

# THE STUDY OF CHOLERA AND MAX VON PETTENKOFER'S VISIT TO MALTA IN 1868

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Europe was first invaded by cholera in 1817-23, the infection having spread from India. A second and third outbreak on a pandemic scale occurred in 1826-37 and 1846-63 respectively.

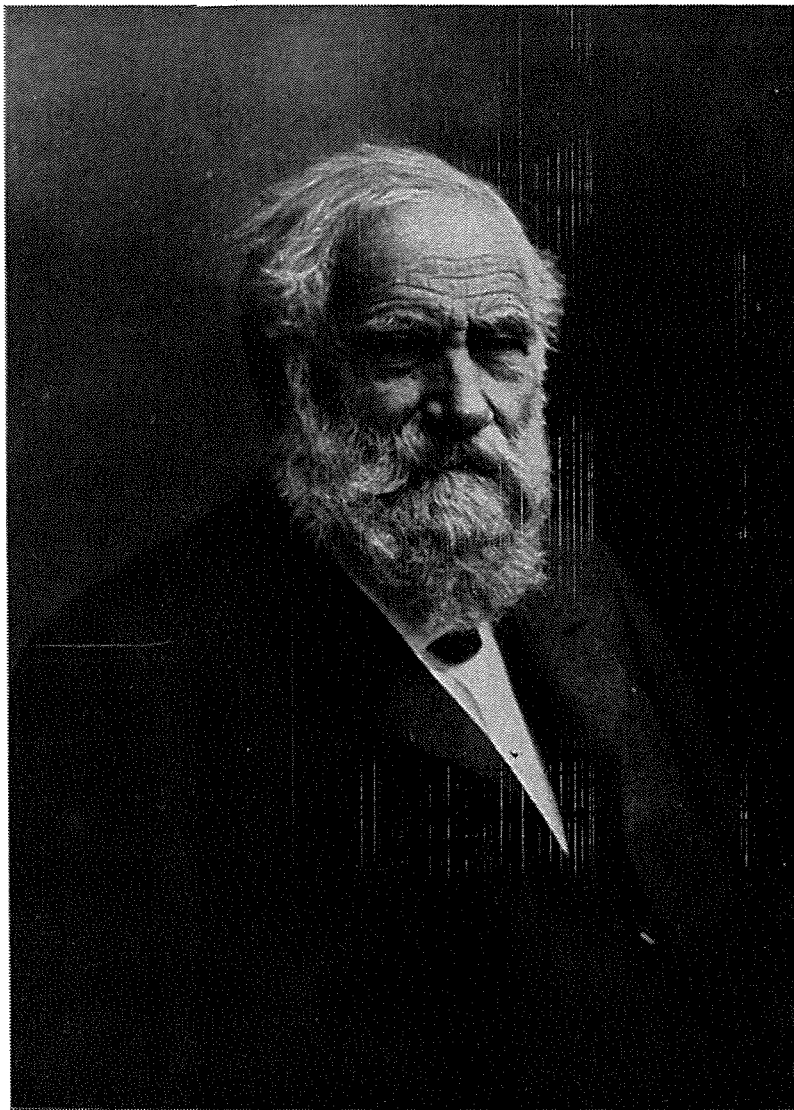
Following the first epidemic, medical men from various European countries began visiting stricken areas abroad in an attempt to study the disease at first hand on the spot. In 1831 Dr. William Russell and Dr. David Barry were sent from Britain to St. Petersburg (Leningrad); in the same year the French physician Francois Magendie went to Britain; later on, Italian investigators proceeded to Paris when cholera broke out in the French capital. However, in spite of all these efforts the cause and mode of transmission of the disease remained as elusive as ever.

By 1866 three International Sanitary Conferences had been held (Paris 1851 and 1859, Constantinople 1866) in an attempt to reach some form of agreement on the preventive measures to be adopted especially in the Mediterranean and the Black Sea but without any practical results (Howard-Jones, N. 1950).

