

The Corps Disease: Brucellosis and Its Historical Association with the Royal Army Medical Corps

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SUMMARY: Brucellosis (also known as Malta, Mediterranean or Undulant Fever) has aptly been nicknamed the Corps Disease because of the major role played by the Royal Army Medical Corps in elucidating its nature and discovering its mode of spread, thus leading to its prevention and eradication. This history of brucellosis, incorporating a complete bibliography of all references to the disease in the Journal of the Royal Army Medical Corps from 1903 to 1992, documents the fascinating story of this association.

Introduction

Brucellosis has almost certainly plagued peoples of the Mediterranean littoral and further afield from time immemorial, though its existence as a separate entity was only recognised with the discovery of its causative organism by Bruce in 1887. British troops were first stationed in Malta in 1798, aiding the Maltese to oust the French from the island during the Napoleonic Wars, and during the nineteenth and early twentieth centuries this illness wreaked havoc amongst the soldiers and sailors of the Malta Garrison. This generated tremendous investigative efforts by doctors of the Army Medical Services, such as Matthew Louis Hughes, James Crawford Kennedy, William Horrocks and David Bruce, as well as the Maltese doctor Themistocles Zammit. This culminated in the successful efforts of the Mediterranean Fever Commission (mainly drawn from the ranks of the RAMC) between 1904 and 1907, which identified the Maltese goat as the reservoir of infection, thereby leading to effective preventive measures.

The Journal of the Royal Army Medical Corps came into being in 1903, and two of its first editors (Bruce 1904-1908, Horrocks 1908-1940) were eminent in the fight against brucellosis. As a result, the Journal effectively became the mouthpiece through which each stage of this epic fight was broadcast to the world, publishing many important original papers and reproducing seminal contributions from other sources when necessary. Thus this history of brucellosis, incorporating a complete bibliography of all references to the illness in the Journal from 1903 to 1992, should be of special interest to medical historians and also to those members of the RAMC intrigued by what has so appropriately been nicknamed the 'Corps Disease'.

History

Prior to 1903

Bruce, in his first editorials in the Journal of the Royal Army Medical Corps after his appointment as editor in 1904, summarised the history of brucellosis (then variously known as Malta, Mediterranean or Undulant Fever) up to that time, with special reference to its relation to the RAMC. The first paper on brucellosis by a

British Military Surgeon was that in 1863 by Assistant Surgeon Jeffrey Allen Marston, who gave a very accurate description of the illness in troops invalided to Malta during the Crimean War, calling it "Mediterranean Remittent (or) Gastric Remittent Fever". His last case history was a poignant depiction of his own sufferings from the disease, noting the irregular type of fever, the languor and weariness, the muscle and joint pains, the gastro-intestinal symptoms and the long duration of illness (1) (Fig 1). In 1879, Surgeon Major H Veale, Assistant Professor of Military Medicine at the Army Medical School, reported from the Royal Victoria Hospital at Netley on Southampton Water on fever patients invalided from Gibraltar, Malta and Cyprus, pointing out the distinctions between this fever and malaria, enteric fever and relapsing fever (2).

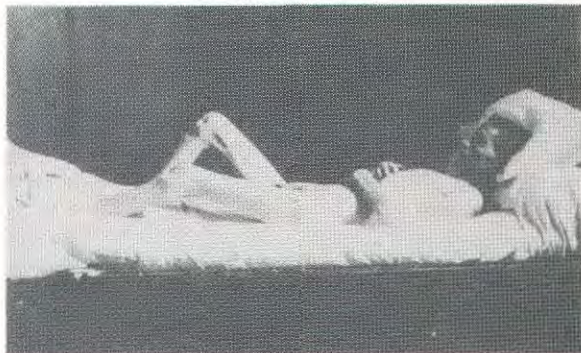


Fig 1. "Malta Fever Patient"; by David Bruce.

Acknowledgement to Wellcome Institute Library, London.

