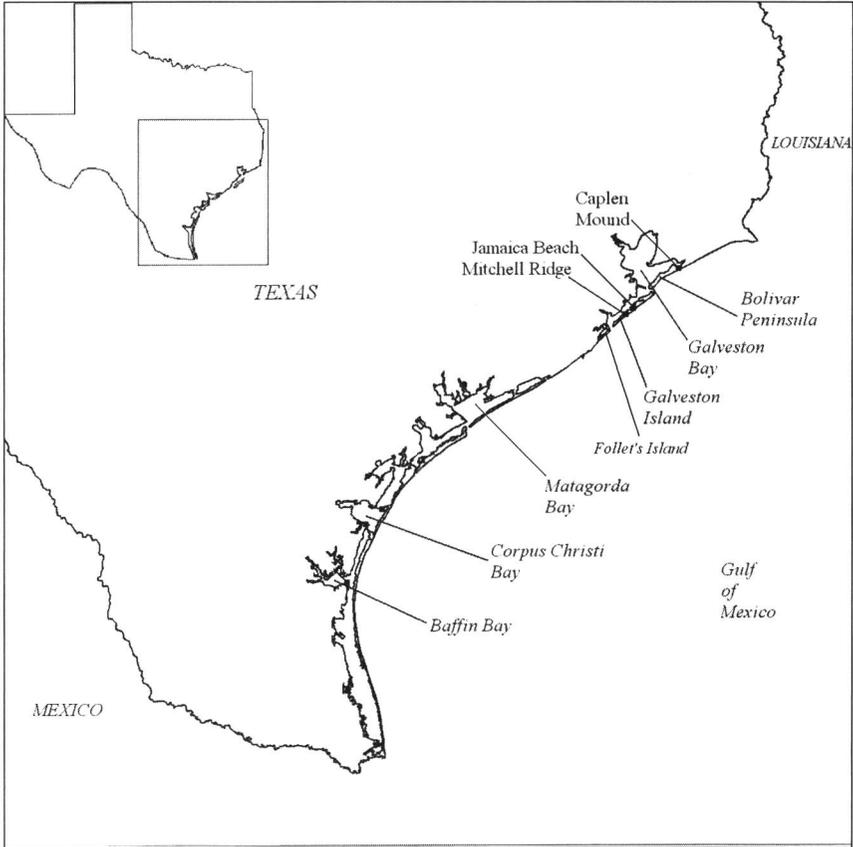
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Map of the Texas coast showing the location of the three archeological cemeteries mentioned in the text. The exact location of the Island of Malhado is unknown, but Galveston Island or Follet's Island are likely candidates. *Map by Matthew S. Taylor.*

# Notes and Documents

## *Cabeza de Vaca and the Introduction of Disease to Texas*

BY MATTHEW S. TAYLOR\*

IN 1528 THE SHATTERED REMNANTS OF A SPANISH EXPEDITION TO LA Florida were cast ashore on the upper Texas coast. Many survivors landed on Galveston Island (or a nearby coastal feature) and were taken in by local Indians. Not long after the starving Spaniards arrived, many of the locals began to die of a mysterious stomach ailment. Many researchers have taken this episode as evidence that the expedition introduced some form of Old World pathogen into what is now Texas. This paper seeks to test that idea by examining the ethnohistoric, epidemiological, and paleopathological evidence. It will also offer alternatives to the traditional interpretation of events.<sup>1</sup>

When Pánfilo de Narváez left Cuba in 1528, he commanded one of the largest conquering forces seen in the Americas up to that point. More than 300 men made landfall on the Florida coast on April 14, 1528, but ultimately only a handful would survive. Narváez blundered his way across Florida, alienating native peoples and losing contact with his supporting fleet. After reaching the area of Apalachee Bay, the remaining Spaniards made improvised barges and attempted to sail to the outpost of Pánuco, more than 900 miles away (1400 kilometers). They mistakenly believed the journey would be a short one.<sup>2</sup>

