An assistant ship surgeon’s account of cholera at sea

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ABSTRACT

The diary of Thomas Graham, a naval ship surgeon, brings the voyage of HMS troopship Apollo in 1849 to life. A year after England’s second great cholera outbreak, the pervasive fear of the disease became a reality onboard when cholera broke out. The intended voyage from England to China was diverted to South America where the ship was put into quarantine. So bad were the conditions onboard that the Times correspondent wrote: ‘I have never seen a convict-ship in which the convicts were not more comfortably lodged’. Graham’s writing provides an insightful record of life at sea in the mid-nineteenth century and the circumstances that led to this cholera outbreak, namely the overcrowding and poor hygiene. He wrote about the current beliefs and assumptions surrounding the disease; that the foul air was to blame. He also noted the varied methods taken to confine patients and treat the disease. The diary is supported by evidence from naval records and newspaper articles. Graham’s writing gives us a glimpse into the life of a man who saw the world from a perspective inaccessible to us and the experience of observing newly discovered continents, cultures and wildlife, which he meticulously recorded. This was Graham’s last piece of writing as he died unexpectedly of malaria shortly after the journey’s end. The diary encapsulates the struggle to overcome disease and the tragic plight a humble ship surgeon shared with the crew.

Introduction

Over 150 years after John Snow identified the Broad Street pump as the source of a cholera outbreak in London, cholera is a well-described and treatable disease. For those dealing with the disease in the mid-nineteenth century, it was mysterious and frightening; the onset of symptoms rapid and the ensuing death cruel. When cholera broke out onboard a naval vessel in 1849, an assistant ship surgeon’s account provides insight into how the disease was perceived and how it instigated public health reform.

The troopship Apollo sailed from Cove in England on 17 February 1849 carrying 711 passengers, soldiers and civilians alike, bound for Hong Kong where it would arrive a year later in February 1850. As a supernumery assistant ship surgeon on board, Thomas Graham was not subjected to the rigidity of a surgeon’s routine and he divided his time between assisting in ‘the sick list’ and in documenting the events, people and places encountered. The accuracy of his record is evidenced by the ship’s musters,1 naval letters (the indexes tell that five letters were sent from the Apollo from the Captain and Physician. The letters are to be found in Admiralty Correspondence; ADM 1:5596, but this is an incomplete set and the letters are missing)2 and contemporary newspaper articles.

Despite naval reforms in the late eighteenth century, life at sea remained problematic with the issues of overcrowding, poor ventilation, inadequate food supplies, limited water and adverse weather conditions being unavoidable for naval vessels. This journey was no exception as Thomas Graham personal account of voyage onboard troopship Apollo 1849–50 (unpublished diary. Wellcome Library, Archives and Manuscripts, Ref: MS.5462. Many quotes from this diary are included. Their location in the diary is denoted by the number in brackets following the quote. p1.r indicates that this passage is on page 1 recto. Similarly, p33.v would indicate that the passage was on page 33 verso) said, ‘After we had been at sea a few days, the scene on the lower deck was anything but pleasant. As many sick and so crowded, children quarrelling and women laying about’(p2.r). Figure 1 depicts a few pages from Thomas Graham’s Diary.

The troopship Apollo was built during the Napoleonic war as a fifth-rate frigate, a medium-sized square-rigged warship designed to transport around 300 men. She was converted to a troopship in 1838. Figure 2 is a painting of the Apollo in the early nineteenth century.3 The lower deck was 154 ft long and 39 ft wide and the hold was 13 feet deep.4 The 711 passengers onboard far exceeded its capacity and even before departure, the ill-fated outbreak may have been forecast.
The outbreak

Britain’s second great cholera outbreak had occurred in 1848 and in the mid-nineteenth century, debates raged over cholera’s true aetiology. The widespread fear of the disease became a reality for the passengers in the Apollo when cholera broke out onboard after four months at sea in June 1849 during the first leg of its voyage to the Mediterranean.
The first case of cholera occurred in a soldier after a few days at sea; ‘One man dead after a very short illness, supposed to have been Cholera. I did not see him but the report had a great affect on all on board which only wore away as day after day passed and no other occurred’ (p2.r).

Further cases occurred in the same company of soldiers six days later, ‘Another case of cholera has occurred during the night. Well marked. At present, the patient lies in a state of collapse’ (p3.v).

