

Urdaneta and the health cargo of the Tornaviaje¹

Mr Xabier Armendáriz²

Abstract

The aim of this paper is to analyze the food cargo of Urdaneta's Tornaviaje and its direct consequences over the health of his sailors. The paper will focus on health issues on board, specially in view of the unknown route that they would follow to go back to the Americas. We will focus on how Urdaneta planned to overcome problems related to prolonged stays at sea, specially health problems due to lack of fresh food. Through contemporary accounts and diaries, we know that Urdaneta understood the necessity of having fresh fruits on board, and took action to ensure the safety of his crew by introducing local fruits from the Philippines such as coconuts. His efforts were successful, and his perilous trip was made with less than 10% of mortality, with no direct mention to scurvy.

1. Introduction

If Friar Andrés de Urdaneta (birth Villafranca de Ordizia, Gipuzkoa, 1508 – death Mexico city, 1568) is known to history is, due to his extraordinary return trip from Asia to Mexico, his deed is a milestone in the history of navigation. On the 8th of October 1565, on board the nao *San Pedro*, he arrived in Acapulco after a long and difficult journey across the biggest Ocean on Earth. He had just established a secure and passable route to go back to the Americas from the Philippine Archipelago. However, Urdaneta's achievements do not end in his nautical knowledge and his ability to successfully complete the crossing of the Pacific Ocean eastwards. Other aspects of his personality and knowledge as a sailor and as a man of science can be found in documental sources and his own personal comments, such as the comparative analysis made by him regarding the different experiences that arose during these great maritime expeditions of his time.

We will discuss exclusively Urdaneta's knowledge of an illness that has ravaged sailors since human populations started conquering the waves: scurvy. That Urdaneta was aware of this disease and that he took measures to fight it can be inferred from the fact that none of the sailors in his ship, the *San Pedro*, died of it during he return voyage from the Philippines to New Spain - which lasted four long months.

2 . The diet on board during the exploration of the Pacific

One of the biggest problems on board ships during the 16th century was the conservation of food. Generally speaking, the small amount of fresh food available - fruits and vegetables - was distributed following a hierarchical order that gave preference to the officers of the ships, not usually reaching the sailors (Mira-Caballeros 2010:9; López-Ríos 1993:67), and it had to be consumed during the first days of travel. The deterioration of fresh food was extremely fast, not

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Society for Basque Studies, SPAIN, info@xabierarmendariz.com

only due to the natural cycle of cellular decomposition, but also due to the storage conditions in the cargo hold. The high temperatures of some areas and the humidity destroyed all food that had not previously been dried, salted or smoked. Even these processes did not guarantee that the food would be preserved for the whole voyage (Fernández Duro 1957:140). The need to submit the food to these processes of preservation limited the type of products that could be carried on board, since not all types of food can receive such treatments. Not many fruits and vegetables can endure the process of preservation, so their presence on board a 16th century ship is extremely rare.

The diet of sailors was basically two types: the first one was the navy hardtack, a sort of unleavened bread made with flour and water and baked twice or more to prolongue its preservation (Marañón 1940:220)³. The second group was made up of legumes (chickpeas, lentils, and beans), dried or salty fish and meat, vinegar, oil and cheese. Even when this diet contained a good amount of calories, its nutritional value was very deficient (Mira Caballos 2010:8). The legumes were toasted in the oven to improve their preservation, destroying any vitamins that they might have contained (Marañón 1940:221). The food was weighted carefully and distributed among the sailors by a steward, who could reduce the rations under the captain's orders in times of shortage⁴. The main course consisted of a bun mixed with a stew of legumes and water. A few days per week,⁵ salty fish or meat was eaten along with some cheese. The remains of the maggoty hardtack was mixed with water to produce a dull soup that was served for dinner. This soup was known as *mazamorra*. The only consolation they had was the vinegar, which was served on rare occasions, and the wine, of which the sailors received around one litre (L) per day each. The wine helped to calm the hunger, as well as the thirst produced by the salty rations (Mira-Caballos 2010:10)⁶. Such diets were rich in carbohydrates and provided some proteins, but it was lacking in vitamins.

