



ultimate aim of the tobacco industry is to sell a lethal product. With advertising budgets that often exceed the public health budgets of entire countries, there are resources to buy the best of creative innovations to lure new smokers. Efforts such as the Framework Convention on Tobacco Control,⁴ the first international public health treaty to which South Africa is a signatory, are therefore critical for countries to learn about old tricks applied to new markets. Countries like South Africa that have ratified the convention are legally bound to restrict

tobacco advertising, sponsorship and promotion, to establish new packaging and labelling of tobacco products, to institute clean indoor air policies and to strengthen legislation to reduce tobacco smuggling.

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HISTORY OF MEDICINE

The Dutch East India Company, scurvy and the victualling station at the Cape

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Evidence that scurvy has long afflicted man is provided by early records describing a disease with symptoms and signs so characteristic that a retrospective diagnosis can be made with reasonable certainty. Quoting Ebbell who obtained the major portion of his evidence from the Ebers Papyrus, G H Bourne wrote: 'Since bleeding gums and petechial haemorrhages are characteristic of scurvy, it seems likely that scurvy was known over three thousand years ago in Egypt.'¹ Roman soldiers campaigning along the Rhine developed a disease that caused loosening of the teeth which they remedied by eating a type of sorrel, probably scurvy grass; the latter, together with watercress and oranges, was used to treat a similar disease encountered in this region during the Middle Ages.² Although it gained its dreaded fame as a scourge of seafarers, scurvy had been known as an endemic disease in Baltic countries, northern Scandinavia and parts of the Netherlands, particularly towards the end of harsh winters. The disease assumed a new significance as it became the major cause of morbidity and death among crews of the small ships that crawled tentatively down the west coast of Africa in search of a route to the spice islands of the East. Vasco da Gama was the first Western

explorer to reach India by sea, but he paid for this success with the lives of half his men, most of whom died of scurvy – the curse of explorers in every quarter of the world at the time.

Origins of the Dutch East India Company

Dutch involvement in and eventual domination of the sea route around the Cape began with an expedition that commenced in 1595 when four ships of the first Dutch exploratory expedition to the East sailed from the West Frisian island of Texel. The journey as far as the Cape of Good Hope was relatively uneventful except that a considerable number of men developed scurvy after they had passed the tropic of Capricorn.³ The small fleet was in desperate need of fresh food but as there was nothing to be had at the Cape they pushed on to Madagascar, which had been used by the Portuguese for victualling purposes. They managed to obtain fresh meat, fish and water, but no fresh fruit or vegetables, and lost so many of their crew to scurvy that the burial site of these unfortunate men became known as the 'Dutch cemetery'. At the northernmost point of the island they eventually obtained fresh fruit, meat and water, but relationships with the local population broke down and they had to leave for Java.⁴ The fleet accomplished its mission and arrived back in the Netherlands 2 years later – but with only 89 of the 249 men and boys who had set out on the journey. Most of the 160 deaths were due to scurvy, but despite its extremely high cost in human life this exploratory expedition succeeded in opening the trade route to the East for the Dutch Republic.

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The phenomenal increase in trade that followed led to the formation of the Dutch East India Company (VOC) in 1602. By 1650, under the direction of The Lords Seventeen, it had become the largest commercial organisation in the world. The VOC gradually displaced the Portuguese from the scene and as the British were not yet powerful enough to pose a serious threat, Dutch merchants dominated trade with the East for the next 150 years.⁴

Vessels, crews and cargo

The VOC fleet comprised hundreds of ships termed 'Indiamen', purpose-built for conveying merchandise over long distances. An average East Indiaman was about 150 Dutch feet (42.45 m) in length, with a width of about 41 feet (11.60 m) and a hold of about 19 feet (5.38 m) in height.⁵ A standard vessel of 160 feet accommodated 250 - 275 men, a 145-foot ship took 200 - 225 men, and a 130-footer 150 - 175 men. The men were accommodated below deck in appalling cramped and filthy conditions that contributed to the spread of contagious diseases.⁶

Space was at a premium on these small vessels. Ships had to carry sufficient water and provisions for their large complement of seamen and occasional passengers on the long journeys. Drinking water stored in large barrels became turbid and malodorous within a short time, probably as a result of the sulphates present in most surface and well water in Holland. In addition small worms would make their appearance in this favourable substrate! For the journey to the Cape ships carried about 420 litres of water and 76 litres of ship's beer per man. Fluids had to be rationed during periods that ships were becalmed.