Overwhelmed with the disease, the ship was unable to dock in Madeira as planned and was put into quarantine. A lengthy detour was made to the Ilha Grande in Brazil for refitting and cleaning. Figure 3 is a pencil drawing of the encampment in Brazil.

The uncertainty as to the cause of the disease was evident in the discussions onboard, and Graham acknowledged his ambiguity with regards to ‘the movement of this strange disease’ (p10.v).

Over a period of 50 days, there were 18 cholera deaths. Figure 4 shows the pattern of the outbreak as adapted from Graham’s description. The periodical pattern indicates a contagious propagated outbreak, spread by person-to-person contact. New cases occurred approximately every 3–6 days; this periodicity would have correlated with cholera’s incubation time. Despite being a waterborne disease, had the Apollo’s water supply been contaminated with cholera; the outbreak would have had a rapid onset with more cases occurring earlier. Person-to-person transmission is relatively rare but is more likely to occur in instances of overcrowding with inadequate facilities for washing. The last case of cholera occurred on 6 August 1849 and the outbreak subsided when the ship arrived in the Ilha Grande.

An article published in the Times in April 1850, after the Apollo had finally reached its destination in China, described the conditions onboard the ship. The article was written by the Times’ Naval correspondent in the China Station.

‘With reference to the Apollo, I ought to state that she was greatly overcrowded by the troops and supernumeries during her most wearisome voyage of eight months. From personal inspection, I can affirm that the place allotted for the women and children accompanying the regiment was totally unfit for the purpose, and that I have never seen a convict-ship in which the convicts were more comfortably lodged. The means of ventilation (scanty enough in harbour, when the ports can be opened) are so insignificant at sea as to be undeserving of the name, and when, in addition to having had to bear the stifling atmosphere of their small portion of the lower deck and the thermometer at 95°, many of them underwent the agonies of childbirth in a small cabin bulkheaded off from it, it will be obvious that no language can exaggerate the miseries which these unhappy women suffered during their eight months imprisonment.

Five supernumerary assistant surgeons were thrust into the midshipmen’s berth, already too small, and those gentlemen, one of whom had been ten years in the service, were obliged to sleep and to perform all the operations of their toilet on the troop deck, in the space between the women and the soldiers, and in view of both!’

![Fig. 3](digital photograph of pencil drawing of the encampment of the 59th regiment at Alborra bay, Ilha Grande, Brazil, by Thomas Graham.)
Searching for the cause

In an era of such high cholera prevalence, the irresponsible overcrowding of the Apollo made the appearance of the disease almost inevitable. In Britain, knowledge of the causal relationship between the spread of disease and poor conditions was coming to light in a period that would later become known as the ‘Sanitary Revolution’.

In 1842, Sir Edwin Chadwick published his report on the ‘Sanitary Condition of the Labouring Population of Great Britain’,7 which argued that poor living conditions, overcrowding and foul air predisposed urban populations to epidemic disease. He claimed that ‘all smell is disease’ and his findings led to the implementation of the first Public Health Act in 1848 which had instigated the building of drains and sewers, the collection of refuse and the procurement of adequate water supplies. In the same year, the General Board of Health was appointed with Dr John Sunderland as Inspector.

Sunderland wrote reports on the 1848 outbreak: ‘there is no sufficient proof that water in this [impure] state acts specifically in generating cholera’.8 However, he acknowledged that ‘the use of water containing organic matter in a state of decomposition is one predisposing cause of cholera’.

Graham was confident that the aetiology of cholera lay in the foul air, reflecting the mid-nineteenth-century belief in miasma as a scientific truth. ‘There appears now to be no doubt but that a specific virus was brought on board by one of the soldiers, which has been called into action by the foul air from holds and crowded lower deck’ (p12.v).

The majority of the cases occurred among the soldiers who lived in the filthiest, most unventilated and overcrowded parts of the ship. This verified his hypothesis that foul air was causing the disease.

‘The Quarter Master died and was buried at 9½ pm. His zeal for the comfort and cleanliness of the troops no doubt was instrumental to his demise for he spent most of his time down among them’ (p12.r).

Miasma was a concept understood and believed throughout Europe. When the Apollo was unable to dock in Madeira because of its cholera problem, Graham wrote: ‘...so much afraid were some that foul air would come ashore in the casks’ (p6.r). The belief in the pathogenicity of the foul air was so strong that the Apollo was not allowed to dock to refill its water supplies. Even four years after the diary was written, in 1854 Dr Gavin Milroy of the Sanitary Commission is reported to have said that ‘The tendency to diarrhoea and dysentery is greatly increased by breathing in impure atmosphere, which is recognised in medical science’.9

The outbreak had originated among the soldiers, but as it progressed, officers were also struck down, perplexing those who had blamed the foul air of the holds. An explanation was derived which would corroborate the previous hypothesis.

