Part IV - Special Studies and Perspectives

27. Diseases Recorded in Historical Documents

Diana Maul de Carvalho

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Diseases Recorded in Historical Documents

Diana Maul de Carvalho

THEORETICAL AND METHODOLOGICAL ISSUES

Building interfaces between scientific fields involves the “translation” of propositions, among other problems. In order to establish a common language, it is necessary to explain the meaning of the concepts in this process. Otherwise, scientific polysemy can lead to an apparently complex discourse which is often merely confusing and with no analytical potential. The history of medicine and the discussion of diseases from a historical perspective demand dialogue between clinical practice, epidemiology, and the human sciences.

Natural history distinguishes man as a unique species among living beings. This man, the measure of all things, allows constructing the discourse of history. With a permanent view, man creates a collective past, future, and present. Nineteenth-century evolutionism situated man as the limit of evolution, fixing his characteristics as a species.

Such permanence, extending to the basic biological characteristics of physiological processes, allows constructing an epidemiological discourse. If we accept these assumptions, we can speak of a historical epidemiology or a history of diseases.

What is a “disease”? And why do we study its history? The study of diseases from a historical perspective involves the very concept of disease and its limits, among other questions. Grmek (1983) proposed to write not a history of knowledge on diseases or of social practices related to them, but rather a history of diseases themselves. In fact, he chose to define disease based on findings (or descriptions) of signs and symptoms and anatomopathological lesions that now correspond to known diseases, or to states classified as potentially pathological. The archaeological material that Grmek included in his studies on diseases in Classical Antiquity – tissues, especially bones, in addition to other findings – oriented the choice of a criterion that could have stability for a relatively long period of time, measured in thousands of years, and which could in a sense be ahistorical.

The theoretical model proposed by Grmek – pathocenosis – originated in the discussions of pathobiocenosis by Pavlovsky (s.d.). However, by removing “bio” from the term, Grmek launched the challenge of including “social variables” in the analysis of diseases in human populations, akin to the concepts of “human ecology”.¹

According to this model, when discussing diseases in the past, we deal with the concepts of possibility and probability of the presence of a given disease entity by constructing it based on epidemiology. An important theoretical impasse has been the inclusion of “social variables” in this model. Thus, possibility is basically defined by comparing the signs and symptoms described in documents or found in mummified tissues with those constituting disease states as currently defined.

We can also use this procedure to discuss the presence of diseases that are now unknown. Just as we speak of “emerging diseases”, we can also conceive of “submerged diseases”. Meanwhile, the probability of occurrence is not defined primarily by the clinical picture, but rather by “epidemiological evidence”, by the presence of factors called “determinants”, “risk factors”, and “associated variables” of the disease in question, depending on the model applied to it.

Signs and symptoms are considered direct expressions of the pathophysiological process and are thus relatively permanent and structural. Epidemiological evidence is circumstantial or contextual. Thus, across long periods of time, even tens of thousands of years, we expect possibilities to be stable and probabilities to vary. These issues apply to both paleopathological analyses and the study of texts and other documents.²

Other authors such as Charles Rosenberg (1992)³ take a different approach. In constructing a social history of diseases, they define diseases by their “social recognition” and study the context and actors involved in this construction.⁴ However, the Grmek of AIDS (1989) is closer to Rosenberg than the Grmek of “archaeological” diseases. The methodological options in constructing this object are unexpectedly complex. At first sight, some choices appear largely oriented by the documental base itself: where only bones exist, we attempt to reconstruct a pathocenosis. Where there are abundant written documents, we choose to reconstruct the string of discourses pertaining to that disease. We suggest that such approaches are not mutually exclusive, although they involve different methodological challenges.

Other chapters of this book discuss the methodological issues involved in the construction of pathocenosis based on archaeological remains. Here, we pose several questions involved in the study of written documents – drawing on some examples – to construct the history of diseases, with Grmek and Rosenberg as possible theoretical and methodological references, but fundamentally considering the possibility of constructing pathocenosis.

For methodological developments, the “evidential paradigm” proposed by Carlo Ginzburg (1986) can serve as the guiding thread for studies on the history of diseases. Of course we do not intend to exhaust the discussion of these methodological questions, and the selection of examples is necessarily skewed by the attempt to present a range of situations illustrating the impasses and potential solutions. The examples should also illustrate our view that the history of diseases is not meant to identify “historical characters” that, when “personified” in microorganisms,

¹ For a discussion on the concepts of human ecology, see Follér & Hansson (1996) and Coimbra Junior et al. (2002).

² Rothschild (1981) and Stanley & Joske (1980) are two anthologies that represent the discussions and initiatives (as of the 1970s) on interdisciplinary studies, which at that time were markedly evolutionary and akin to the proposals of Grmek and other authors.

³ See also Rousseau et al. (2003).

⁴ For a review of the concepts and theoretical positions in the social history of diseases, see Nascimento & Silveira (2004).

acquire autonomy as agents and as a unique explanation for the events.⁵ We see the history of diseases as an important marker for the ways human societies are organized, their modes of production, and their interventions in the environment that allow defining territory as the space built by human movement (Santos, 1996) – a human creation, of which diseases are an essential component.

DISEASES RECORDED IN TEXTS

We define “texts” as a wide variety of documents, ranging from those where one would explicitly expect to see diseases described (or at least named), such as death certificates and patient records, to literary works, which can also contain evidence of their presence. Here, we only consider texts from the so-called “Western tradition” of medicine, in a few European languages, and recorded from the 15th century to the present.

The interpretation of such texts should consider that our reading may not identify (as diseases) events that are not recognizable as such today (unless explicitly named). Meanwhile, events that were not considered abnormal in the past will also probably be underrepresented, even though they correspond to diseases that are now properly identified.

From the 18th to the 19th century, from classificatory to pathophysiological medicine, from Pinel to Claude Bernard, disease moved from a set of signs and symptoms that allow a phenotypic classification to an expression of altered functions with a definable “normal”; a pathophysiology with a material substrate.