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<sup>1</sup> Literature that discusses the epidemiological consequences of the Narváez expedition include Cyclone Covey, *Cabeza de Vaca's Adventures in the Unknown Interior of America* (Albuquerque: University of New Mexico Press, 1998); Henry F. Dobyns, *Their Number Become Thinned* (Knoxville: University of Tennessee Press, 1983); John C. Ewers, "The Influence of Epidemics on the Indian Populations and Cultures of Texas," *Plains Anthropologist*, 18 (1973), 104; Dean R. Snow and K. M. Lanphear, "European Contact and Indian Depopulation in the Northeast: The Timing of the First Epidemics," *Ethnohistory*, 7 (1988), 15-33; R. J. Thornton et al., "Depopulation in the Southeast after 1492," in *Disease and Demography in the Americas*, ed. John W. Verano and Douglas H. Ubelaker (Washington, D.C.: Smithsonian Institution Press, 1992), 187-195.

<sup>2</sup> Alex D. Krieger (trans. and ed.), *We Came Naked and Barefoot: The Journey of Cabeza de Vaca across*

The five barges were barely seaworthy, but they managed to make it past the Mississippi River and were finally thrown ashore up and down the coast of Texas in November 1528. Between their embarkation at Apalachee Bay and their landing in Texas, the survivors had very little to eat or drink, were attacked at nearly every landing by native peoples, and suffered from the effects of the elements in an open barge. A total of two barges landed on or near present-day Galveston Island. One of them held the treasurer of the expedition, Álvar Nuñez Cabeza de Vaca. He would be one of only six survivors of the expedition. After many trials and tribulations he and three other castaways—Andrés Dorantes de Carranza, Alonso del Castillo Maldonado, and Esteban—would walk their way across a portion of North America and eventually to Spanish-held territory in Mexico in 1536. Two other members of the expedition were later discovered by the entrada of Hernando de Soto. Juan Ortiz was found in Florida and Lope de Oviedo near the lower Mississippi River.<sup>3</sup>

Cabeza de Vaca later wrote that after they were shipwrecked, only one man had strength enough to climb a nearby tree to gain intelligence of their surroundings. Eventually, they were found by local Indians, probably either Karankawas or Akokisas. These peoples were hunter-gatherer-fishers who inhabited the bays and inlets around Galveston Island. The Spaniards were taken in and fed, but shortly after their arrival some of the Indians began to die. Cabeza de Vaca described the event thus: “Lastly, in a very short time, out of eighty men that in both groups [on the two barges] who had come there were only fifteen who were still alive, and after these deaths the Indians of this land were struck by a stomach disease that killed half of their people, and they believed it was we who were killing them. . . .” The Indians sought to kill the remaining Spaniards, but one of them interceded on behalf of the Europeans, reasoning that if they had the power to inflict disease they would not have killed so many of their own number. Because of this event and several other unfortunate incidents, Cabeza de Vaca and his surviving companions named the island “Malhado,” meaning misfortune or doom.<sup>4</sup>

A second version of this story was recorded by the sixteenth-century historian Gonzalo Fernández de Oviedo y Valdez. His account reads: “Also, an

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*North America* (Austin: University of Texas Press, 2002). For this paper the translation of Alex D. Krieger is preferred, although it is not the only available source. The multivolume work of Rolena Adorno and Patrick C. Pautz, *Álvar Nuñez Cabeza de Vaca: His Account, His Life, and the Expedition of Pánfilo de Narváez* (Lincoln: University of Nebraska Press, 1999) is an excellent translation, but the authors seem to be unfamiliar with regional geography and much of the archeological and anthropological research regarding Cabeza de Vaca’s sojourn with the American Indians of South Texas and the Gulf Coast.

<sup>3</sup> Krieger (trans. and ed.), *We Came Naked and Barefoot*, 1, 32; Donald E. Chipman, *Spanish Texas, 1519–1821* (Austin: University of Texas Press, 1992), 39.