3. Scurvy: the disease of the sea

Scurvy is the most common nautical disease. The prolonged periods of time spent at sea and the lack of fresh food provoke a general state of avitaminosis in a short period of time, specially vitamin C (L-ascorbic acid). The symptoms start with tiredness and depression, then changes in the gums and in the skin appear followed by strong pain and swelling of the joints. The peak of the disease comes when the gums are so swollen and weakened that the act of eating ends with loss of tooth and a strong smell of rot. Other symptoms that usually accompany scurvy are hemorrhage, edemas, jaundice and high fever.

³ Even though hardtack was more nutritious than the common bread because it was made from bran, its hardness was so great that it had to be soaked in salty water in order to eat it (Marañón 1940 :220).

⁴ These were unforeseen circumstances, like for example bad weather and bad winds that might delay the trip more than expected; or perhaps the inability to call at a port due to political conflicts.

⁵ The disponibility of meat and fish was sometimes diminished by the damage made by rats, insects and rotting. With some luck, fish was abundant in the seas that the ships were sailing, which was always a great improvement over the poor diet on board.

⁶ The wine given among the sailors was of low quality, unlike the one provided to the officers on board. However, even the distinction between food qualities was not enough to prevent scurvy among the higher ranks.

Death overcomes the patient between convulsions and shock.

Due to the severity of its condition, scurvy was the deadliest nautical disease in long distance navigation (López-Ríos 1993:97-99). References to the disease are common since Classic Antiquity; Hippocrates, Celsus and Pliny wrote about it (López-Ríos 1993:98)⁷. Vasco de Gama himself lost a hundred men of a hundred and sixty-eight to the disease on his expedition to India; according to his logbook *Diario de a bordo* (1496-1497) (López-Ríos 1993:99) The disease was so widespread that they were down to eight working men per ship at one point.

The symptoms can show up in a span of between one month and a half and three months, depending on the availability of fresh food on board. In general, a person needs around 10 milligrams (mg) of vitamin C per day. The body's reserve of vitamin C is around 1,5 grams (gr) and 3 gr, depending on the health of the sailor prior to embarking. A rough estimate of the lapse of time that it takes to develop scurvy in oceanic expeditions can be made, taking into account that in periods of shortage the maximum loss of vitamin C is 4% (López-Ríos 1993:97-99).

Until the mid 18th century, medical science considered scurvy a contagious disease of unknown origin, and that it was most likely triggered by the climate, the digestive system or humorism (López-Ríos 1993:106).

It is commonly accepted by the history of medicine that Dr. James Lind (1716-1794) was the first person to cure scurvy. Lind, who was a surgeon on board the British vessel *HMS Salisbury*, conducted a clinical trial on board, testing changes in the diet of his subjects to see whether such alterations affected the development of scurvy. A few selected subjects afflicted with scurvy kept the standard on-board diet, while two sailors were given cider and two other men were given lemons and oranges⁸. In his famous book, *A Treatise of the Scurvy* published in 1753, he described the results of his experiments: the two men who drank cider improved, while the two sailors who were given lemons and oranges made a full recovery (López-Ríos 1993:107).

⁷ Cited by López-Ríos: Hipócrates: "*Libro de internis affectionibus*" In *Enciclopedia Internacional de Cirugía*. Madrid, Moya, 1883, I, p.206.; Celso: *De Medicina*, II, chapter III; Plinio: *Naturalis Historia*. XXV, chapter III.

