

## **Brucellosis: The Malta Experience**

### **A Celebration 1905 - 2005**

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This 380 page Monograph describes in some chronological order the progress made in the study of this worldwide disease of animals that also affects humans. Most of the important discoveries regarding this disease were made by English and Maltese investigators working in Malta during the nineteenth and twentieth century. In the words of Dr Kennedy one of the members of the Mediterranean Fever Commission, "The History of Malta Fever (Brucellosis) is practically the history of its study in the Mediterranean and more especially in Malta". This Book is an account of these important discoveries and the subsequent efforts to control and eradicate this disease in Malta, which are very interesting from a historical and social point of view.

The Introductory chapter is an interesting historical study on 'Fevers' going back to the time of Hippocrates, who described this disease, and to the important advances made in the study of Fevers during the 19<sup>th</sup> century when Malta Fever was differentiated from Typhoid and Typhus and other fevers by Jeffrey Allen Marston, a doctor in the Royal Artillery, who as a result of his observations on the thousands of troops in Malta suffering from fever from the Crimean War published a 35 page document in 1861 entitled "Report on Fevers (Malta)".

The second half of the 19<sup>th</sup> century was dominated by Louis Pasteur with his observations on fermentation (1850-1877) and Robert Koch who discovered and published his work on the pure culture of bacteria in 1881. This was followed by the two 'golden' decades of bacteriology (1880-1900) when the bacterial cause of most of the important diseases was discovered. During this period the Sacra Infermeria at Valletta was packed with young soldiers who were suffering and dying from this mysterious fever. David Bruce, a young medical officer in the British Army who had been posted to Malta was spurred by his wife, Mary Elisabeth Bruce, an adept laboratory technician, trained in Robert Koch's laboratory in Berlin set about discovering the cause of this fever that was plaguing the British Military in Malta. It must be recorded that at that time there was no bacteriology laboratory at the Sacra Infermeria. At this stage Bruce sought the help of the Maltese analyst and bacteriologist Dr. Giuseppe Caruana Scicluna who was one of the first doctors to study and train under Louis Pasteur in Paris. The analyst Caruana Scicluna in the Public Health Laboratory carried out most, if not all of the bacteriological work.

David Bruce eventually got all the credit for the discovery of the *Micrococcus melitensis*, the cause of Malta Fever, in 1887. Very little credit was given to Caruana Scicluna who presumably carried out all the work in his laboratory of isolating the *Micrococcus melitensis*. Prominence in this chapter is given to Caruana Scicluna's work as a bacteriologist and to another young army medical officer Dr. Mark L. Hughes whose parents resided in Malta for his work on the description and bacteriology of Mediterranean Fever (brucellosis) in 1897.

The second chapter includes the appointment of the Mediterranean Fever Commission and some of the more important and decisive discoveries such as:

1. Zammit's papers and his discovery in 1905 of the responsibility of the ubiquitous goat and its milk in the spread of Mediterranean Fever.

2. Another important discovery was Zammit's modification of Wright's Agglutination Test on the milk of goats – The Zammit Test.
3. Work by other members such as Horrocks and Kennedy who together with Zammit tested goats from all over Malta and carried out various experiments.
4. Work by Eyre, Zammit and Kennedy on the infectivity of Milk products containing *Brucella melitensis*, including the local cheese (the 'gbejna').
5. Work by Shaw who discovered that a number of 'normal' persons were in actual fact suffering from brucellosis and excreting the micrococcus in their urine. Shaw at Bighi Hospital on the other side of the Grand Harbour was working in isolation and failed to make the connection of brucellosis with the Maltese goats, which were spreading the disease through their milk to the many families in their homes in the Maltese Islands.
6. On the other hand, Themis Zammit, the only Maltese member of the Mediterranean Fever Commission, was working in the laboratory of the Mediterranean Fever Commission in the Department of Health where Caruana Scicluna, who had played a very important role in the discovery of the *Micrococcus Melitensis* as a bacteriologist, was the Chief Government Medical Officer. As a matter of fact, Caruana Scicluna had drawn the attention of Themis Zammit to the fact that there had been several cases of Mediterranean Fever amongst goat breeders in the Sliema area. Zammit eventually made the 'fundamental' and highly important discovery that Mediterranean Fever was primarily a disease of goats and that the goat and its milk was the cause of the spread of Mediterranean Fever in the Maltese Islands.

The third chapter (1907 – 1922) describes the follow up after the discovery of the goat's responsibility of the spread of Mediterranean Fever and the reactions of the civil population to this discovery. The military banned goats' milk from all their establishments with a resultant dramatic disappearance of the disease amongst the soldiery. In strong contrast the civil authorities were faced by indifference and obstruction from the civil population resulting in a persistent and increasing prevalence in the civil population.

The great 'Goats Controversy' lasted for about ten years up to 1916. Certain public persons and newspapers refused to acknowledge that the common goat that had always been present in the Maltese Islands was responsible for the disease and continued to blame the bad sanitation and 'dirt' for this disease. Goat's milk was very popular, particularly with the English residents, and was preferred to cow's milk after the discovery in 1897 of tuberculosis in the cow by Bang in Denmark. The public in general preferred goat's milk since the goats used to come to people's houses and milked there and then. In this way the people were assured that they were getting unadulterated milk. Another general belief was that 'to boil is to spoil' and so many people preferred to drink milk fresh from the goat without boiling.