<sup>4</sup> Alvar Nuñez Cabeza de Vaca, “Account of the Disasters,” in Krieger (trans. and ed.), *We Came Naked and Barefoot*, 178, 183 (quotation).

ailment of the stomach struck the natives of the land so that half of them died, and seeing this the Indians had thought of killing those few Christians who remained alive, and [the Indians] said that they [the Christians] had brought that disease and plague to their land. It willed God that one of their leaders said that it should not be done thus, nor should they believe that those Christians had brought that disease to them, since it was seen that they also had died and there were very few of them left, and that if the Christians had brought that disease to them, they would not have died. Thus because of what that leader said they did not kill the Christians.”<sup>5</sup>

Both accounts indicate that the Spaniards were struck by the same ailment that attacked the Indians. The high rate of death experienced by the Indians of Malhado is the event that many researchers take as evidence for the first transmission of Old World pathogens to the coast of Texas.<sup>6</sup> Henry F. Dobyns went so far as to say that when the Indians blamed the Spaniards for the disease they were “biologically correct.” In contrast, David Henige rejects the idea of Old World disease transmission, pointing out that the poor physical condition of the Spaniards could easily render them susceptible to common bacterial infections. He suggested that amoebic dysentery or diarrhea was more likely the cause of the ailment.<sup>7</sup>

Of interest is one of the descriptions that Cabeza de Vaca gave of some food-gathering strategies on Malhado Island. “Their occupation of this island is from October to the end of February. Their subsistence consists of the roots . . . taken from under [the water] in November and December. They have weirs and they have no more fish from about this time. . . .” He also mentioned that local Indians would collect oysters from the shallows. These food-gathering strategies may have led to the Indians or Spaniards coming in contact with a water-borne pathogen, whether bacterial or viral.<sup>8</sup>

Several diagnoses have been made regarding the disease that felled the Indians of Malhado. Dean R. Snow and K. M. Lanphear and Russell Thornton et al. suggested that the disease was typhoid fever. Cyclone Covey and David Henige have hypothesized it was infectious dysentery. John Ewars postulated that cholera was the culprit. In order to pin down a possible diagnosis, the epidemiology of these maladies must be examined.<sup>9</sup>

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<sup>5</sup> Gonzalo Fernández de Oviedo y Valdez, “Historia General y Natural de las Indias, Book 35,” in Krieger (trans. and ed.), *We Came Naked and Barefoot*, 257.

<sup>6</sup> Dobyns, *Their Number Become Thinned*, 261; Ewars, “The Influence of Epidemics on the Indian Populations and Cultures of Texas,” 107; Snow and Lanphear, “European Contact and Indian Depopulation in the Northeast,” 17; Thornton et al. “Depopulation in the Southeast after 1492,” 190.

<sup>7</sup> Dobyns, *Their Number Become Thinned*, 261; David Henige, “Primary Source by Primary Source? On the Role of Epidemics in New World Depopulation,” *Ethnohistory*, 33 (Summer, 1986), 300.

<sup>8</sup> Cabeza de Vaca, “Account of the Disasters,” 183.

<sup>9</sup> Snow and Lanphear, “European Contact and Indian Depopulation in the Northeast,” 17; Thornton et al., “Depopulation in the Southeast after 1492,” 190; Covey, *Cabeza de Vaca's Adventures in the Unknown Interior of America*, 60; Henige, “Primary Source by Primary Source?,” 300; Ewars, “The Influence of Epidemics on the Indian Populations and Cultures of Texas,” 108.

Typhoid fever is caused by the bacterium *Salmonella typhi*. It infects a human host via food or water contaminated by infected individuals. Symptoms manifest between eight and fourteen days of ingesting the bacteria. They include fever, headache, joint pains, sore throat, and constipation. Additionally, appetite loss and abdominal pain may also be present. Later, a fever will develop that will rise for two or three days and continue to up to two weeks. During the fever period, the infected individual may suffer nosebleed, bronchitis, and delirium. Serious cases of the disease may result in bloody diarrhea, apathy, and severe intestinal ulcers that become infected.<sup>10</sup>

Cholera is a bacterial disease caused by *Vibrio cholerae*. The bacterium enters the body by consumption of contaminated water or food. Contaminated food may take the form of fruits and vegetables washed with tainted water or raw shellfish from fouled bodies of water. Symptoms include incessant diarrhea, vomiting, and severe muscle cramps. The primary cause of death from cholera is dehydration resulting from a toxin produced by the bacterium that instigates the flow of fluids from the blood into the intestines. Cholera is native to India and it is not thought to have spread to Europe before the nineteenth century. However, Portugese sailors may have come into contact with the disease along the Malabar coast in 1498.<sup>11</sup>