‘It appears that two tubes from the lower deck opened on the main deck, and the captain had caused the covers to be removed from them just previous to the first outbreak. This
may in part account for its attacking the ships company, as it was chiefly in the messes near this tube. They are now covered up like the others to the upper deck; on this second outbreak no cases have as yet occurred among them’ (p14.r).

Graham’s proposal that the foul air had moved up the tubes was a logical assumption and was confirmed for him by the cessation of cases upon the covering of the tube. It is certainly possible that soiled material may have moved through the open tube and contaminated the officers’ food, yet it is also possible that the officers’ food may have been soiled by the hands of those preparing it.

Fevers, like cholera, were believed to have predisposing and exciting factors. Predisposing factors included a poor diet, overwork, poverty, poor ventilation and unclean water. The exciting factor was the trigger that caused the disease to manifest. This is comparable to today’s theories of host, agent and environmental factors in any disease aetiology. An appreciation of the role played by various factors in disease was evident in the diary and highlighted the general acceptance of these beliefs. ‘I have heard that when the vinegar was served out, that many of the soldiers mixed large quantities with water and drank it. No doubt such imprudence would tend to produce diarrhoea and consequently predispose to cholera’ (p11.v).

The pattern of the outbreak indicated that its cause was not a contaminated water supply; nonetheless the poor water quality would have increased the likelihood of many other gastrointestinal complaints. ‘Indeed the water obtained at Tenerife is quite thick and on first removal from the tank has a fetid smell which disappears on exposure to the air’ (p9.r).

It is true that cholera cases ceased upon arrival in the Ilha Grande, where there was an abundance of water for washing and cleaning the ship.

John Snow wrote in 1836: “The question of contagion in various diseases has often been discussed with a degree of acrimony that is unusual in medical or other scientific enquiries...It is the great pecuniary interests involved in the question, on account of its connection with quarantine”.11 The medical historian E.H. Ackerknecht also suggested that the rather anti-scientific viewpoint held by the anti-contagionists demonstrated the influence of the rising commercial interests requiring fair trade.12 That the scientific beliefs of the era reflected the political mood provided an explanation for the delay in the recognition of the true aetiology of cholera.

This contagion-anti-contagion argument was evident on the Apollo. ‘A consultation was held whether it would be prudent to go back to Gibraltar. All except myself decided upon its non-contagious nature’ (p5.r). Graham seemed an independent and rational thinker in his belief that cholera was contagious, and yet he acknowledged that others thought like him when he wrote: ‘Tonight the bedding of the women was thrown overboard which circumstance looks as if doubt existed with regard to its (cholera’s) contagious nature in the minds of some of those who maintained the contrary’ (p5.v).

A desire to continue impeded the judgement of those onboard and they argued against contagion so that their journey would be delayed no further, giving a modest example of the influence of politics on disease theory.

The economic implications of quarantine made contagion an unpopular hypothesis. Nonetheless quarantine was a naval protocol, involving 40 days of isolation, which could be ended by gaining a clean bill of health certificate (practique). The Apollo went into quarantine in the Ilha Grande (p6.r) but gained pratique after a month.

### Changing opinions

Between 1845 and 1856, over 700 works on cholera were published in London alone. In 1849, John Snow, sceptical of the miasmatic hypothesis of cholera transmission, published his pamphlet on ‘The Mode of Communication of Cholera’.10 His theory that cholera was waterborne would not be widely accepted until much later, when he highlighted the disparity in cholera mortality rates between the areas of London supplied by different water companies. He is better known for having identified the Broad Street pump, a water pump in Soho as the source of a cholera outbreak in 1854. The question of whether or not the disease was contagious was a particularly salient argument.

### Treatment and prevention

There was no effective treatment to cure cholera, but various remedies were believed to soothe the disease or relieve symptoms. Such treatments included bleeding and purging, homeopathic remedies and depressants such as opium.

‘There is another case in a woman and now ten hours from the first attack she is moribund. Galvanism was tried and with such effects that it promises to be very useful. She however sunk and was buried at 8 pm’ (p5.r). The use of Galvanism here demonstrates the experimental nature of novel therapies at sea.