At this time there were four main schools of thought on the epidemiology of cholera: (1) the air-borne or tainted air theory, the adherents of which were divided into two groups — those that believed that the cholera "poison" was a vapour or miasm and those that held that the "poison" was of a solid nature and was carried from place to place by air currents; (2) the water-borne theory according to which cholera was spread by polluted drinking water as had been proved

statistically by John Snow who traced a cholera outbreak in London to a water pump in Soho in 1849; (3) the contagion theory which held that cholera was transferred from one person to another by physical contact. The leader of this school was Robert Koch who subsequently discovered the *Vibrio cholerae* while working in Alexandria (Egypt) in 1884 (Greenwood, M. 1949); and (4) the "ground-water" theory evolved by Dr. Max Pettenkofer (1818-1901), Professor of Hygiene at Munich University. He was one of the early investigators into the physiology of nutrition, an exponent of the influence of the physical and social environment on the incidence and spread of communicable diseases and a pioneer of sanitary reform (Rosen, G. 1958). He opposed the contagionists in the sense that he maintained that apart from "contagia" one other condition was essential for the production of the disease, viz., suitable conditions of dampness of the soil. According to this theory the cholera organism which had penetrated the soil in the damp state came to the surface when the soil dried and spread through the air in the form of a miasm or gas (Longmate, N. 1966a); hence his emphasis on the water content of the soil.

Such was the controversial position when Max von Pettenkofer, an "eminent natural philosopher", came to Malta to study the manifestations of cholera in the Island, after having visited Gibraltar and parts of France and Italy with the same purpose in mind. By that time Malta had experienced four cholera epidemics — in 1837, 1850, 1865 and 1867. It appears that



**Max von Pettenkofer (1818-1901)**

*(By courtesy of the Director of the Universitätsbibliothek, Munich)*

what prompted Pettenkofer to come to Malta was the fact that the cholera epidemics of Gibraltar and of Malta had been closely followed and discussed in Munich and his opponents had quoted these two places as illustrations of the fallacies of his soil-moisture theory.

Before coming to Malta, Pettenkofer must have been in communication with the British Secretary of State for the Colonies as the latter sent the following despatch from Downing Street to the Governor of Malta, Sir Patrick Grant, on the 4th February 1868:

"Sir,

I have to introduce to your notice Professor Pettenkofer, a distinguished physician of Munich, who has for many years been engaged in endeavouring to ascertain the laws which govern the distribution of cholera and has made several important addition to previous knowledge on this subject.

Professor Pettenkofer is anxious to extend his researches by private local inquiry into the cholera outbreaks which recently occurred at Gibraltar and Malta.

Fully appreciating the importance of these proposed investigations I have to request that every facility which it is in your power to give may be afforded Professor Pettenkofer in conducting his inquiries in Malta.

I have the honour to be,  
Sir,

Your most obedient humble servant,  
(Duke of) Buckingham and Chandos".

Sir Patrick Grant referred the despatch to the Comptroller of Charitable Institutions, Mr. (later Sir) F. V. Inglott and to the Superintendent of Police with the remark that they would "no doubt give to Professor Pettenkofer the full advantage of their local information on the subject" (Despatches of Sec. of State to Governor, 1868).

Pettenkofer arrived on the 4th May 1868 on the Italian mail steamer "Massilia". He landed at Marsamxett Harbour where he was met by Sir Victor Houlton,

Chief Secretary to Government, who took him to the Hon. Mr. F. V. Inglott: "I soon realised," wrote Pettenkofer, "that I was in very good hands. Mr. Inglott, Maltese born, was well acquainted with the conditions of the Island and her people" (Pettenkofer, M. 1870a).

In Malta he read A. B. Spratt's *On the Geology of Malta and Gozo* (Malta, 1854), J. Sutherland's *Report on the Sanitary Condition of Malta and Gozo with Reference to the Epidemic Cholera in the Year 1865* (London, 1867) and D. Galton and J. Sutherland's *Report of the Barrack and Hospital Improvement Commission on the Sanitary Condition and Improvement of the Mediterranean Stations* (London, 1863). He did not regret that he did not know about these publications before his arrival in Malta; in fact he confessed that had he been able to read them abroad he might have relied on their contents and been tempted to forgo his journey to Malta — something he would have really regretted as during his stay in the Island he had learned "many other things of great epidemiological interest and usefulness". Indeed writing in 1887, he said that he still felt "most heartily grateful to the Colonial Secretary..... and to the Comptroller of Charities, Mr. F. V. Inglott and Prof. S. L. Pisani in Malta for all the help these gentlemen extended to me in a most friendly manner, Pettenkofer, M. 1887a).