The sailors' work was physically demanding and called for adequate nutritional intake. The foodstuffs supplied were unrefined and the meals unattractive, but meals were adequate in bulk and nutritious within the restrictions imposed by the lack of effective methods of food preservation for a journey of unpredictable duration and under widely variable climatic conditions. Dried cereals and double-baked biscuit provided carbohydrates. Dried pulses and beef preserved in brine provided protein, while bacon, butter and oil (mostly olive oil) met fat requirements. Slaughter-stock were taken on board to provide fresh meat during the early phase of the journey, but this was messy and the supply 'on the hoof' was usually rapidly exhausted. The seamen regarded food as an important factor in their wellbeing and attributed many of their illnesses to an incorrect diet. By the 16th century it was known that fresh fruit and vegetables would cure scurvy within a few days, but the question of how to preserve these essential items of diet remained unsolved until the late 18th century.

The picturesque VOC ships were cumbersome, so the journey to the East could only be accomplished in about 5 months. It became evident that the longer the duration of the journey the

greater the morbidity and mortality, particularly due to scurvy, although other infectious and deficiency diseases also played their part. The average mortality rate for the 15 VOC ships travelling from the Netherlands to Batavia between 1625 and 1631 was 14.4%, with a range from 2.5% to 30%.

Scurvy and other diseases in the Company's fleet

The main afflictions to plague Dutch seamen during their country's Golden Age were traumatic injury, scurvy, malaria and gastrointestinal infections. Scurvy was the most important, although epidemics of typhus were occasionally devastating. Although scurvy is usually regarded as an affliction of sailors who spent months at sea, it was familiar to the Dutch as it was endemic in parts of the Netherlands, particularly around Alkmaar. It was also encountered in a milder form in poorer communities in the cities during spring, probably owing to the high cost of fresh vegetables after the long European winters.³ This seasonal decline in the intake of fresh fruit and vegetables meant that men joining the Easter Fleet, which left Holland between April and June, often had low reserves of vitamin C, and therefore were more liable to develop scurvy. To aggravate matters this fleet took a few weeks longer to reach the Cape than the Christmas fleet because of the different prevailing winds.⁵ Any prolongation of time spent at sea such as being becalmed, which often happened near the equator, could have disastrous effects on the health of crew and passengers.

Clinical features of scurvy

There are innumerable descriptions of scurvy in 17th and 18th century medical texts. Of relevance to the VOC fleet is the information in journals kept by the ships' *chirurgijns* from 1695, on instruction of the Lords Seventeen. These journals had to record all information on diseases affecting seamen, including details of the clinical state and treatment of each individual. A 16th-century Dutch doctor, Pieter van Foreest, described the early symptoms of scurvy, namely depression, shortness of breath, weakness, pain in the legs and red gums. This was followed by swelling, haemorrhage and necrosis of the gums, with the teeth becoming loose in their sockets. Blue blotches appeared on the arms and legs, followed by swelling and stiffness of the joints, leg oedema and death.³

Treatment

In 1593 Sir Fredrick Hawkins wrote: 'That which I have seen most fruitful for this sickness is sower [sour] Oranges and lemons . . .'.² This was confirmed in 1600 when the crew of a ship in Lancaster's fleet who had received a daily dose of lemon juice were completely free of scurvy, while the crews of all the other ships were severely afflicted.² These observations and similar contributions by others were lost, probably



because they were not adequately recorded. Disease continued unabated despite learned dissertations and speculations about its causation. Attempts were made to explain the clinical phenomena of scurvy in terms of the current philosophy on the origins of disease that dominated medical thinking at the time, e.g. the humoral or chemical theories. These had such a hold on the profession that practical observations such as those by Hawkins were ignored or forgotten because they did not conform to the medical opinion as to 'how things ought to be'.