⁸ Due to the relevance of his experiment, we transcribe the most enlightening sections: On the 20th of May 1747, I took twelve patients with scurvy, on board the *Salisbury* at sea. Their cases were a similar as I could have them. They all in general had putrid gums, the spots and lassitude, with weakness of their knees. They lay together in one place, being a proper apartment for the sick in the fore-hold; and had one diet common to all, viz, water-gruel sweetened with sugar in the morning; fresh mutton-broth often times for dinner; at other times puddings, boiled biscuit with sugar, etc.; and for supper, barley and raisins, rice and currants, sago and wine, or the like. Two of these were ordered each a quart of cyder a-day. Two others took twenty-five gutts of elixir vitriol three times a-day, upon and empty stomach; using a gargle strongly acidulated with it for their mouths. Two others took two spoonfuls of vinegar three times a-day, upon and empty stomach; having their gruels and their other food well acidulated with it, as also the gargle for their mouth. Two of the worst patients, with the tendons in the ham rigid, (a symptom none of the rest had), were put under a course of sea-water. Of this they drank half a pint every day, and sometimes more or less as it operated, by way of gentle physic. Two other had each two oranges and one lemon given them every day. [...] The consequence was, that the most sudden and visible good effects were perceived from the use of the oranges and lemons; one of those who had taken them, being at the end of sixs theis fit for duty. (Lind, J. 1753: 145-148)

4. Andrés de Urdaneta

Urdaneta was born in the gipuzkoan village of Villafranca de Ordizia towards the end of 1507 or the first months of 1508. His family was most likely involved in the maritime trade with the recently discovered West Indies, the Spice islands and an area well known to the Basque whalers: Terranova, *el mar de los bacallaos* - the cod sea (Miguel 2002:21). This link between the sea and Urdaneta's explains his cunning ability in trade. It also sets him within the world of Basque seafaring. Basque sailors who traveled to Terranova in search for cod or whales did not usually suffer from scurvy (Agirre 2004). Contemporary documents show that the most common beverage on board was cider, since wine was too expensive for the Basque shipowners. Cider is a good source of vitamin C, which would account for a reduced number of scurvy cases in Basque ships (Agirre 2004)⁹. This knowledge was most likely known by Urdaneta.

Urdaneta was only 17 when he set sail to Asia with the doomed Loaysa expedition. Of the seven ships that left Corunna on 24th of July 1525, only one managed to arrive in Mindanao (current Philippines). We don't know what Urdaneta's role in the expedition was, but he seemed to have been well considered by the officers of the ships since he signed as a witness in Elcano's last will. Urdaneta and the remaining crew (26 sailors) were stranded in the Spice Islands. He remained in the Pacific region for almost a decade, until he reached Spain on a Portuguese ship, on 26th of June of 1536. During these years he suffered many misfortunes, but he also acquired a vast amount of knowledge. The sources of this knowledge were diverse, but possibly the most interesting was the rescue of castaway sailor Gonzalo de Vigo, from the Magellan expedition. He survived in the island of Guam, and knew the language of the local population. Urdaneta spent most of his years in the Pacific with Gonzalo de Vigo, from whom he learnt that language (Miguel 2002:40-42; Arteche 1943:160).

On his arrival to Europe he was captured by the Portuguese, who seized Urdaneta's diaries, in which he wrote about his time in the Pacific. He escaped from Lisbon and upon his arrival in Valladolid, he started re-writing his experiences in Asia-Pacific. Based on his writings, both the diaries and the memorial, it is clear that Urdaneta had a deep knowledge of the Spice Islands, their geography, the people who inhabited them, their customs, wind patterns and so on (Arteche 1943:160-162). This knowledge helped him undertake such a difficult task as the "*tornaviaje*", the return trip Westwards to Mexico, and it most likely helped him to control direct health issues that threatened the voyage.

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Cider has been the alcoholic beverage traditionally consumed in the Atlantic coast of Europe and the south of the British Isles. The humid climate made it difficult to grow vines, but apple trees grow abundantly. There are many references to the Basque custom of drinking cider, but perhaps the most interesting was made by French Inquisitor Pierre de Lancre. De Lancre defined the Basques as bad farmers who preferred life at sea and their women as witches who used the cider from the apple, the fruit of sin: "*ne mangent que pommes, ne boyvent que jus de pommes, qui est occasion qu'elles mordent si volontiers à cette pomme de transgression, qui fist outrepasser le commandement de Dieu et franchir la prohibition à notre premier père*". Lancre, Pierre de., 1612. *Tableau de l'inconstance des mauvais anges et démons...* Livre I, Discours II. Chez Jean Berjon. Paris.