The phenotypic classificatory medicine of the 18th century only recognized disease based on the diseased individual, after the fact. Medicine with a pathophysiological basis, in the 19th century, proposed to define “normal” positively, not only as absence of the perceived disease. It was thus possible to find the disease before the fact and “discover” the diseased individual by comparison with the “normal”.

The operationalization of these concepts led to profound changes in medical practice. Medicine assumes that pathological phenomena are identical to the corresponding normal phenomena, except for quantitative variations (Canguilhem, 1990). In so doing, medicine assumes not only the capacity to recognize diseased individuals, to name diseases, and to treat them, but also to define the diseased individual (including the negation of his own recognition), embodying in the physician the role of defining a social value, namely health.

New issues emerged from the 19th to the 20th century. Diseases could now be seen not only as the result of changes in the internal milieu affected by external aggressors, but as the result of ecological relations. Cannon (1939), with the theory of homeostasis, signaled this issue by discussing the equilibrium between the internal and external milieus. Selye (1956), by developing the theory of stress and defining the general adaptation syndrome and diseases of adaptation, elaborated on questions raised by Broussais (1828) with his theory of irritation. Furthermore, expanding on the theory of homeostasis, he attempted to solve one of the impasses in pathophysiological clinical medicine (namely, that altered individuals are not always ill), to the point of proposing that some deficiencies can be protective.

The observation of patterns of death in the collective body also allowed the development of a human ecology, which immediately included social relations in the determination of disease. Disease now became an attribute that was no longer exclusively one of diseased individuals, but of a certain social formation. The realization that death is not a random, unpredictable event, but that there are different patterns for different sets of humans, different forms

⁵ See, for example, Crosby (1986) and Diamond (1997).

of illness and dying, had been recurrent in authors from “Western medicine” since Hippocrates. However, the 19th century certainly witnessed new elements in this discussion (Chadwick, 1965; Engels, [1845] 2008).

The 20th century ushered in a new theoretical and methodological development in the study of these issues through the incorporation of knowledge from biology, human and social sciences, mathematics, and statistics into a new discipline – epidemiology.

It thus became possible to study the disease without the patient. Of course bouts of a given disease occur in actual individuals, the ill. But this new vision allowed studying the determinants of the occurrence and distribution of diseases and patterns of illness without immediate reference to the patient (Terris, 2005). The 20th century also witnessed an unprecedented “standardization” of diagnostic criteria and definition of diseases with the establishment of an International Classification of Causes of Death, now the International Classification of Diseases (ICD), already in its 10th Revision and adopted by all the member countries of the World Health Organization (WHO) (1990). The consensus is so great in this classification that we tend to forget that fewer than a hundred years ago there were classificatory keys in dispute that could vary from one author to another. Furthermore, the same name could refer to what were different diseases (according to the current key), while different names could refer to the same disease.

READING TEXTS AND PERFORMING DIAGNOSES

We will provide examples to illustrate several issues raised by the use of written documental sources for discussing the history of diseases. We will leave aside problems in reading that arise from difficulty in comprehension due to “physical” problems with the text – the manuscripts’ handwriting, fonts, deterioration of the material – as well as problems in translation. We will thus focus on issues related to changes in the theoretical basis for defining diseases and classificatory keys and the social context for the production of the documents.

The first example is scurvy, a name that has survived for centuries. What relationship can we establish between its current meaning and that of four hundred years ago? Are we talking about the same disease? The second example deals not with changes in the “medical context” but rather potential problems in identifying the possible meaning of absence of “expected diagnoses”. In the third example, we discuss diagnoses that are impossible, at least based only on a reading of the texts.

Diseases in mutation

Carpenter (1988) wrote *The History of Scurvy and Vitamin C*, possibly the most complete review of the subject to date, citing 722 references in the text, including 298 books. The introduction states that next to hunger, scurvy is probably the nutritional deficiency that has caused the most suffering in human history. This means that scurvy has historically outstripped pellagra, beriberi, vitamin A deficiency, and even kwashiorkor. No small feat. Even today, populations submitted to major food restriction or alcoholics frequently present pellagra.

The World Health Organization considers vitamin A deficiency an important cause of blindness in the world, motivating a specific vitamin A supplementation program. Scurvy appears to have disappeared. Carpenter (1988), like other authors, situates scurvy’s heyday at the time of the great seafaring voyages, the theme of his first chapter. As he reports, oranges were already known to cure scurvy. He mentions the diary by Fray Antonio de la Ascención in 1602 on an expedition along the coast of California, reporting that various sailors had come down with the same highly lethal disease that routinely attacked crews on route from the Philippines to Mexico, around Cape Mendocino.

The first symptom was pain throughout the body, making the person extremely sensitive to touch. Some could not even bear the touch of their blankets.

Next, livid spots appeared (especially from the waist down), the gums swelled, the teeth came loose, and the person often died suddenly, while talking.⁶ Carpenter (1988) explains how in the 17th century, scurvy, or the “scourge of the sea”⁷, became recognized as an important chapter in nosology, classified as acid or alkaline. Scurvy became so ubiquitous that Thomas Sydenham (1769) claimed that the two main subterfuges of ignorant physicians were malignancy and scurvy, which they blamed for disorders and symptoms that often resulted from their own prescriptions.

Henri van Holsbeek (1860), a Dutch physician experienced in the maritime routes to Asia, wrote a treatise on naval hygiene and medicine. The book has an interesting structure, because unlike most modern medical textbooks, it does not delve directly into the description of diseases. Rather, the first three chapters discuss the peculiarities of life at sea and its relationship to health. The author emphasizes the risks that differ from those on dry land, especially isolation, malnutrition, and poor accommodations, in addition to backbreaking work. He highlights differences in the environment, with high humidity and constant temperature changes. He describes the seas and the earth’s climates.