While these learned arguments about the cause and treatment of scurvy increased in complexity and irrelevancy, sailors continued to succumb to the disease and they and the *chirurgijns* desperately looked for natural remedies. Various agents were tried but none was particularly effective. A plant associated with the Cape called scurvy grass (three-leaved sorrel), *Oxalis pes caprae*, was much sought after by Dutch sailors and later by sailors of other nationalities. When ships arrived at the Cape 'diseased men such as have the scurvy, so soon as they taste the shore, eat three-leaved grass, fresh meat and the like, and bathe, they become whole and frolic in a small space'.²

Dutch settlement at the Cape in the mid-17th century

Increasing sea traffic demonstrated the strategic value of the Cape of Good Hope. Sooner or later it would therefore have been occupied by one of the European seafaring nations, as almost happened in 1620 when the British flag was temporarily planted at the Cape. However, the Dutch settlement was not part of a military strategy but a desperate measure to deal with the appalling morbidity and mortality of seamen making the journey from Europe to the East. Before the Dutch settlement, passing ships had made use of the Cape as a place of refreshment with varying degrees of success. From a medical point of view the most important early visitor to the Cape was the Dutch physician Jacobus Bontius in 1629. He had a great interest in botany, was employed by the VOC as Apothecary and Surgical Inspector, and in 1627 sailed from the Netherlands with the fleet of the famous Jan Pietersz Coen. His ship arrived at the Cape shortly after the rest of the fleet had put ashore. About 100 men were severely afflicted with scurvy so he was able to observe first hand the beneficial effects of fresh food, particularly meat, fish, penguin meat and sorrel, in their diet.⁶

While practising as a physician in Java in 1630, Jacobus Bontius described the symptoms and signs of patients with beri-beri. This disease had been known in Malaya and India for centuries; centuries later the cause was proved to be a deficiency of vitamin B₆ (thiamin). It affected some sailors, particularly on the return journey from the East to the Netherlands, and was a particular problem in 1661 when the biscuits usually issued for the return journey were replaced by polished rice. Bontius seemed to have good luck or insight

in dealing with deficiency diseases, as happened when he prescribed raw shark's liver for the treatment of night blindness in sailors.⁷

By 1648 scurvy dominated Dutch seafaring life and trade, but in that year a disaster occurred which led to a partial solution. On its outward journey to the East the ship the *Haarlem* was wrecked at the Cape and 60 crew members were stranded there for almost a year before being picked up by the return fleet. Two of their leaders, Leendert Janzen and Matthijs Proot, reported in 1649 to the Amsterdam Chamber of the VOC their conviction, in the light of their experiences, that a settlement at the Cape would significantly improve the victualling of the VOC's ships. Before deciding on this report the Lords Seventeen asked the opinion of Johan van Riebeeck, a ship's surgeon with the return fleet under Wollebrant Geleynsz, which had returned the *Haarlem's* crew to the Netherlands.⁸ Van Riebeeck was an astute observer although he had only spent about 3 weeks ashore at the Cape while the salvaged cargo of the shipwrecked *Haarlem*, its crew and their possessions were transferred to the fleet. He supported the suggestion of Janzen and Proot on the grounds that this would greatly improve the health of the men. He stressed that by not stopping at the Cape on the outward voyage, crews had to be put on tight water restrictions, meat was boiled in salt water and the men were given wine to compensate for lack of water. 'Though the wine is a cordial and strengthening, the sailors remain not the less subject to scurvy and similar diseases in consequence of the staleness of the food.'⁷ The report and Van Riebeeck's response led to the Lords Seventeen deciding to establish a victualling station at the Cape, with Van Riebeeck as its first Commander.