Dysentery has several different forms. Contagious dysentery, or shigellosis, is caused by the bacteria of the genus *Shigella*. Symptoms appear eight hours to eight days after ingestion. They begin with nausea, vomiting, severe diarrhea, stomach cramps, weakness, poor vision, headache, and difficulty swallowing. A person is infectious for about a month after diarrhea appears. The *Shigella* bacteria are found in contaminated food and water. Dogs that ingest infected human feces can transmit the disease to humans. The bacteria can also be spread by sexual contact. Shigellosis has a low mortality, and most individuals infected with the disease will recover on their own.<sup>12</sup>

There are few accounts of native infectious pathogens on the Texas Gulf Coast. At best, there is only anecdotal evidence. The eighteenth-century Spanish mission of Nuestra Señora de la Luz, located on the eastern shore of Galveston Bay, was plagued by mosquitoes, flies, periodic flooding, and poor water. These conditions resulted in chronic bouts of dysentery. When Anglo-American settlement began in 1820, the coastal fringe had a reputation as an unhealthy, disease-ridden place that was best avoided.<sup>13</sup>

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<sup>10</sup> Carol Turkington and Bonnie L. Ashby (eds.), *The Encyclopedia of Infectious Diseases* (2nd edition; New York: Facts on File, 2003), 309.

<sup>11</sup> Ibid. 53–54; Rita R. Colwell, “Global Climate and Infectious Disease: the Cholera Paradigm,” *Science*, 274 (Dec., 1996), 2025–2031.

<sup>12</sup> Turkington and Ashby (eds.), *The Encyclopedia of Infectious Diseases*, 269.

<sup>13</sup> Chipman, *Spanish Texas, 1519–1821*, 165; Robin W. Doughty, *Wildlife and Man in Texas: Environmental Change and Conservation* (College Station: Texas A&M University Press, 1983), 18–20.

In addition to the historical record of events, paleopathological analysis can provide important information about past patterns of human health and disease. An examination of the paleopathological record of the Galveston Bay area is necessary in order to evaluate properly the likelihood of Old World disease transmission by the members of the Narváez expedition. Luckily, the archeological record of the area is rich in osteological data.<sup>14</sup>

Acute infectious diseases rarely leave their mark on the skeleton, usually because the infected individual dies before osseous lesions can develop. This can obscure the factual record of past human health and render epidemic episodes invisible. However, many chronic diseases leave a tell-tale pattern of lesions on the skeleton. Study of these osseous lesions provides a very important source of inferential information on the health of past peoples.<sup>15</sup>

Paleopathological studies in other parts of North America reveal that native peoples were not living in a disease-free environment. Diseases such as tularemia, giardia, rabies, amoebic dysentery, hepatitis, herpes, pertussis, and poliomyelitis were present in native groups before European contact. Generally, North American native diseases were of an episodic and chronic nature, rather than acute and epidemic.<sup>16</sup>

Several cemeteries have been discovered in the Galveston Bay area that are broadly contemporaneous with the landing of Cabeza de Vaca. These sites are Caplen Mound (41GV1), Jamaica Beach (41GV5), and Mitchell Ridge (41GV66). Caplen Mound is located on the Bolivar Peninsula and was excavated by archeologists from the University of Texas in 1932. A total of sixty-six burials were uncovered and artifacts were removed that included items from the early Historic period of the Texas coast.<sup>17</sup>

The Jamaica Beach cemetery, located at about the midpoint of Galveston Island, contained a total of nineteen burials. The site was excavated by members of the Houston Archeological Society on behalf of the Houston Museum of Natural Science. Later radiocarbon assays dated the site to between A.D. 1200 and 1500.<sup>18</sup>

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<sup>14</sup> Clark S. Larsen, *Bioarchaeology: Interpreting Behavior from the Human Skeleton* (Cambridge, Cambridge University Press, 1997), 2.

<sup>15</sup> *Ibid.*, 64; Donald J. Ortner, "Skeletal Pathology: Probabilities, Possibilities, and Impossibilities," in *Disease and Demography in the Americas*, ed. John W. Verano and Douglas H. Ubelaker (Washington, D.C.: Smithsonian Institution Press, 1992), 5-13.