Van Holsbeek’s third chapter provides a detailed description of ships and highlights the risks due to problems in their construction, pointing out that ships built of green timber caused serious intermittent fevers among the crew. He identifies risks with the cargo and the various parts of the ship related to humidity, heat, stagnated air, and lack of light. Such insalubrious conditions were the purported cause of outbreaks of “ship fever” and other frequently epidemic diseases. He says that provisions were a frequent cause of diseases and that water should be stored in iron as opposed to wooden barrels, in which water acquired a loathsome stench and taste.

Van Holsbeek states that scurvy was now (i.e., in 1860) rare at sea, that it appeared to be endemic in all countries above 60 degrees latitude, on the Baltic coasts, in Iceland and Greenland, and that in the temperate parts of Europe it used to be epidemic, but had disappeared with progress in hygiene and civilization. He attributes scurvy to humidity, lack of light, stagnated air, poor nutrition, moodiness, overuse of dried and salted meats, lack of fresh vegetables, and consumption of rotten meat and spoiled water. He also claims that excessive use of spices that required large amounts of gastric juice for digestion contributed to scurvy. Fresh vegetables, citric fruit juices, and alcoholic beverages prevented scurvy.

James Lind’s classic *Treatise of the Scurvy* in 1754 (edited by Stewart & Guthrie, 1953) agreed with the theories then in vogue that attributed scurvy to humidity, poor diet, stagnated air, and lack of hygiene and exercise. His recommendations were basically bathing before embarking, clean and dry clothing, careening the ships, adequate water storage, and provision of fresh foods (greens, vegetables, and fruits). Since provisions were difficult to preserve, he suggested measures to concentrate and preserve orange and lemon juice, plus the use of onions, which kept better. Commenting on the last version of the treatise, from 1772, Carpenter (1988) shows that Lind’s classical experiment was actually planned to demonstrate that sulfuric acid and vinegar had no effect against scurvy. Lemon and orange juices were the “positive control”, since Lind had no doubt about their anti-scurvy properties. However, the sailors serving as negative controls, maintained under a diet that contained no vitamin C, were also cured just as quickly as those who drank fruit juices.

⁶ Importantly, no modern physician would consider a diagnosis of scurvy based on this report, except as a remote possibility.

⁷ For a discussion of this “construction” of disease, see Grmek (1968).

Carpenter contends that the sailors had tricked Lind. For the cases he found of cure at sea, the author offers only three possible explanations: unwitting use of fruits, lying, or placebo effect. He never considers the possibility that the reported disease was not what we now call scurvy.

We now comment briefly on two classical reports of scurvy related to the early transoceanic voyages in the late 15th and early 16th centuries: Vasco da Gama's route to the Indies and Ferdinand Magellan's circumnavigation. In light of current diagnostic criteria, we attempt to establish points of agreement or disagreement in the voyagers' accounts and discuss possible alternative diagnoses. We use versions of the travel diaries that we consider reasonably trustworthy for the purposes of this work. We will not discuss the possible lack of correspondence between terms used in the description of plants, animals, or even signs and symptoms and their current meanings.

VASCO DA GAMA'S VOYAGE (CHAUNU, 1969; CHANDEIGNE, 1992; VELHO, 1998)

On July 8, 1497, a fleet of four ships (one of which carrying provisions) set sail from Lisbon. On July 27 they anchored in Cape Verde, staying for a week. From August 3 to November 7 they sailed out across the open South Atlantic, without landing. They reached the Bay of St. Helena, where they stayed for eight days, careened the ships, mended the sails, took in wood, and made contact with the natives. They set sail again on November 16, rounding the Cape of Good Hope on the 22th. On November 25 they anchored for 12 days in what is now Mossel Bay. They took in water, distributed the provisions among the three main vessels, and destroyed the storage ship. On December 8 they set out to sea again, and on January 11, 1498, they took in water at Mozambique Island. On January 24 they reached the mouth of the Quelimane:

“We spent thirty-two days in the river, taking in water, careening the ships, and repairing the *Raphael's* mast. Here many of our men fell ill, their feet and hands swelling, and their gums growing over their teeth, so that they could not eat.” (Velho, 1997: 168, our italics)⁸

They continued sailing along the coast till reaching Malindi, where they hired an Arab pilot to help guide them across the Indian Ocean. On April 24 they left Malindi and crossed the Indian Ocean, dropping anchor close to Calicut on May 20. They stayed there for three months, sailing next towards Anjediva. They began their return voyage to Portugal on October 5, 1498, reaching Malindi on January 2, 1499, where scurvy took new victims.

They set sail from Malindi on January 11, with two ships. They dropped anchor on March 3 and later on April 25. The first vessel reached Lisbon on July 10, 1499, bringing word of the newly-discovered maritime route to the Indies. Vasco da Gama, with his brother ill, was delayed and probably reached Portugal between August 29 and September 9.

FERDINAND MAGELLAN'S VOYAGE (PIGAFETTA, [1524?] 1985)

The circumnavigation of the globe started festively on Monday morning, August 10, 1519. Five ships with 237 men set sail from Seville for the maritime port of Sanlúcar. The crew slept onboard in Sanlúcar, getting off on land every morning. They set sail from this port on September 20, reaching Tenerife on September 26, where they stayed in port for three days to take in water and coal. They stayed for two more days in Monterroso, where they fished for shark. On an unknown date they reach a point on the Brazilian coast, where they took in abundant provisions, including chickens, potatoes, pineapples, sugar cane, tapir meat, geese, and fish.

⁸ Interestingly, the editor of this ship's log, Eduardo Bueno, in his note 5 on page 143, assumes that this report is “the first mention of scurvy in the history of navigations by the European peoples” and that the disease is “the result of poor nutrition onboard and lack of vitamin C”.