Pettenkofer held Pisani in very high esteem both as "a scholar and as a medical practitioner". As a young man Pisani had gone to Edinburgh University — then at the height of its fame as a medical centre — after graduating from our University in 1850. There he obtained the M.D. and also the Licentiate of the Royal College of German and on his way back to Malta he had acquired a good knowledge of German and on his way back to the Island in 1854 he spent some time in Berlin to familiarize himself with German medicine and surgery. On being appointed Professor of Anatomy at our University in 1858 he went for a season to Munich "to be initiated into the mysteries of hygienics and sanitation by his friend the celebrated Dr. Pettenkofer" (*The Daily*

**VIEW OF A MODEL AT THE NATIONAL MUSEUM, VALLETTA.**

*(By courtesy of the Director. Photo by Mr. Jos. Spiteri)*



The “mandragg” was bounded by St. Mark Street, Marsamxett Bastion, St. Lucy Street and St. Patrick Street. It was approached by flights of steps from the three streets mentioned. Pettenkofer made his exit from the set of steps that led to the intersection of St. Mark Street with St. John Street (arrowed).

*Malta Chronicle* 1908). Indeed Pettenkofer had received Pisani "not only as a very welcome guest but also as his dear pupil" (*Malta* 1908).

Pettenkofer made several excursions in our countryside to study the geological formation of the Island and especially the porosity of our rocks. The archaeologist, Dr. A. A. Caruana, D.D., who was then Secretary of the University, provided him with samples of our limestone, sandstone and marl which Pettenkofer sent to Munich for analysis by his assistant Mr. Aubry (Pettenkofer, M. 1870b). Somewhere in the west of the Island he descended with Inglott and Pisani down a deep shaft into a newly-dug gallery which formed part of the scheme then in hand to increase the water yield of Malta.

He also inspected the hygienic state of some of our towns and stressed the indispensability of a pure water supply and a good drainage and sewerage system; and the proper ventilation of blocks of buildings and of streets for the promotion of the general health of the population and for preparing it to resist the onslaught of disease on an epidemic scale.

One of the most densely populated districts of Valletta was the so-called *Manderaggio*. When the city was being built in 1566, it was intended to construct a small harbour for the shelter of small craft. A site was chosen on the Marsamxett side of Valletta and the rock was cut down but the project was given up before sea-level was reached. In the oblong hollow that resulted, dwellings of a small size were built without any plan over an area of two-and-a-half acres which was traversed haphazardly by gloomy narrow passages and alleys. In these dark and damp hovels dwelt the poorer inhabitants of Valletta.

In 1865 Dr. A. Ghio, the Chief Police Physician, condemned this slum as the most unhealthy place in Valetta and pleaded for its demolition and levelling up to the surrounding areas (Cassar, P. 1965a). Pettenkofer has recorded his impressions of this place where "a ray of sunshine seldom penetrates" and where about 2500

persons lived at the time: "I could only reach the *Manderaggio* down some steps as if descending underground. The first time I wandered there was in broad daylight but quite alone. Among these houses, in the gloom of the place, among these people, I began to doubt whether I was in the right spot. I tried to turn back quickly but I did not succeed in doing so because I could not make out from which direction I had entered. I could not ask as I do not know a word of Maltese. The residents of the *Manderaggio*, apart from their Arabic mother dialect, could not speak any English or Italian. I was spoken to and questioned a lot but I do not know what the people said. I was happy at last to come to some steps again which led me outwards and I breathed once again more easily as I stood in Strada San Giovanni" (Pettenkofer, M. 1870c and 1887b). The *Manderaggio* no longer exists, having been levelled up in 1948. Its site is now occupied by blocks of modern dwelling units on each side of a large square and playground facing Marsamxett Harbour.

Pettenkofer was shown round the university by the Rector Dr. S. Schembri M.D. and conducted through the Lazzaretto buildings and Quarantine Station by Dr. A. Ghio. He visited several of the Charitable Institutions run by government including hospitals. He thus wrote about them: "Even from their external appearance one notices the loving care bestowed on the Charitable Institutions in Malta and this impression grows stronger as one observes their internal arrangements" (Pettenkofer, M. 1870d). He was so struck by the orderliness and good management of the Lunatic Asylum, opened eight years previously, that he declared that "if he were ever to be afflicted with mental disease he would prefer the Malta establishment to any other" (Inglott, F. V.n.d.). When viewed in the context of subsequent events, these remarks sound like a poignant forewarning of his own doom for Pettenkofer ended his life by his own hand.