<sup>16</sup> Debra L. Martin and Alan H. Goodman, "Health Conditions before Columbus: Paleopathology of Native North Americans," *Western Journal of Medicine*, 176 (Jan., 2002), 65-68; see disease entries in Donald J. Ortner and W. G. J. Putschar, *Identification of Pathological Conditions in Human Skeletal Remains* (Washington, D.C., Smithsonian Institution Press, 1985).

<sup>17</sup> Thomas N. Campbell, "Archeological Investigations at the Caplen Site, Galveston County, Texas," *Texas Journal of Science*, 9 (1957), 448-471.

<sup>18</sup> Ray Ring, "41GV5 The Jamaica Beach Site," *Bulletin of the Houston Archeological Society*, 10 (1963); Jennifer L. Z. Rice, "Paleopathology at Jamaica Beach (41GV5) in Galveston, Texas," *Bulletin of the Texas Archeological Society*, 74 (2003), 141-148.

Another contact-era cemetery, Mitchell Ridge, was found on Galveston Island, not far from Jamaica Beach. A total of fifty-one burials were removed from the site along with artifacts such as marine-shell beads, bird-bone whistles, prismatic blades, drills, bifacial knives, bifaces, utilized flakes, glass trade beads, red ochre, and a small brass bell. Radiocarbon assays dated four burials to the early part of the Late Prehistoric (A.D. 700–1300), six burials to the later Late Prehistoric (A.D. 1300–1500), two to the Protohistoric (A.D. 1500–1700), and eight to the early Historic (A.D. 1700–1800).<sup>19</sup>

The skeletal samples from all three of these cemeteries display a relatively high rate of chronic infectious lesions. In the Caplen Mound sample, over 30 percent of the adult tibiae showed evidence of periostitis, osteitis, and osteomyelitis. Joseph Powell, in his study of the Mitchell Ridge sample, reported similar high rates of infectious lesions. The same pattern was also observed at Jamaica Beach. Infectious lesions were found most commonly in the tibiae, followed by the fibulae and femora.<sup>20</sup>

Many of these lesions are indicative of a specific disease process known as treponematosis, or congenital syphilis. Treponematosis was an endemic disease common to most areas of North America, and Texas was no different. In a study of endemic treponematosis on the eastern portion of the Texas Gulf Coastal Plain, Diane Wilson found relatively high rates of characteristic osseous lesions. The highest rates of treponemal lesions appeared in the samples closest to the coast. During the Late Prehistoric, 23.8 percent of the individuals in the gulf coast samples suffered from treponematosis. Inland Late Prehistoric samples suffered rates of 0 percent (in Central Texas), 5.5 percent (Late Caddo), and 25.7 percent (Protohistoric East Texas).<sup>21</sup>

In contrast to the high rates of chronic lesions, the indigenous populations of the upper Texas coast seem to have enjoyed a very successful subsistence strategy. Estimated adult statures from Mitchell Ridge and Caplen Mound indicate that the populations were well nourished. The average estimated stature of males at Caplen and Mitchell Ridge are 171.5 cm and 171.6 cm (5'8"), respectively. Females averaged 159.8 cm (5'3") at Caplen and 158.5 cm (5'2") at Mitchell Ridge. Males attained an estimated stature

<sup>19</sup> Robert A. Ricklis, *Aboriginal Life and Culture on the Upper Texas Coast: Archaeology of the Mitchell Ridge Site, 41GV66, Galveston Island* (Corpus Christi: Coastal Archaeological Research, 1994).

<sup>20</sup> Matthew S. Taylor, "Late Prehistoric Infectious Disease on the Upper Texas Coast: Caplen Mound (41GV1)," *American Journal of Physical Anthropology Supplement*, 40 (2005), 204; Joseph F. Powell, "Bioarchaeological Analysis of Human Skeletal Remains from the Mitchell Ridge Site," in *Aboriginal Life and Culture on the Upper Texas Coast: Archaeology of the Mitchell Ridge Site, 41GV66, Galveston Island* (Corpus Christi: Coastal Archaeological Research, 1994), 287–405; Rice, "Paleopathology at Jamaica Beach (41GV5) in Galveston, Texas," 143.