On December 13 they reached Rio de Janeiro, where they described an animal consistent with a golden lion tamarin. They left Rio de Janeiro on December 27, sailing southward along the coast. They found and hunted penguins, storing abundant provisions. On May 19, 1520, they set into port for the winter, building a house for a forge and a warehouse for the victuals and other goods. They remained anchored for five months and captured two Patagonians. On October 21, 1520, they resupplied the ships with water, firewood, and fish and prepared to set sail across the open ocean.

One of the vessels set off to return to Spain, taking along a Patagonian who died during the voyage. On the Brazilian coast they had captured a native whom the fleet took along on the Pacific crossing. On November 28 they entered the Pacific, where they sailed for three months without tasting any fresh food. Their provisions ran out, including the hardtack. The crew reached the point of eating rats, leather, and sawdust. The water was putrid and fetid.

“Attacked by an illness, their gums swelled until they grew over the teeth, and nineteen died, and the Patagonian and the Brazilian. Besides those who died, twenty-five or thirty fell ill both in the arms and legs, but they were all healed.” (Pigafetta, [1524] 1985: 82)

On March 6, 1521, they landed at Thieves' Island (Ladrões), and on the 17th they got off at another island. They treated the sick with coconut water and coconut meat and supplied the ships with coconuts, oranges, palm wine, and chickens. On March 22 there were still sick crewmen on board. Two men died on April 10, but the report failed to specify the cause. Reaching the Philippines, they abandoned one of the ships and the crew was distributed between the remaining two. No longer with Ferdinand Magellan, who had been killed in a skirmish with a local chieftain, just one ship, the *Victoria*, began the return voyage to Spain, sailing from the Moluccas on December 21, 1521. On February 11, 1522, they passed Timor, apparently their last supply point until Cape Verde. They did not stop in Mozambique, although they only had water and rice onboard and several men were ill. They rounded the Cape of Good Hope on May 6, 1522, and continued to skirt Africa without calling into port, since the entire coast was under Portuguese control and they feared being taken prisoner. Twenty-two men starved to death, and there was widespread fear that they would all die of hunger. Finally, on July 9, they reached Cape Verde, where they managed to take in rice. They returned to Sanlúcar on September 6, 1522, with only 18 men, mostly sick.

POSSIBLE INTERPRETATIONS OF SCURVY

The reports from the two voyages reveal striking differences in the circumstances in which “scurvy” purportedly occurred. Given their political importance, the two voyages probably shared many important characteristics for our discussion. The captain-generals of both fleets were highly experienced, and the sailors were probably selected from among the best. The ships were carefully fitted, as indicated by Chaunu (1984), reporting that Vasco da Gama laid up double the provisions and water per crewman as compared to Columbus' first voyage.⁹

We find no information on Ferdinand Magellan's provisions, but the ships must have been well stocked. Chaunu (1984) refers to the seaman's daily rations, consisting of 1.5 to 2 pounds of hardtack, 0.5 to 1 pound of salted meat (beef, pork, or codfish) or cheese, and for drinking and cooking, 1 liter of water, 3/4 liter of wine, 1/20 liter of vinegar, and 1/40 liter of olive oil. The victuals (and water) onboard had to last at least four months. The accounts of both these voyages upon their return and other evidence highlight their political importance.

On the return voyage from the Indies, in order to gain time, Vasco da Gama, with his brother dying, gave up arriving first and sent another ship ahead with the news to Portugal.

⁹ At least in thesis, no one knew that Columbus would journey so much closer. Or did they?

Concerning the last leg of the circumnavigation, Pigafetta gave a dramatic and exceedingly eloquent account upon returning in the *Victoria* without Magellan. The handful of starving survivors had refused to run the risk of landing in Portuguese-dominated African territory.

However, the reports on the disease called “scurvy” reveal different situations. In Vasco da Gama’s voyage, no food shortages ever appear in the diaries, and the fleet never spent more than three months without calling into a port. During the longest periods at sea, no cases of disease or other crisis situations were reported onboard. Disease only struck previously healthy and well-fed crewmen while on land, at the mouth of the Quelimane River, on the East African coast.

João de Barros, apud Holanda (1992: 263), referring to the same voyage, says that scurvy began to strike around the mouth of the Zambeze River, with “erysipelas, and the gums swollen so that they hardly fit in the mouth, and rotted”. Scurvy en route to the Indies became a constant scourge, described by Sassetti, apud Holanda (1992: 263), in 1585:

“Every year 2,500 to 3,000 men or boys arrive from Portugal, of the sorriest lot to be found; of these, a fourth or a third are thrown overboard, sometimes even half, mostly dead from scurvy.”

Concerning the voyage he made in 1583 (apud Holanda, 1992: 263), Sassetti reports:

“On a single day 160 men fell ill, and among them the gums swelled up entirely, so that they had to be cut out in order for the patient to close his mouth, giving off an unbearable stench, followed by an inflammation of the knees and lower limbs. Finally there came a very strong pain in the chest, without preventing the man from breathing, but then putting an end to his life, snuffed out like a lamp’s wick with no oil.”

Sassetti’s descriptions emphasize the acute, extremely severe, and epidemic nature of the disease from its onset. Such characteristics are inconsistent with the smoldering onset of a vitamin-deficiency disorder, and suggest other possible causes. Infectious diseases as the principal cause or at least as a triggering factor are highly likely: malaria, yellow fever, other arboviruses, or bacterial infections. There is a clear suggestion of the relationship between the disease and coastal areas in East Africa, where Vasco da Gama stopped and which later became an obligatory stopover en route to the Indies.

A vitamin-deficiency etiology is far more plausible on the circumnavigation, since the disease only appeared in the crew after five months of harsh Antarctic winter and three months and twenty days navigating with no taste of fresh food. More than eight months of monotonous food, then full-blown hunger. The account of various sick crewmen having recovered after eating fresh foods reinforces this hypothesis.