The Tornaviaje

Urdaneta's life was quite remarkable. In 1538 he accompanied Pedro de Alvarado to New Spain to help him organize a new expedition to the Spice Islands (Miguel 2002:48). However, after the death of Alvarado, Ruy López de Villalobos took control of the expedition, which was meant to seek a return route to New Spain. Urdaneta was left behind, and Ruy Lopez de Villalobos' expedition failed.

Meanwhile, Urdaneta occupied relevant roles related to maritime issues, working in the service of viceroy Mendoza (Miguel 2002:50). In March 1553, Urdaneta's life changed after he joined the order of the Augustinians. Although he led a monastic life, he was mentioned repeatedly in connection with the Spice Islands. In 1560 the new viceroy of New Spain, Luís Velasco, received a letter from king Philip II ordering him to mount a new expedition to the Spice Islands.¹⁰ The Spanish king was aware of the need to establish a Spanish presence in Asia, specially in the Philippines after disputes with Portugal arose regarding the ownership of the Maluku Islands. Philip II was also pressed by the need to find an alternative way back through the Pacific Ocean, and not around Africa, which was controlled by the Portuguese. In the king's own words: *"porque lo principal que en esa jornada se pretende es saber la vuelta, pues la yda se sabe que se haze en breve tiempo"* [Translation: because our chief concern of this journey is to find a way back, since the outbound journey is known to take a short time] (Miguel 2002:54). The command of the new expedition was assigned by Gipuzkoan Miguel López de Legazpi. However, the technical command fell in the hands of Urdaneta (Arteche 1943:146), who had mentioned several times his absolute certainty that he would be able to find his way back through the Pacific Ocean to complete the return trip.

Each man had different missions: Legazpi was instructed to take control over the Philippines, while Urdaneta was ordered to find his way back to New Spain through the Pacific Ocean in what will be known as the Tornaviaje.

It was during the organization of the expedition that Urdaneta showed his deep knowledge of naval medicine gathered from his experience on board the Loaysa expedition and his observations during his stay in the Pacific Ocean. In several letters to Philip II and viceroy Velasco, he insisted on provisioning the ships with kidney beans (which contains vitamins B1,B2,B3,B9), broad bean (rich in vitamins C, A, E, B1, B2) and guarana, a tropical fruit with a high content of vitamin C (Miguel 2007). In a report for viceroy Velasco related to the Tornaviaje, Urdaneta explains the characteristics of a disease that he himself had observed first-hand in the Loaysa expedition:

De mas de [e]sto, da una enfermedad en esta Mar de Poniente a los hombres que se les creçen y podreçen las enziás y mueren muchos de [e]sta enfermedad, que a nosotros solo en una nao se nos murieron desde el estrecho hasta las yslas cuarenta hombres y aun a los que an ydo desde a Nueva España para la Espeçiería no les a dexado de dar esta enfermedad empero como la nauegación se haze em poco tiempo y lleuan bastimentos frescos, no haze tanta impresión como haze en los que ban desde España por el Estrecho (Miguel 2009: 483-484).

[Translation: Besides this, there is a disease in this Sea of Ponente that makes men's gums grow and rot and many die from this disease, in only

¹⁰ (Archivo General de Indias (AGI) Section Patronato, 23, 12).

one nao forty men died from the strait to the islands, even those who went from New Spain to the Spice islands have also been affected but since the navigation takes a short time and they have fresh food, the disease does not affect them as much as those who travel from Spain through the strait]

Both references indicate without a doubt that Urdaneta knew of the effects of lack of fresh fruit and vegetables in the development of scurvy, even when he was unable to identify the agent that was involved (vitamine C would not be discovered until the 20th century)¹¹.