<sup>21</sup> See chapters in Mary L. Powell and Della C. Cook (eds.), *The Myth of Syphilis: The Natural History of Treponematosis in North America* (Gainesville: University Press of Florida, 2005); Diane E. Wilson, "Treponematosis in the East Texas Gulf Coastal Plain," in Powell and Cook (eds.), *The Myth of Syphilis*, 162–176.

that was 96.7 percent of the average stature of modern Americans. Females fared even better, achieving 98.5 percent of the modern average.<sup>22</sup>

The paleopathological data of the upper Texas coast illustrate a complex picture of community health. Local populations were well nourished and showed little evidence of nutritional stress. On the other hand, they suffered frequently from chronic infectious diseases, such as treponematosiis, which left a lasting signature on their remains. Although treponematosiis is not the disease described by Cabeza de Vaca, we can infer that if one native contagious infectious disease was present, then there were probably others as well. Because acute infectious diseases generally do not leave lesions on the skeleton, one can only hypothesize about their impact on these hunter-gatherer populations. Acute infectious episodes could infect hunter-gatherer populations by way of human to animal transmission (zoonoses) or through vectors such as fleas, ticks, and mosquitoes.<sup>23</sup>

Based upon the available historic, ethnohistoric, and anthropological data, it is unlikely that the survivors of the Narváez expedition transmitted Old World pathogens to the Texas coast. The reasons for this finding include: (1) the small number of the Spaniards, (2) the time between their embarkation from Cuba and their arrival in Texas, (3) the lack of any disease before the episode on Malhado, (4) the presence of native infectious pathogens, and (5) the death rate of the Spaniards exceeding that of the Indians. Each of these reasons alone would be enough to cast a reasonable doubt on the idea of disease transmission by the Narváez expedition, but each one must be examined more carefully.

The expedition led by Panfilo Narváez consisted of approximately 300 men of fighting age (i.e. men that were at the prime of life). There is no record of any women or children aboard. In a survey of the 1519 conquistadors of Mexico, Grunberg found that over 70 percent were under the age of thirty. Probably most of the men in the expedition had been exposed to a variety of infectious agents while they were still children. This exposure would have created immunities to the most common Old World communicable diseases.<sup>24</sup>

Disease transmission is reliant upon contact between an infected person and a susceptible one, but if enough of the host population is immune to the disease, then the chain of transmission will be broken. The population

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<sup>22</sup> Matthew S. Taylor, "Estimations of Stature as an Indicator of Health in Prehistoric Hunter-Gatherers" (presentation given at the meetings of the Texas Archeological Society, Austin, Texas, 2005).

<sup>23</sup> T. A. Cockburn, "Infectious Disease in Ancient Populations," *Current Anthropology*, 12 (1971), 45-62; George J. Armelagos, "Health and Disease in Prehistoric Populations in Transition," in *Disease in Populations in Transition*, ed. Alan C. Swedlund and George J. Armelagos (New York: Bergin and Garvey, 1990), 127-144.

<sup>24</sup> Bernard Grunberg, "The Origins of the Conquistadors of Mexico City," *Hispanic American Historical Review*, 74 (May, 1994), 275; Ann F. Ramenofsky, *Vectors of Death: The Archaeology of European Contact* (Albuquerque: University of New Mexico Press, 1987), 148-149.

has what is referred to as “herd immunity.” Given that the members of the expedition made up a select group of young adult males, it seems likely they would have met the criteria for herd immunity. This would have made it very difficult for an Old World communicable disease to sustain itself for very long. To put it simply, the population that made up the Narváez expedition was not large enough, nor diverse enough (i.e. no women or children), to sustain a virulent contagion for very long.<sup>25</sup>

When the expedition landed on Florida it had been about forty-nine days since it had last set foot on Cuba. Old World infectious agents have varying latency periods, but the ones most associated with New World virgin-soil epidemics, such as cholera, typhoid fever, measles, and smallpox, have an incubation period of between six hours to twenty days. Cabeza de Vaca, however, makes no mention of any sickness on their way to Florida. Had typhoid fever or any other contagious infection hitched a ride aboard the ships, it would have made itself known before the Spaniards set foot on the continent. Furthermore, some of the diseases suggested for the epidemic on Malhado were not yet present in Europe by 1528. Cholera, which was the diagnosis of John Ewers, did not spread outside of south Asia until 1817. Therefore, it is the most unlikely of the diseases postulated in the literature.<sup>26</sup>