Still, other possible factors cannot be ruled out. A toxic etiology is feasible in both cases, at least as a contributing factor to the picture described above. Since water and its storage were the crew’s main problem, the materials used to make the barrels, possible fungi and toxic algae growing inside, and substances added as preservatives could have played an important role in the development of diseases.

Scurvy, the principal scourge of the seas until the 17th century, is now a rare disease, resulting from vitamin C deficiency. Even in situations of critical food shortage such as in Sub-Saharan Africa and the hinterlands of Northeast Brazil, with reports of pellagra and other nutritional disorders, scurvy is rare. This can be explained by the fact that vitamin-deficiency diseases almost never appear today in their “pure” form outside the laboratories, and that the most common disorders result from various factors, whether nutritional, toxic, or infectious. It is often impossible to determine the most important contributing cause.

Hutchinson (1975) comments that Lind began his recommendations to the British Admiralty with: control of the filth that propagates infections, careening the ships, providing clean new clothing to the seamen, and isolating cases of infection. He recommended distilling water at high sea and consuming lemons. Meanwhile, scurvy was reclassified, based on the “recognition” of its vitamin C-deficiency etiology, during the general reclassification of infectious diseases according to their etiological agents and of other diseases based on pathophysiology. This reclassification split up and scattered the various disease states that comprised the old “scurvy” syndrome. Lind’s treatment, which is often viewed today as a premonition of the discovery of scurvy’s vitamin C-deficiency etiology, was in fact not specific, but related to altered humors and quality of the blood that the signs and symptoms indicated. Various other diseases were treated in similar fashion (Cullen, 1786; Holsbeek, 1860; Huxham, 1776; Sydenham, 1769).

Scurvy is now expected in individuals or populations submitted to chronic (and especially qualitative) nutritional deficiencies. It has been reported among followers of “fad diets” and elderly individuals that adopt monotonous eating patterns with near-exclusive ingestion of bread, pasta, and dairy products and practically no vegetables, greens, or fruit (Wilson, 1975). In both situations, scurvy only develops after many months or even more than a year of such a diet.

Scurvy epidemics are absolutely unexpected, except as part of severe malnutrition and associated with manifestations of other nutritional-deficiency disorders, as appears to have occurred in 19th century Europe during the Potato Famine (Braudel, 1969; Dodds, 1966). One would not expect to find cases of a vitamin-deficiency disease manifested in its “pure state” on ships.

Beginning in the 16th century, on the transatlantic route, scurvy was reported among the embarked slaves, where it became known as the “scourge of Loanda”. What did ships and maritime voyages mean for the risk of a vitamin-deficiency disease like scurvy? The most common association we found was with voyage time, thus highlighting the decisive role of steam engines in its disappearance. However, consulting travel reports (Boxer, 1969; Miceli, 1994), we find that total voyage time was shortened, but not total length-of-stay at sea. On the contrary, the latter increased constantly on the merchant marine and military routes.

The Indiamen, caravels, and galleons on the transatlantic or transpacific route to the Indies depended on the winds and the currents. They thus necessarily had preferential times for embarking and returning. They frequently spent months in port, waiting for cargo and friendly winds. A voyage to India could last six months or more, but the ships did not stay at sea for more than four months. Even in crossing the Pacific, it was common for vessels to spend no more than eight weeks without calling into port (Boxer, 1969; Chaunu, 1984).

Boxer’s observation is interesting (1969: 218), quoting Diogo do Couto, that there were inevitably numerous diseases and deaths on the voyage in either direction, when the Indiamen stopped, “...as they very often did, whether voluntarily or otherwise, at Mozambique Island. Between 1528 and 1558 over 30,000 men died there, mainly from malaria and bilious fevers, after having landed from the Indiamen which called at this place in that thirty-year period.”

Fray Jerônimo Lobo (apud Chandeigne, 1992: 161) reports on the conditions in an Indiaman’s provisions in 1621:

“The victuals were spoiled rotten. The pork was so bad that whole barrels were tossed overboard, as many as the crewmen opened, all rotten and rancid. They claimed it was because of salting too much, in order for the pork to weigh more, so that all of it was wasted. The wine had also gone sour, so they opened the spigots and let it pour out through the scuppers into the sea. I saw rice thrown on the deck that was so rotten and spoiled that I decided to take a closer look, and I would not have believed it was rice had they not told me.”

Greed definitely played an important role, since it was common to over-salt meat so that it would “weigh more”. Still, we cannot overlook the difference that steel and refrigeration made for onboard provisions. The baseline

conditions were also significantly different. It is hard to imagine today (although possible) that anyone would supply a ship with untreated water. Yet the waters that routinely supplied Lisbon's population in the 1600s did not exactly deserve a clean bill of health. Several other reports corroborate Pigafetta's description (1985) of putrid and stinking water, whenever the circumstances prevented frequent renewal of the water supply.

The conditions onboard were further aggravated by the limited experience of many crews at sea. We quote Boxer (1969: 211):

"Deep-sea sailors are not made in a day, and the wastage from death and disease in India was very high. As early as 1505, completely raw crews were being recruited for service in the *carreira*, as instanced by the chronicler Castanheda's anecdote of João Homem's rustic seamen. These yokels could not distinguish between port and starboard when his ship left the Tagus until he tied a bundle of onions on one side of the ship and a bundle of garlic on the other. 'Now,' he said to the pilot, 'tell them to onion their helm, or garlic their helm, they will understand that quickly enough.'"

Exaggerations aside, the author comments on the countless complaints arising among crews unaccustomed to working at sea. In addition to the poor overall hygiene and spoiled food and water, the crowding of young men from all walks of life doubtless facilitated outbreaks of infectious diseases. It is surprising that the reports were not more dramatic and frequent, that some voyages took place without serious diseases onboard, and that the average case-fatality on the route to the Indies apparently did not exceed 50% between 1500 and 1700.