Legazpi's expedition set sail on 21st November 1564, and reached the Philippines in 22nd January 1565, without any loss attributed to scurvy. Urdaneta served as the interpreter for Legazpi on his arrival to the Philippines, and in short he was ordered to start the journey back. The nao *San Pedro* was ready for her return to New Spain. On 1st June 1565 they set sail from Cebu following a North-East course. In command of the expedition was Legazpi's own grandson, Felipe de Salcedo, who was only 18 years old. However, Urdaneta was in charge of the navigation. The story of the trip was recorded by Esteban Rodríguez, first pilot, and Rodrigo de Espinosa, second pilot. Unfortunately, Urdaneta's account - which can be found in the National Library of Paris - is badly preserved and barely legible. From the pilots' accounts we know that Urdaneta stocked up the vessel for eight or nine months, although he knew that the trip would take around four months at the most. They sailed between the islands of the archipelago until they reached Luzon, and there the pilots wrote that Urdaneta replenished the food they had already and ordered to stock a large amount of coconuts (Miguel 2002:77). After this last call, the ship never touched land until they reached Acapulco.

The relevance that Urdaneta places in coconuts is not casual. The coconut can be easily preserved and it lasts for a long time, something he would have known from his experience in the Maluku islands. Also, it is a reliable source of water in case of shortage. Perhaps its most remarkable feature is its great content of vitamin C, which is 3,3 mg (around 6%). The vitamin is present in the pulp, as well as in the water¹². It could be argued Urdaneta knew about the use of coconut in the prevention of scurvy during his stay in the Maluku islands. He spoke fluent Malay and Tagalog, and he knew local maritime customs and their types of ships (Miguel 2002:71; Arteché 1943: 160).

5. Arrival in America

During the trip, Urdaneta made several tackings to calculate longitude estimates, prolonging the trip more than necessary. On 18th September 1565, after navigating across the Pacific for three months and a half, they sighted the

¹¹ Albert Szent Gvordyi, Chemistry professor at the University of Budapest, isolated the vitamin C of a green pepper in 1928. He received the Nobel Price of Medicine and Physiology in 1937 for this and other achievements.

¹² It is worth noting that the biggest producers of coconuts are currently located in Southeast Asia. The Philippines tops the list with 17 million tons per year. Indonesia and Malaysia, the old Maluku islands, produce 16 million and half million respectively (Food And Agricultural Organization of United Nations: Economic and Social Department. The Statistical Division. (2007) <http://faostat.fao.org/>

coast of California, approximately around the island of Santa Rosa.

The balance of deaths on board was of 16 out of a 200 men crew, just around 8% of the sailors when most vessels of the same period lost between 33% and 40% of the crew to scurvy, while many more were suffering the last stages of the disease (Miguel 2002:81). None of the accounts that have survived mention scurvy, although they do tell of the bad health that suffered most of the crew - just a few who reached the Americas were fit to work - even under the care of Urdaneta, who also acted as the nurse on board¹³.

Within sight of land, Urdaneta decided to continue to Acapulco, where they arrived on 8th October, two weeks after reaching California. It would have been surprising that Urdaneta would not have stopped for provisions if there had been cases of scurvy on board. That would have meant depriving the crew of the fresh food that he knew was essential against scurvy. He also prolonged the trip to make tacking maneuvers. The sixteen deaths on board and the general exhaustion of the sailors can be attributed to any of the common infectious diseases, tropical maladies or traumatismos that usually affected life on that type of vessel - the nao - (Marañón 1940:223). We cannot forget that these men had been at sea for almost ten months since the outbound trip.

Another point that hints at Urdaneta's knowledge of naval medicine comes from a surprising source. A deserter of the outbound expedition, Alonso de Arellano, completed the return trip before Urdaneta on board the patache *San Lucas*, thanks to the knowledge shared with him by Urdaneta. However, the men that were still alive when they reached the Americas were severely ill with scurvy¹⁴.

Eleven years after the death of Urdaneta, an augustinian friar called Agustín Farfán, published in 1579 his *Tratado Breve de Medicina* (Brief Treaty of Medicine). He must have known Urdaneta, since they were members of the same order. In his book, Farfán writes that to prevent scurvy the patient should be administered: “un medicamento con medio limón y media naranja amarga, con un poco de alumbre quemado” [translation: a remedy with half lemon and half orange, with a bit of burnt alum] (Farfán 1579). These observations were made 200 years before Johann Georg, Heinrich Kramer or James Lind made their observations.