Pettenkofer left Malta on the 11th May. Before doing so he expressed his intention of writing an account of his investigations in Malta and promised to

send some of his works to the Royal Library (The Malta Times, 1868; Pettenkofer, M. 1870e). He kept his word.

He published the results of his observations in the Island in the *Zeitschrift für Biologie* in 1870 under the title of *Die Choleraepidemien auf Malta und Gozo* (Bd. VI). The gist of this study (which contains several misprints) is that a scanty rainfall in the first five months of the year predisposed the Island to cholera epidemics but an abundant rainfall during the same period diminishes considerably the chances of cholera outbreaks on a large scale.

At the Royal Library there are the following four works of Pettenkofer: (1) *Verhandlungen Cholera Conferenz in Weimar am 28 und 29 April 1867. Munich. 1867.* (Proceedings of the Cholera Conference held in Weimar on the 28th and 29th April 1867). It is signed by Pettenkofer and inscribed *Der Universitaets Bibliothek in Malta* (To the University Library in Malta).

(2) *Wodurch die humanistischen Gymnasium für die Universität vorbereiten. Rede an die Studirenden der Ludwig-Maximilians Universität zu München. Munich. 1869* (How the humanistic grammar school prepares for the university. Oration to the students of the Ludwig-Maximilian University of Munich).

(3) *Verbreitungsart der Cholera in Indien. Braunschweig, 1871.* (The dissemination of cholera in India).

(4) *Zum gegenwertigen Stand der Cholera Frage. Munich and Leipzig, 1887.* (On the present state of the cholera question).

The last two books are presentation copies to the "most respectful" Prof. S. L. Pisani over the signature of Pettenkofer. Both contain references to the cholera epidemics of Malta and Gozo and their pages are marked in pencil from the hand of Pisani. The fourth book also bears comments from Pisani such as *Wie hier in Malta in 1837* (As here in Malta in 1873). *Nur eine coincidenza* (only a coincidence), *Sonderbar!* (How strange!), *Infermieri di regola non si ammalano — salvo eccezionalmente — per contatto cogli colerosi*

(Nurses are not as a rule attacked — unless exceptionally — through contact with choleraic patients) and "In every respect places apparently alike or quite alike still suffer differently from cholera".

Pettenkofer's speculations met with some opposition in Malta. In fact, already in 1865, Dr. A. Ghio had expressed his conviction that the spread of the disease occurred by means of the excreta of patients which passed either directly or indirectly to other individuals. He also envisaged the transmission of cholera by healthy carriers or by affected persons who did not manifest the usual signs and symptoms of the disease (Ghio, A. 1867). Subsequent research was to prove him right.

The most outspoken critic was Dr. Gavino Gulia, Professor of Forensic Medicine and Natural History at our University. Pettenkofer, though admitting the possibility of cholera propagation by human intercourse, had condemned the quarantine measures which in those days were considered to be the best safeguard against the introduction of epidemics in the island. Thus, writing on "Cholera and Quarantine" in the Maltese medical journal *Il Barth* of the 29th January 1874, Dr. Gulia stated: "Experience has shown governments what are the means of defending their people (against cholera) and these consist in prolonged and rigorous quarantine. The deliria of Pettenkofer (though one of the greatest geniuses of Germany) cannot be invoked by those in charge of public health. History teaches us that Indian cholera has always been imported from abroad and that it was not the 'air columns' of Lawson nor the soil emanations of Pettenkofer that brought the fatal germs but lack of attention in the application of a strict quarantine".