‘The treatment tried this time was acet: plumbi et opu’ (p8.v). The lead and opium pill (pilula plumbi cum opio) was a useful remedy for pain, diarrhoea and stomach and bowel bleeding.13
‘Two other cases were placed on the sick list. One was treated with an emetic and salt and the other was bled’ (p14.r). Despite the seemingly futile treatment, both of these cases survived.

In 1846, Sir William Burnett, Director-General of the Medical Department of the Navy had stated that ‘Bleeding, blistering and purging would cause most types of fever to cease and if needed one should then give mercury, calomel or blue pill either with or without mercury.’

With few effective treatments, preventative measures were vital in controlling the spread of disease. On the Apollo, such measures included separating the sick from the healthy, airing the linen and the imposing of its quarantine. In addition, the bedding and cots were thrown overboard and disinfectants were used. It was known that these acts would be effective, yet the reasons why would not be clear until 20 years later when Pasteur would formulate his germ theory.

The voyage’s legacy

Given the insanitary and overcrowded conditions and the lack of knowledge of cholera’s cause or its treatments, there seemed little hope for the victims of the Apollo. Yet, despite adverse conditions, an overall cholera mortality rate of 2.5% seems fortunate. To put this outbreak in context with others at the time, naval records of cholera cases and deaths in the Mediterranean Squadron in 1850 give mortality rates from as low as 0.4% to over 9%. (NA ADM 101/113/6 Medical journal detailing cholera outbreak in Malta 1850/51. Admiralty and predecessors: Office of the Director General of the Medical Department of the Navy and predecessors: Medical Journals 1785–1963.)

Cholera’s true aetiology was yet to be identified when the Apollo sailed, but without effective treatments, this knowledge may not have radically altered the actions taken to halt the spread of disease. To rid the boat of the foul smells that were believed to be the source of the disease, the holds were cleaned, the ship was disinfected, and the sick were separated from the healthy. These remain advisable measures today. In 1866, a Fleet Order from the Admiralty on ‘Sanitary Precautions in Regard to Cholera’ advocated similar actions in response to the devastating effects of cholera during the Crimean war. It is worth noting that most of the preventative measures that were advocated had already been practised on the Apollo.

Graham survived the appalling conditions of the Apollo and, despite being ‘thrust into the midshipman’s berth, already too small’, had avoided the clutches of cholera. It is a tragic irony that only months later, after the journey’s end, his demise would be at the hands of another infectious disease, malaria (G. J. Niblett, unpublished letter). On arrival in Hong Kong, his writing became sparse and his diary ended on 27 March. Following the last entry in the diary, an entry was written in another hand stating ‘died Whampoa shortly after this was written’ (f.51r). Thomas Graham’s body now rests on Dane’s Island, an island in the Pearl River near Canton.

The scientific breakthroughs and shifts that were to occur in the future eluded Thomas Graham, but on this voyage we saw his search for more adequate answers. One can only speculate about Thomas Graham’s reasons for creating his diary. Like Darwin, recording his observations on HMS Beagle 15 years previously, he must have believed in the value to others of his record and the scientific soundness of his opinions. The factual content of the diary implies that Graham at least hoped that his diary would be useful to those who would one day read it. He might even have considered it one of a number of voyages that he would chronicle, but his tragic and unexpected end deprived us of the benefit of any further insights.

Acknowledgements

Thanks to the staff at the Wellcome Library and the National Archives. Thanks to John Beagle for his help in researching Graham’s life prior to this voyage and to Brian Newbury at The Parker Gallery, Pimlico Rd, London, for his help in obtaining the image of the Apollo.

References

1 NA ADM 38 7534 (HMS Apollo), ADM 38 3604 (HMS Hastings) Admiralty: Ships’ Musters (Series III) 1793–1878.
3 Photograph of the original painting by Thomas Butterfield fl.1798–1827.
4 Apollo statistics obtained from Directory of Warships; the Fifth Apollo, Warship Histories, National Maritime Museum 1986.
6 The Times. From Our Own Correspondent, The China Station, 19 April 1850, p. 7, Issue 20467, Col F.


13 The Seamen’s Medical guide in preserving the health of a Ship’s crew. 11th edn. London: George Phillip and Son, 1863.


15 The Times. From Our Own Correspondent, The China Station, 19 April 1850, p 7, Issue 20467, Col F.