Once the Manila galleon route was established,¹⁵ we find constant references regarding the use of citrics in the galleon's infirmary cabinet:

Variedad de naranjas: Lumben, amumontoy, aason, apugan, caramisca, malcape, cabuagao, opong-opong y samugao, bien naturales o en conserva se cargaban en los galeones. La variedad del limonero biasung, abundante en Visayas fue muy eficaz para evitar el escorbuto (Cabrero 2009: 574)

¹³ Urdaneta was accompanied by a member of his order: friar Andrés de Aguirre. In contemporary accounts there is an explicit mention by the crew thanking the friars for their care (Arteche 1943: 181)

¹⁴ “La gente estaba turbada, que no había quien acudiese ni acertase con cabo ninguno por la grande oscuridad (sic) que hacía y también por estar toda la gente enferma de la grande hambre y sed que han pasado y pasaban y aunque hubieran que comer no podían, porque a **todos** se les andaban los dientes y les creció mucha carne de la boca, tanto que les tapaban las encías y en tocando en cualquier cosa se les caían los dientes”. (Cuevas 1943)

¹⁵ It was also common that upon arrival on the Californian coast the natives would approach the galleons on canoes to offer the exhausted sailors citrics and other fruits cultivated by the missionaries (Lyon 1990: 27).

[**Translation:** “variety of oranges: Lumben, amumontoy, aason, apugan, caramisca, malcape, cabuagao, opong-opong and samugao, either natural or preserved were stocked in the galleons. The lemon tree variety called biasung, abundant in Visayas was very effective in the prevention of scurvy”]

In any case, it seems that not all sailors and explorers serving under the Spanish crown shared this knowledge. It could be perhaps that this information was not transmitted generally among captains of the fleet or the officers responsible of the vessels¹⁶. Another possibility is that this knowledge was ignored in lieu of commercial gain in view of cargo distribution and the costs of the quantity and quality of the crew's food.

6. Conclusion

Taking into account the Tornaviaje and Urdaneta's knowledge, it is unsustainable to maintain that scurvy was considered a contagious disease up to the 18th century. Contemporary documents show that Urdaneta was a Renaissance man, whose knowledge and experience were taken into account by the Spanish crown. His indications were applied broadly to long oceanic travels, such as the Manila galleon route.

On the other hand, Urdaneta's notes about health on board are clear and concise. From them it can be determined that Urdaneta possessed ample knowledge of the nature of scurvy. In fact, if we take into account the language used in his anotations, it could be suggested that this knowledge was shared with other pilots, although it was not a general knowledge among every pilot. The familiarization of Spanish pilots with scurvy and its treatment using fresh food and citrics could have been wider than previously thought. However, as mentioned before, there was not a general education plan that would have guaranteed that every pilot in a Spanish vessel had access to this information. In later oceanic travels scurvy was again present, but it is difficult to determine if this is due to ignorance or to stocking and logistic issues related to supplies and preservation. After reviewing Urdaneta's work, it seems more likely that the latter option was to be blamed.

It is not the aim of this paper to establish whether it was James Lind or Urdaneta he conqueror of scurvy, like English literature portrays the former. Instead, our goal is to point out the lack of communication between the navies of the great world powers, which were battling each other for territorial expansion. In this sense, the lack of communication postponed the generalization of the cure against scurvy, which led to the deaths of too many sailors who met a horrific and painful end.

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¹⁶ An example can be found in memorial nº 4, that captain Pedro Fernández de Quiros sends to don Luis de Velasco, viceroy of Peru, in 1598. In a long list of the provisions that were needed for his 1605 expedition to the mythic *Terra Australis*, he lists the required food, giving little relevance to fresh vegetables and a total absence of citrics and other fruits (Fernandez de Quiros 1597-1614: IV, 62-63)

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