Within a month of Van Riebeeck landing at the Cape, two VOC ships, the *Walvis* and the *Oliphant* arrived with many sick men on board so that a tent hospital had to be erected to accommodate them.⁹ Such temporary structures served the sick seamen until adequate hospitals could be built. When the fort was built the hospital was a wooden structure of doubtful sturdiness constructed against an outside wall and able to accommodate 30 patients. In 1664 Van Riebeeck's successor, Wagenaer, obtained permission from the VOC to convert the rice store on the beach into a hospital that could house 400 patients. Such was the demand for hospitalisation of sick seamen that the first Governor of the Cape, Simon van der Stel, was given permission to build a new hospital in 1693, but it was only completed in 1699. It was a large hospital and was highly spoken of by visitors from Europe, but in time it deteriorated and had to be replaced. (This hospital was situated north of the Company Gardens and between the present-day Adderley and St George's streets, and Wale and Longmarket streets.)

A refreshment station at the Cape was a first and important step in the battle against scurvy; it provided care for the



sick and fresh food that helped to prevent the disease on the journey to Batavia. Gardens were therefore established immediately after the Dutch landed at the Cape. Van Riebeeck fortunately had the expert assistance of a professional gardener, Hendrik Boom, who established his garden at the site of the present-day 'Company Gardens'. Production rapidly increased so that VOC ships and those of other nations could be supplied with fresh produce. As the demand increased, servants of the company took their discharge and became freeburgers, whose farming activities were entirely dependent on the market provided by passing ships.

After 1652

Fresh food provided at the Cape did not influence the wellbeing of crew and passengers on the journey from Holland, but undoubtedly improved the health of those who continued to the East or were returning to the Netherlands. Although the disastrous effects of scurvy and other diseases on crews of ships calling at the Cape were better annotated following the introduction of surgeons' journals in 1695, this brought a solution no nearer.

Until about the middle of the 18th century scurvy continued to take its toll on the outward passage from the Netherlands. The *Gouden Buys* sailed from Enkhuizen on 4 May 1693 with 194 men on board and when it arrived at the West Coast, about 24 miles north of St Helena Bay on 19 October, only 12 members of the crew were still able to work. Seven men went ashore on 11 November; 5 of them died of hunger and 2 survived. A yacht was sent to assist the stricken ship but when it reached the *Gouden Buys* the latter had drifted ashore and the only survivor on board died soon afterwards.¹⁰ On 23 November, the *Schoondyk* arrived from the Netherlands; 134 crew members had died and the surviving 120 men were all sick. The *Pampus* arrived at the Cape on 23 December with only 16 healthy men on board as it had lost 60 men *en route* and 83 survivors were down with scurvy. A fleet of 11 ships arrived from the Netherlands on 11 November 1695 with 678 men unable to walk and some so ill they died on their way to the hospital. Many were ill but able to get about, while 228 had perished on the way to the Cape.¹¹

When the *Geelvoick* with its accompanying vessels the *Nijptang* and 't *Wezeltje* arrived at the Cape early in September 1696 on their way to the Great Southland, a number of sailors suffering from scurvy had to be taken to the Company's hospital. The three ships remained in Table Bay for about 6 weeks, and the entry in the ship's journal of the *Geelvoick* for Tuesday 16 October reads: 'In the forenoon the ship *Vosmeer* of Zeeland, skipper Landsheer, has come to anchor here below Robben Island, powerless, firing a few guns. Have hurried there with all boats to move the ship to safety, have found more than hundred dead and the rest sick, had only four healthy seamen in the ship. Set out from Zeeland with

225 crew on 26th April, God thanked for ditto ship and the remaining crew.'¹² Five of the dead were French refugees on their way to the Cape.¹³