At any rate, onboard crew conditions should obviously be interpreted in light of their relationship to the prevailing conditions on land. Voyage time can obviously increase the inherent risks of life at sea. But it may also simply increase the probability of an onboard manifestation of phenomena that are not directly related to the crossing itself, due to the increase in observation time.

When we separate the voyage time from the periods before and after it, we introduce an important bias, implicitly assuming that whoever died onboard would not have died if they had stayed on land, and that all the onboard deaths bear a cause-and-effect relationship to seafaring. It is beyond the scope of this chapter to continue this discussion here, but numerous recent studies on the transatlantic traffic have pointed to new elements for elucidating this topic.¹⁰ The ships of discovery are examples of these diverse experiences; drawing on Grmek's concept (1983), we would say that they are noteworthy examples of pathocenosis in change.

We thus contend that the purported scurvy in Vasco da Gama's fleet and in later voyages to the Indies probably deserves to be reconsidered in favor of many more likely differential diagnoses. Meanwhile, Pigafetta's report of the Pacific crossing during the first circumnavigation contains elements suggesting much greater likelihood that the scurvy of that voyage was the same disease we know today.

Hidden diseases

Silva, Carvalho & Souza (2006) report an interesting disease profile in workers from a textile factory in Cataguases, southeastern Minas Gerais State, Brazil, in the mid-20th century. In this case, our problems with identification of the diseases are not related to theories on diseases or the records' "reliability". The primary sources are all "official", namely the Death Registry of the Cataguases Municipal Government, books 5 and 6 (Municipal Archives), and the Registry of the Caixa Beneficente (Workers' Mutual Health Fund) at the Peixoto Brothers Textile Factory, no. 3, year 1941,

¹⁰ See, for example, Florentino (1995), Alencastro (2000), and Soares (2007).

containing records of visits to the company physician by workers and their families. The year was 1941, so diseases were no longer attributed to miasmas, but to viral, bacterial, or parasitic infections or various pathophysiological disorders. Yet we face at least two relevant issues here: lack of uniform classification of diseases and the context for the production of diagnoses. We will not go into problems pertaining to death records or demographic issues. Rather, we will discuss “the search for tuberculosis”.

Tuberculosis was present in the general population and was one of the main causes of death, especially in young adults, not only in Cataguases but in all major urban areas of Brazil (Nascimento, 2005). Oddly, it was only diagnosed in one worker from the textile factory in 1941. This “nosological silence” led to a search for the disease and the context in which it was recorded, as summarized below (Silva, Carvalho & Souza, 2006).

During 1941, the Peixoto Brothers factory manufactured 6,080,585 meters of fabric. Average daily production (for 16 hours) was 21,483 meters, or 6.03 meters per loom-hour. The factory’s equipment was in perfect state of maintenance, and there were an average of 470 employees for the year as a whole, including office staff, bricklayers, and carpenters. The books record expenses with the Workers’ Mutual Health Fund, the IAPI (or Institute for Industrial Workers’ Retirements and Pensions), workers’ compensation, accident insurance, and even a brass band.¹¹

To discuss the workers’ health, we analyzed data on visits to the company physician from January 2 to December 31, recorded in book number three of the Caixa Beneficente. This was the only book located, and it records the date, the worker’s or family member’s name, factory sector, signs and symptoms, diagnosis, and treatment.

Of the 536 visits to the company physician, 435 were for factory floor workers. Of these, 271 factory employment records were found and analyzed (62.3%), pertaining to 81 men and 190 women, containing other data such as nationality, color, and marital status.

Eighty-six per cent of these workers were between 15 and 39 years of age in 1941. According to the records, workers at the Peixoto Brothers factory had continuous access to healthcare, since the company physician was always on call, treating both the workers and their families, in addition to acting as “occupational physician” by signing sick leaves and investigating work-related accidents.

The 435 workers examined by the company physician included 238 women (54.7%) and 197 men (45.3%). Based on the description of signs and symptoms, the diagnoses were classified by chapters of the ICD-10 (WHO, 1989). A total of 1,466 diagnoses were recorded, classifiable as follows: diseases of the respiratory system, 463; diseases of the digestive system, 401; ill-defined causes, 308¹²; diseases of the genitourinary system, 96; infectious and parasitic diseases, 88; diseases of the blood, 59; diseases of the skin and subcutaneous tissue, 34; external causes, 14; and diseases of the musculoskeletal system, 3. As mentioned above, there was only one record of “tuberculosis”.¹³

During the year 1941, 34 medical examinations were recorded in the book for purposes of job admissions, five for discharge, and eight for sick leave. Four job admissions were turned down by the physician: two due to “anemia” (sic), one due to a skin disease, and another for an unspecified reason. Records of diseases that affected female workers at

¹¹ Jornal Cataguases, official municipal register, Jan. 28, 1942; insert.

¹² In the ICD-10, this chapter is called “Symptoms, signs, and abnormal clinical and laboratory findings, not elsewhere classified”, previously referred to as “ill-defined causes”, the term used here.

¹³ In this case, registered as such. The authors would also have classified as such other cases referred to as “phthisis” or other terms that we consider probable pulmonary tuberculosis.

the factory included 30 cases of amenorrhea, probably pregnancy. Of the sick leaves, one was for two months duration for a female worker assigned to the weaving sector, diagnosed with concomitant anemia and pregnancy.

As a source for discussing the health situation in the overall Cataguases population, we consulted the death registry for 1940 to 1944, since there was no regular record of diseases for the same period. The mortality profile for the years 1940 to 1944 drew on book number 5 of the Death Registry kept by the Cataguases Municipal Government, containing the official annotation of the death, transcribed from the statement completed by a physician and stating the underlying cause of death used to issue the death certificate.¹⁴ The underlying cause was coded according to the rules of ICD, 10th review (some records were illegible).