Kennedy left Malta at the end of his term of military service in Malta and for some years was based in London. Following his experience in Malta, Kennedy decided to test the cows in England and discovered that a good number of these reacted to *Brucella melitensis* antigen sent to him by Zammit. He published his results in the *Journal of the Royal Army Medical Corps* in the January issue of 1914 before he left for India. A few years later Dr. Alice Evans working in the United States solved this problem by discovering *Brucella abortus*, which

was very similar to *Brucella melitensis*, as the cause of Bovine Brucellosis. The prevalence of brucellosis continued unabated in the Maltese Islands during the nineteen twenties and thirties and reached a high incidence during the 1930's with a peak of 1,909 notifications in 1934.

It became very obvious that the measures that were being taken by the civil authorities (which consisted mainly of testing 'suspected' herds and slaughter when possible) were ineffective in controlling the disease in goats and humans. The public in general was indifferent to the problem and continued to consume 'raw' milk and milk products. Other solutions to the problem had to be sought and these solutions included Vaccination of goats and Pasteurisation of the milk.

### **1938: Milk Pasteurisation**

The Milk Pasteurisation Plant in Hamrun was officially opened in 1938 and the Pasteurised Milk Scheme was introduced in May 1938. It was at first limited to Valletta, Floriana, Msida, and Sliema but World War II (1939-45) disrupted the Scheme while the Pasteurisation Plant was also damaged. As a result we had the highest peak ever of 2,410 notifications in 1946. In 1940 the introduction of unpasteurised goats' milk into the towns of Msida, Sliema, Gzira and St. Julian's was forbidden. Owing to the war, it was not possible to extend these bans further but from 1946 onwards such extensions were made until by the beginning of 1964 it was illegal to supply raw milk for consumption anywhere in Malta. The ban on the consumption of raw milk in the island of Gozo, which is intensely agricultural, did not come into effect until the 1st March 1964.

"The Pasteurised Milk Regulations, 1938," published by Government Notice No. 504 of the 23rd December, 1938, established that on and after the 1st February 1939, no milk other than pasteurised milk shall be sold or offered or kept for sale in any town or village specified by the Regulations and also prohibited the entry of goats into these areas."

### **1949: Antibiotic (tetracycline) treatment of brucellosis**

The discovery of antibiotics in the late 1940's and in particular the tetracyclines proved a godsend for the Maltese people. Professor J. E. Debono the professor of Medicine, who had a vast experience of the disease with a worldwide recognition, was given supplies of this antibiotic for trial. The results were dramatic with a rapid improvement in the signs and symptoms of the disease accompanied by an equally dramatic drop in mortality from the disease. Later studies conducted by Rizzo Naudi et al. on 504 cases of brucellosis concluded that tetracycline has to be given for a minimum period of three weeks or more to minimise these relapses.

### **1955-1964: Development of Vaccination of Goats**

The Brucellosis Research Laboratory which was set up in 1936 for studying ways of eradicating the disease from the goats of the Maltese Islands ceased functioning at the outbreak of World War II and was not reopened until almost twenty years later when Dr G.G. Alton an FAO/WHO expert worked at the Experimental Farm in Ghammieri, Malta for a period of more than ten years carrying out research on brucellosis in goats and their immunisation by vaccination with the, then new, Rev 1 vaccine. His studies revealed that the Rev 1 Vaccine developed by

Elberg and Faunce in 1956 was superior to all the other vaccines then available as regards safety and efficacy. 'Whilst this work was carried out in the 1950's, it is important to note that fifty years later (in the year 2005), it is the general view that, despite the rapid development of new approaches in the field of vaccination, it is anticipated that in the near future the Rev 1 vaccine would remain the only accepted vaccine in national control programs'.

It is a great pity that, after an initial campaign of vaccination of goats, Malta failed to conclude it successfully; on the other hand, The authorities concerned continued to rely mainly on registration, testing and slaughter, presumably as a result of the continued and persistent lack of cooperation from the goat, sheep and cow breeders. This has led to considerable financial losses over the years and a great delay in the eradication of the disease.

The annual incidence of Brucellosis decreased quite dramatically after the 1950's, while the mortality from the disease practically disappeared. The introduction of milk pasteurisation gave the Maltese public a false sense of security. By the 1980's several campaigns to eliminate/eradicate Brucellosis conducted by the government in goats and cows had failed to produce the desired results and a small number of cases of brucellosis continued to occur every year on account of an increasing consumption of the small cheeselets (gbejniet) by the public in general and at receptions such as weddings. The cheeselet production industry had become a multimillion Malta pound industry.

The sanitary authorities were predicting that we were due to have another explosive outbreak. This happened in 1995/96 when over 230 cases occurred. This time the Government launched an extremely aggressive campaign and confiscated millions of stocks of these cheeselets (gbejniet) combined with a similarly aggressive campaign by the veterinary department in detecting breeders who were breaking the law. The industry lost £Millions but the breeders were finally brought to their senses and started to cooperate. This produced the desired result of 'elimination' of this historic disease from the Maltese Islands. Since 1995 there have been no cases of brucellosis except for the occasional case imported from abroad.

Have we finally eradicated brucellosis? A word of caution is needed. Following the 1988 outbreak, intensive efforts brought the numbers of notified human brucellosis down to an almost negligible level. Was it complacency or overconfidence that contributed to the 1995/96 epidemic? If so we need to redouble our prevention efforts to ensure we learn from and not repeat history. Brucellosis in animals and man is still present worldwide and all around us in the Mediterranean.