



Institute of  
Biomedical  
Science

# Bruce and Brucellosis

Sir David Bruce (1855–1931)



Ever since man began to domesticate animals (especially the cow, pig, goat, dog, chicken and duck) he has been afflicted by fevers. Hippocrates reportedly described a low-grade fever with regular “remissions” all around the Mediterranean basin, which has become known variously as Malta fever, Mediterranean fever or undulant fever.

## Nineteenth century

- 1863: JS Marston, an associate surgeon in the British Army, noted that British troops invalided to Malta during the Crimean War were suffering from a “remittent fever”. The average time off from duty being 90 days with significant morbidity.
- 1879: H Vede reported that in patients he was observing there was a distinction between the remitting fever and that of malaria, enteric fever and relapsing fever.
- 1884–1888: Dr David Bruce was based in the station hospital in Valletta (Malta’s capital) where he carried out research into Malta fever. He isolated the organism from the spleen of a victim and confirmed this finding by recovering it from seven other fatal cases. Seven monkeys injected with the organism suffered a febrile illness and four died. He named the organism *Micrococcus melitensis* from the Roman name for Malta, (Melita, meaning the Honey Isle).



The Mediterranean Commission (Courtesy Wellcome Images)



Giuseppe Siciliana



Map of Malta

- 1887: Giuseppe Siciliana recovered the organism from one in 10 patients with the disease and, using agar plates, cultured the organism from the spleen of four soldiers dying from Malta fever. It was Siciliana who probably played a significant role in working out the epidemiology of the disease, and it seems likely that he suggested to Themistocles Zammit that goats’ milk was the source of infection.
- 1897: Almroth Wright, working with David Semple, successfully applied serum diagnosis enabling differentiation in the laboratory of Malta fever from enteric, malaria and other fevers in the laboratory. In the same year, the first book on the disease was written by Matthew Louis Hughes, which summarised all that was known about the disease at that time.

Valletta Harbour



Matthew Louis Hughes (1867–1899)

## Twentieth century

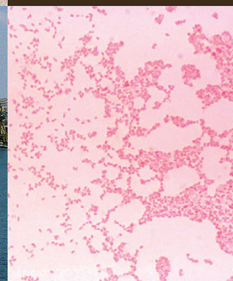
- 1904–1907: As a consequence of previous findings the Mediterranean Fever Commission was set up and worked to investigate the disease.
- The commission’s reports were excellent examples of investigative medicine at its best. The main aims of the commission were to determine the chain of transmission of the disease.
- 1904: Themistocles Zammit, the only Maltese doctor on the team, demonstrated that the blood of goats reacted positively using his agglutination test and managed to recover the organism in pure culture from goats’ blood.
- He concluded that, as they suffered no fever, they had “innapparent infection”.
- At the same time, WH Horrocks showed that some of the goats did, in fact, suffer a fever and that the organisms were excreted in the goats’ milk.
- Zammit and Horrocks’s findings were corroborated by further studies showing that up to 50% of the 20,000 goats on Malta were infected and that 10% were excreting the organisms in their milk.
- An outbreak of undulant fever occurred in Rhodesia after Maltese goats were imported into the country. This led to a banning of goats’ milk in the Army and Navy in 1906, leading to a dramatic fall in the cases of Malta fever, and resulted in a milkmen’s strike on the island!
- Clear proof of the association of the goat with Malta fever came from an incident on the SS Joshua Nicholson, a merchant vessel trading between Egypt and Antwerp. The ship had anchored in Valletta harbour and took on board 65 Maltese goats (known to be good milk producers) for delivery to Washington in the USA to encourage goat keeping. On route to Antwerp the majority of the ship’s crew drank the raw goats’ milk and were struck down with Malta fever.
- 1904: Malta fever came to an end in Gibraltar when importation of goats from Malta was ended, to be replaced by Spanish goats.
- 1907: David Bruce gave an update on the epidemiology of the disease.
- 1908: Malta fever had almost been eliminated from British troops but not from the civilian population, which continued to drink fresh, raw goats’ milk.
- 1908: David Bruce received a knighthood for his work.

- 1914: J C Kennedy sounded a warning of the possibility of *Brucella* in cows in England after the discovery that the milk and serum of healthy London cows agglutinated *Micrococcus melitensis*. After the end of the First World War studies revealed that “contagious abortion” in cattle could be related to Malta fever. He realised that the organism, *Bacillus abortus*, isolated in 1895 by Bernhard Bang was actually a separate strain of the same genus and suggested the change of genus name to *Brucella* in recognition of Sir David Bruce.
- Alice Evans, a dairy microbiologist in the USA, also showed a similarity between *Micrococcus melitensis* and *Brucella abortus*.
- 1914: A third cause of human undulant fever, *Brucella suis*, was isolated from the fetus of a sow by J E Traub.
- 1918: Sir David Bruce was made a Knight Commander of The Bath.
- 1920: Kennedy’s suggestion of the change of name was ratified and the genus name was officially changed to *Brucella*.
- 1928–1931: I F Huddleston and E Abell described the valuable method of distinguishing the various *Brucella* species using the ability to grow in the presence of the aniline dyes thionin, basic fuchsin, methyl violet and pyrimin.
- 1957: The disease was only conquered in Malta when the sale of raw milk was banned and pasteurisation became compulsory on the island. Since then the disease has been restricted only to those eating raw goats’ milk cheeselets (a local delicacy known as ‘gbejniet’)



*B. melitensis* culture

*B. melitensis*: Gram stain from 48-hour culture



An average of 10 cases of brucellosis are diagnosed each year in England and Wales.

Forgotten, but not gone:  
old diseases that can still bite

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