In the five-year period, 1,439 deaths were recorded in the city of Cataguases and its townships. Males accounted for 55.3% of the deaths and females 44.7%. As for nationality, Brazilians represented 1,418 of the deaths, or 98.5% of the total. Annotations on skin color showed that nearly half the individuals were white, 710 (49.3%), followed by brown (i.e., mixed-race) with 373 (25.9%), and black with 348 (24.2%). Eight annotations were missing information on skin color.

Annual variation in mortality was slight, with a mean of 287 deaths per year. Thus, for this five-year period, we found no evidence of epidemic situations, at least with diseases involving high case-fatality. Death records by age bracket for 1940-1944 were used to calculate points for the Nelson de Moraes proportional mortality index¹⁵: under 1 year of age, 23.6%; 1-4 years, 14.3%; 5-19 years, 8.2%; 20-49 years, 19.7%; and 50 years and older, 34.2%. Compared to the Brazilian curves for the year 1990 (Datasus, 2009), the authors observed important differences in all age brackets except 20 to 49 years.¹⁶

Deaths from ill-defined causes led the list, with 338 records, or 23.5% of all deaths during the five-year period, followed by infectious and parasitic diseases with 333 (23.1%), diseases of the circulatory system with 223 (15.5%), diseases of the respiratory system with 174, and diseases of the digestive system with 104. All other causes accounted for fewer than 5% of the deaths. Disaggregating the data by age bracket and sex, among infants (under 1 year of age), deaths from ill-defined causes led the list, followed by infectious diseases and diseases of the respiratory system. In the next age bracket (1 to 4 years), infectious diseases led the list, followed by ill-defined causes and diseases of the respiratory system.

In the 5 to 19-year bracket, infectious and parasitic diseases continued to predominate, followed by diseases of the respiratory system and ill-defined causes. From 20 to 49 years, infectious and parasitic diseases predominated, followed by ill-defined causes, with diseases of the respiratory system in third. From 30 to 39 years, causes related to pregnancy, childbirth, and postpartum predominated among women. From this bracket upwards, diseases of the circulatory system were the leading causes of death, but infectious and parasitic diseases still ranked second.

An analysis of proportional mortality by causes shows an important difference between 1940 and 1990: the proportion may be similar, but in the 1980s and 1990s “external causes”, basically homicides and traffic accidents, became the main factors for mortality in young adult Brazilians (Datasus 2009).¹⁷

¹⁴ The Death Registry, Book no. 5, of the Cataguases Municipal Government contained name, sex, color, birthplace, age, marital status, parents' names, cause of death, and date of death.

¹⁵ For this indicator, see for example Medronho et al. (2002).

¹⁶ Less than 1 year, 11.86%; 1-4 years 2.20%; 5-19 years 3.79%; 20-49 years 20.91%, and 50 years and older, 61.25%.

¹⁷ For a discussion of the “epidemiological transition”, see Medronho et al. (2002).

There was a significant presence of diseases of the respiratory system, yet the explicit diagnosis of pulmonary TB was infrequent in the textile factory's obituaries and other records. This led the authors to discuss this diagnosis and the possible reasons for its absence from the documents. During the period in question, TB was one of the leading causes of death in Brazil, especially in young adults (Nascimento, 2005). This period immediately preceded the widespread introduction of antibiotics and chemotherapeutic agents (streptomycin, isoniazid, and PAS) developed in the 1940s and 1950s, which revolutionized TB treatment. The newspaper *Gazeta de Leopoldina* announced that the disease was spreading in Cataguases and surrounding towns, especially affecting the working class. BCG vaccination drives were launched in the region in children and bacillus-negative individuals.¹⁸ The *Gazeta* blamed wartime shortages for people's poor nutrition and claimed that "the 'breeding grounds for the bacillus' are the poor, people on diets, those with poor childhood nutrition, and those who exercise inadequately".¹⁹ Mortality records for Cataguases in the five-year period showed 92 deaths from tuberculosis, or 6% of all deaths, 63.3% of which in the 20 to 49-year bracket. To put this figure in modern perspective, the same percentage (6%) today would mean approximately six times the number of deaths from tuberculosis recorded in 2001 for the State of Rio de Janeiro, which currently has one of the highest TB incidence rates in Brazil.

Cases were recorded in individuals from 0 to 71 years, showing that the disease affected the entire population, although the largest number of cases occurred in young adults. The mean age, based on the age recorded on the TB death records, was 32 years for men and 33 for women.

As highlighted by Antunes, Waldman & Moraes (2000: 376), "The age structure of these deaths was consistent with patterns in high-prevalence countries, with higher rates in children under 5 years and adults 20 to 49 years of age and 60 years or older, with a peak in the 20 to 49-year group." The records showed more of the pulmonary form, with 77 cases, or 83% of total, followed by TB deaths with site unspecified, then 7 cases of intestinal TB, and TB of the bones, larynx, and kidneys, with only 1 case each.

In the textile factory records, the only worker diagnosed with pulmonary TB had been assigned to the factory's machine shop. Before his TB diagnosis, he had been treated for flu and bronchitis. He was hired in 1940 at only 14 years of age, and by 15 he was already receiving treatment for tuberculosis. His contract was rescinded in 1944, with no record of the reason for his being laid off. This worker never returned to the company, nor do we find his name in the death registry for 1944. During the period there was only one record of a sputum test at the company, for an employee assigned to the fabric inspection room, and with a negative result. The absence of any recording of tuberculosis by the company physician may be due to deliberate underreporting, because if the disease were diagnosed, the worker would be forced to leave the factory and would thus lose his or her income, in addition to running the risk of not being rehired. Tuberculosis is also an important factor for social discrimination, which could help explain the absence of TB diagnosis in the factory records, despite the numerous diagnoses of respiratory diseases. Tuberculosis is evidently a possible confounding factor in any discussion of the determinants of these diseases and forces us to view its attribution to working conditions in a relative light. According to company records, this disease, which affected the entire population, only affected one of the factory workers, but it is not possible to exclude its "disguised" presence among the numerous respiratory signs and symptoms.