What is often lost in the discussion of possible disease transmission on Malhado is the high mortality rate of the Spaniards. Cabeza de Vaca reported that about half of the Indians died. This is a very high number, but the Spaniards suffered more. Only fifteen of eighty Spaniards survived the epidemic, a death rate of over 81 percent. Granted, the Spaniards were suffering from undernourishment and exhaustion, but it seems strange that the Europeans would have suffered more greatly from an Old World disease than the Indians. A mortality rate of 81 percent might even suggest a virgin-soil epidemic in reverse.

North America before Columbus was not a disease-free zone. It is certain that indigenous American populations endured and combated native diseases. In fact, some scholars have suggested that native New World hemorrhagic fevers, and not Old World pathogens, were responsible for depopulation in central and southern Mexico in the sixteenth century. Although it is not the disease mentioned by Cabeza de Vaca, it is well documented that treponemal disease was present in North America well before European contact. On the Texas coast itself, the bones of pre-contact individuals tell us that treponemal

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<sup>25</sup> Kenrad E. Nelson, “Epidemiology of Infectious Disease: General Principles,” in *Infectious Disease Epidemiology: Theory and Practice*, ed. K. E. Nelson et al. (Gaithersburg, Md.: Aspen Publishers, 2001), 39.

<sup>26</sup> Krieger (trans. and ed.), *We Came Naked and Barefoot*, 22–23; Nelson, “Epidemiology of Infectious Disease,” 28; Ewers, “The Influence of Epidemics on the Indian Populations and Cultures of Texas,” 108; Colwell, “Global Climate and Infectious Disease,” 2025.

disease was a chronic and serious challenge to community health. While it is nearly impossible to observe the effect of acute infectious pathogens in past populations, the presence of treponemal disease indicates that infectious pathogens existed on the upper Texas coast before Europeans landed. Based on the available data, one can infer that other diseases may have been present that left no mark on human bone, making them invisible in the paleopathological record. Some recently described viruses may eventually shed more light on the disease history of North America.<sup>27</sup>

For example, the Norwalk family of viruses may have been present in the pre-contact New World. The first recognized outbreaks of the Norwalk virus occurred in North America, suggesting that it may be a native pathogen. These viral agents have been known to infect humans via marine molluscan vectors, an important fact given that Cabeza de Vaca mentions that the inhabitants of Malhado exploited the shallow oyster beds around the island. Norwalk viruses cause nonbacterial gastroenteritis with symptoms including severe diarrhea and vomiting. These symptoms would certainly fit the description of the disease given by Cabeza de Vaca.<sup>28</sup>

Based upon the evidence presented in this paper, it is highly unlikely that the survivors of the Narváez expedition transmitted Old World disease to the inhabitants of the Texas coast. The most circumspect explanation is that the indigenous inhabitants of Malhado were struck by a native pathogen that wreaked more havoc upon their guests than upon themselves. Incidences of disease transmission between the Old World and North America have been well documented. There is no doubt that pathogens unwittingly brought by European explorers resulted in massive depopulation of great swaths of the Americas. However, it is improbable that Cabeza de Vaca and the other survivors of the disastrous Narváez expedition were responsible for the first introduction of these diseases to Texas.

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<sup>27</sup> Rodolfo Acuña-Soto et al., "Large Epidemics of Hemorrhagic Fevers in Mexico 1545–1815," *American Journal of Tropical Medicine and Hygiene*, 62 (June, 2000), 733–739; see chapters in Powell and Cook (eds.), *The Myth of Syphilis*; Wilson, "Treponematoses in the East Texas Gulf Coastal Plain."

<sup>28</sup> Caul, "Viral Gastroenteritis: Small Round Structured Viruses, Caliciviruses and Astroviruses. Part I. The Clinical and Diagnostic Perspective," *Journal of Clinical Pathology*, 49 (Nov., 1996), 874, 876; Scott R. Rippey, "Infectious Diseases Associated with Molluscan Shellfish Consumption," *Clinical Microbiology Reviews*, 7 (1994), 419–425; Cabeza de Vaca, "Account of the Disasters," 186.