Light on the horizon

In the light of his experience in the Austro-Hungarian army, Dr J J G Kramer wrote in 1720 that oranges, limes and lemons or their preserved pulp administered as such or as lemonade, could cure scurvy without the aid of any other agent.⁵ This information was not acted upon until James Lind's famous experiment in 1747 comparing the effect of two oranges and a lemon given daily with the effect of other 'remedies' given for scurvy. The citrus cure worked within days, but patients and doctors alike found it difficult to believe that such a simple cure could be so effective against such a disastrous disease. In his *Treatise on the Scurvy* published in Edinburgh in 1753 James suggested how scurvy could be prevented and treated in British sailors, but his work did not gain immediate acceptance. In the treatise Lind provided the reason for this. 'It is no easy matter to root out old prejudices or overturn opinions which have acquired an establishment by time, custom and great authorities.'

Other practical issues included deterioration of citrus fruit on the long sea journey so that it was often inedible by the time it was really needed. Lemon juice was prone to go off, and when it was boiled in an attempt to preserve it in the form of syrup, it lost its potency due to the vitamin C being destroyed by heat. Some learned men attributed the effect of citrus fruit to the acidity and tried for years to substitute other acidic substances as cures despite the fact that patients died of scurvy while being treated. It is probable that the confusion engendered by the use of inactive or adulterated lime juice contributed to the delayed appreciation of the dietary origins of scurvy. Despite having no proven anti-scorbutic activity, malt drinks also enjoyed some popularity and added to the therapeutic confusion surrounding this disease.⁵

Dr Paulus de Wind, an eminent Dutch medical man, translated Lind's treatise and went a step further by recommending the use of sauerkraut, prepared by pickling raw cabbage. This was introduced as part of the seaman's diet by the VOC in the second half of the 18th century.⁵ This dramatically reduced the incidence of scurvy and the Dutch example was rapidly followed by other countries. On his first expedition to the Pacific, Captain James Cook had 7 400 pounds of sauerkraut on board besides some rob of lemon and lemon juice, with the result that not one of his crew died of scurvy (rob is the juice of a fruit reduced by boiling to the consistency of a syrup and preserved with sugar). In his report to the Royal Society of 1776 Captain Cook mentioned the effectiveness of malt drinks, rob of lemon and orange as preventive methods against scurvy and also advocated sauerkraut 'as it spoils not by keeping'. Cook was promptly



elected a fellow of that august body – but not Lind!²

Owing to the confusion about the effectiveness of citrus fruits and their derivatives, it took more than 30 years before the British Navy responded to Lind's work by making the daily consumption of lemon juice compulsory among sailors, thereby dramatically reducing the incidence of scurvy. This was done at the instigation of John Blane, a great admirer of Lind's work, when he was doctor to Admiral Rodney's fleet in the Caribbean.⁵

At the time of the second British occupation of the Cape lemon juice had become compulsory in the British Navy but it took a long time before the poor antiscorbutic qualities of lime juice were appreciated; by then it had earned the nickname 'limey' for the British.

Afterthought

Between 1928 and 1932 ascorbic acid was synthesised by Albert Szent-Györgyi, who proved its antiscorbutic action, and this earned the Hungarian a Nobel prize in 1937. Within a year of the discovery of the chemical structure of ascorbic acid it was synthesised.¹⁴ By the time this happened the preservation of fruit and vegetables by means of refrigeration had become common practice so that scurvy ceased to be a threat to

seafarers and explorers. In South Africa the disease no longer presented in the seaports but had become a problem of the hinterland and was a measure of malnutrition during the Anglo-Boer War, as demonstrated by black citizens during the sieges of Mafeking and Kimberley. Later in the 20th century it served as an index of the inadequate diet of black prisoners and mineworkers. It also manifested as a brief epidemic in Cape Town in the early 1950s among black workers on an inappropriate and grossly deficient diet.²

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