¹⁸ *Gazeta de Leopoldina*, Oct. 19, 1941, no. 52, p. 1, Editorial.

¹⁹ *Gazeta de Leopoldina*, Nov. 30, 1941, no. 63, p. 1, Editorial.

Impossible diseases

Our last example focuses on diseases that cannot be diagnosed by analyzing the text. This does not mean that other studies (e.g., paleopathology) cannot contribute to the diagnosis. Often such diseases appear in the texts more as “symbolic entities” than as “disease entities”. When the name of the disease traverses the time and space of classificatory paradigms and the signs and symptoms described in the text does not include elements that can be viewed today as pathognomonic of some currently recognizable disease, we may lack the basis for a helpful discussion of the current diagnosis. Leprosy is perhaps the most representative of these “disease entities” in the West.

Maria Carlota Rosa (2005a)²⁰ discusses leprosy as depicted in a medieval work of fiction, *Estoria do muy Nobre Vespesiano Emperador de Roma* [The Story of the Very Noble Vespasian, Emperor of Rome]. We summarize this work next, with comments, notes, and references for the respective excerpts. According to the author, *Vespesiano* is an anonymous novel that circulated widely in 14th and 15th-century Europe. Mixing fact and fiction, the plot unfolds as a consequence of the search for a cure to Vespasian's disease.

There is only one incomplete extant copy of the Portuguese version of *Estoria do muy Nobre Vespesiano Emperador de Roma*, belonging to the National Library of Portugal (Inc. 571), and printed in Lisbon in 1496. The text tells how Vespasian, racked with leprosy, hears of Jesus Christ and his Passion and is cured by using the linen handkerchief that Veronica gave Jesus to wipe his face at the foot of the cross. To give thanks for this blessed gift, Vespasian makes good on his vows: he destroys Jerusalem to take revenge for the Lord's death and has himself baptized, along with all his people and knights.

Popular tradition appears to have been particularly fond of impious Emperors with leprosy that were cured by baptism, like Constantine I (306-337). Attacked by leprosy after defeating Maxentius, he purportedly refused the treatment prescribed by his physicians, who (like the Greeks) recommended bathing in the blood of innocent children (Bluteau, 1712-1721). Baptized by the Pope, Constantine was miraculously cured.²¹

All the action hinges on the Emperor's quest to restore his health. Although the word “leprosy” never appears in the text, Vespasian was in fact a leper. The Vespasian of the text has a severely mutilated face, as reported by his messenger (fol. a6 r-v):

“Thou shalt know that my Lord the Emperor suffers a terrible and ugly disease on his face. No physicians or surgeons in the world can make him well, because the disease grows so much every day it has worn and afflicted his face such that no man can look at his teeth or jaws.”

The Western world had known leprosy for a long time. Its most obvious (and dreaded) symptom in the collective imagination was precisely mutilation, disfiguration. In the medieval Christian world that produced Vespasian, lepers were considered the devil's helpers and had to wear bells around their necks to announce their approach, in order for the healthy to take refuge (Margotta, 1968).

Against leprosy, all the might of the greatest empire on Earth was helpless, as was the best science to be recruited by someone with so much earthly power. The illness was incurable. Medicine was useless, and the hope for Vespasian's cure came from news of a woman who had lived in voluntary isolation due to her horrible illness, but was made well

²⁰ We thank the author and the editors of *Cadernos de Saúde Coletiva* for permission to use the text, and we take entire responsibility for any inaccuracies in our summary.

²¹ Constantine was baptized in 337 AD not by the Pope, but by a bishop of Aryan tendencies, and died soon afterwards (Di Berardino, 1983).

by faith in Christ, materialized in the linen handkerchief she held out to Him to wipe his face at the foot of the cross. Vespasian could only be healed by a relic that had touched Christ (fol. a4v), with Veronica's handkerchief, with faith and baptism: "And if thou doeth not all these things, thou canst never be healed of thy illness and thy affliction." (fol. b2)

Touching a relic of Christ purified the afflicted. The sacrament of baptism, in turn, was a means of salvation from physical and spiritual death, in which the baptized broke with sin, giving rise to a new life. In Vespasian, salvation was extended to the entire people, purified by the baptismal water and healed of any and all disease:

"And when the people heard him they dove into that sacred water as far as they could and came out baptized, and they worshipped God Almighty Jesus Christ. And Our Lord performed a great miracle at that hour, and whoever became Christians marveled that whatever illness or disease they had before the baptism, no sooner were they baptized than they were cleansed and healed of the disease as if they had never been ill." (fol. f)

Vespasian exemplified disease as the consequence of sin. A pagan living such a dissolute life deserved an incurable and terrible disease as punishment. The individual could restore his health by persevering in the faith and in Christian practices, which bore little relationship to home remedies or a physician's skills. The physician could only relieve the physical suffering that resulted from such condemnable behavior, but not provide the true cure. But if the individual could avail himself of sacred relics or baptismal water, he could begin a new life, freeing himself from spiritual and corporeal death.

This text and many others did not primarily describe a disease. Although we may sometimes find more detailed descriptions of signs and symptoms, a possible diagnosis would probably add little to our understanding of the context.²² Relics or the royal touch (Bloch, 1924) have absolute curative powers that require no nosological classification.

CONCLUSION

The three examples discussed above represent only a minimum sample of the many questions that can be raised in reading texts to construct a history of diseases. Much remains for discussion. However, we highlight the need to establish interdisciplinary discourses. Without a plural dialogue, the complexity of such issues virtually impedes any competent discussion. Meanwhile, we should tackle the challenge, based on each object and objective, of defining the terms of this dialogue in order to produce a coherent dialogue that opens new questions, not merely a patchwork quilt. This is no simple task. We hope that the points discussed here, and especially the examples, will have sparked the reader's curiosity towards this evolving field and the desire to explore it.

²² For other discussions of medieval texts, we refer the reader to Rosa et al. (2005b).

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