Dr. Gulia was convinced of the infectiousness of cholera and in support of his stand he reported the death of a follower of Pettenkofer, a Dr. Obermeyer, while the latter was engaged on experiments on the aetiology of cholera. Dr. Obermeyer had carried some post-mortem specimens and faeces from choleraic patients to his bedroom for microscopical examination

when he was attacked by the illness. According to another version he had injected himself with "choleraic matter" to show Virchow's pupils that cholera was not "contagious". "However that may be", continued Dr. Gulia, "as soon as he became aware of the prodromal symptoms, he carried out microscopical researches on himself with the result that he rejected the strange ideas of Pettenkofer and confirmed the infectiousness of cholera" (*Il Barth*, 1873). By 1875, Dr. Gulia was publishing excerpts in Italian from George Wilson's "A Handbook of Hygiene", London, 1873, dealing with the preventive measures and the need for disinfection in infectious diseases and stressing the infectiousness of the faeces in cholera, the dangers of contaminating the water supply by these dejecta and the necessity of a thorough disinfection of linen used by choleraic patients (*Il Barth*, 1875).

When cholera again broke out in Malta in 1887, Prof. S. L. Pisani, who had by now become Chief Government Medical Officer, was corresponding with Pettenkofer about it. The epidemic raged from July to November with 761 notified cases. It showed beyond doubt the beneficial influence exerted by the provision of a drainage system and the use of good drinking water in reducing the extent and severity of the outbreak. In fact the fortified towns of Malta which enjoyed these benefits suffered least whilst among the villages, which were all undrained, those that bore the brunt of the attack had been dependent on surface drinking water collected during the winter and stored in underground wells. Prof. Pettenkofer estimated that but for the sanitary improvements enjoyed by the towns, the mortality from cholera would have been five times greater and that it would have cost the country the sum of £20,000 in addition to the loss of earnings through sickness, relief to widows and orphans and maintenance of sick in hospitals. Pettenkofer congratulated the Maltese on "this happy result" due to the money they had so well spent on sanitation in previous years (Pisani, S. L. 1888).

In spite of Robert Koch's discovery

of the *Vibrio cholerae* in 1884 and of its isolation in Malta during the 1887 epidemic by Dr. Giuseppe Caruana Scicluna and Dr. A. M. D. Bruce (Cassar, P. 1965b) and of the increasing conviction that this microbe was the specific cause of the disease, Pettenkofer continued to maintain that what was known about the microbe did not harmonise with the dependence of epidemics on season and locality. Prof. Pisani had commented on the presence of the cholera vibrio in the cases of the 1887 epidemic but could not help noticing that the association of an outbreak of cholera with season and locality was very "pointedly shown" in the Malta epidemic. Thus he remarked, cholera had invariably visited the Island during summer (June-November); its appearance amongst us was three times officially declared on the same day (9th June); and, lastly, in spite of an uninterrupted communication with Malta, Gozo remained untouched on six out of the nine different occasions that cholera prevailed in Malta — an immunity that was ascribed by Pettenkofer to the absence of "favourable conditions" in Gozo for the development of the malady.

So unshakable was Pettenkofer's conviction that the germ was not the only cause of the disease that he swallowed a huge dose of living cultured *Vibrio cholerae* supplied by Koch in 1892. No harm befell him! (Bruno, G. 1949; Guthrie, D. A. 1947; Winslow, C. E. A. 1952; Longmate, N. 1966b).

Cholera again visited Malta between October and December 1911 when Dr. (later Professor Sir) Themistocles Zammit succeeded in isolating the *Vibrio cholerae* from the sea-water at Marsaxlokk near the village of Zejtun which was an important focus of infection (Zammit, T. 1913). By then, however, both Pettenkofer and Pisani were dead — the former in 1901 and the latter in 1908. Pettenkofer's "ground water theory" had been disproved, although his assumption that other factors were involved in the causation of the disease, apart from the invasion of the host by the germ, was sound; however, these factors were not the ones envisaged by him. In fact we know to-day that, among

other conditions, the virulence of the germs, the immunological defences of the host and the appearance of a new strain of vibrio (for example El Tor) play a major role in the development of the illness.

The Pettenkofer story is an eloquent illustration of that mental phenomenon with which psychologists are so familiar, i.e. how a dominating idea acts like a pair of blinkers to focus the sight of a man of high intellectual powers on an illusory vision to the exclusion of the truth so unequivocally demonstrated by his contemporaries working in his own field. It also stands out as a warning that in the search for causal relationships the non-specialist and less renowned man can see the truth where the "expert" makes a false surmise and gets bogged in an intellectual morass of his own creation.

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