Surgeon Captain (later Sir) David Bruce, while based in the Station Hospital in Malta's capital city, Valletta, from 1884 to 1888, carried out his researches into Malta Fever, reporting that it was attacking several hundred soldiers and sailors every year, their average length of stay in hospital in Malta being 85 days, with many being invalided to England. On July 9, 1887 he isolated the specific organism responsible for the disease from the spleen of a victim, going on to prove its causal role by isolating it from splenic cultures from seven other fatal cases, and by animal experiments (3-5). In 1893 Bruce

named the organism 'Micrococcus melitensis' from the Roman name for Malta, Melita (the Honey Isle). The classic monograph by Surgeon Captain Matthew Louis Hughes in 1897 on "Mediterranean, Malta or Undulant Fever" after his six year tour of duty in Malta contained everything known on the subject up to that date and included a complete bibliography (6). In the same year, Professor (later Sir) Almroth E Wright (Professor of Pathology at Netley) and Surgeon Major (later Sir) David Semple (Assistant Professor of Pathology) successfully applied the method of serum diagnosis, enabling clinicians to differentiate Malta Fever from enteric, malarial and other fevers (7-8).

Prologue 1904-1905

The first article relating to Malta Fever in the Corps Journal was in 1904 by Lieutenant James Crawford Kennedy who was stationed in Malta from 1901 to 1906. Kennedy spent most of this period in charge of the Acute Fever Wards at the Station Hospital, Valletta (previously the Holy Infirmary of the Knights of St John and now converted into the Mediterranean Congress Centre) and suitably enough his article described a classic case history in a soldier with slight but long-continued fever and severe pains localised to the shoulder joint (9). Next follow the first editorials by Colonel (later Sir) David Bruce, describing the history of the illness, its clinical presentation, its geographical distribution worldwide and in Malta, with full details on the *Micrococcus melitensis* and speculation on the mode of infection (10-12). At this stage in time, no one knew the source of infection or the method of spread. The prevailing view was that the disease might be transmitted to man by mosquitoes or other blood-sucking insects. Further papers reflect the concern of doctors in the Malta Garrison at the high incidence of Malta Fever in the civil and military population, and in the army and naval hospitals (13-19), together with a case report from England (20).

Already, the feeling was that "Mediterranean Fever may be considered in a great degree as the special property of our Corps" (14). With hindsight the unintentional irony of this comment becomes apparent, for many soldiers and sailors, in hospital for other reasons, caught Mediterranean Fever whilst under medical care — from the goats' milk which was prescribed for them!

The Mediterranean Fever Commission 1904-1907

The Mediterranean Fever Commission (MFC) was formed in 1904 by the Royal Society at the request of the Secretary for the Colonies, Mr Alfred Lyttleton, because of the great concern about the prevalence in Malta of Mediterranean Fever. Its working members represented the Army, the Navy and the Civil Government, and initially consisted of Colonel D Bruce RAMC as president, together with Major W H Horrocks RAMC, Staff-Surgeon E A Shaw RN, and Dr T Zammit MD, Board of Health, Malta, assisted by Captain J Crawford Kennedy RAMC (appointed late in 1904), and by Staff-Surgeon R

T Gilmour RN (who placed his spare time at the service of the Commission in 1904 and 1905). Later members included Lieutenant-Colonel A M Davies RAMC, Dr J W H Eyre (Bacteriologist to Guy's Hospital), Majors J G McNaught, T McCulloch and J C Weir RAMC, Dr R W Johnstone (Local Government Board), Staff-Surgeon F H A Clayton RN, and Fleet-Surgeon P W Bassett-Smith RN.

The work of the Commission was eventually published in seven volumes of Reports by the Royal Society (21), almost all of which were then reprinted by special permission in the Journal of the Royal Army Medical Corps.

The Reports reprinted in the Corps Journal may be grouped under two headings: Experimental and Epidemiological, and are excellent examples of investigative medicine at its best. The main aim of the Experiments (22-37) was to determine the chain of transmission of the disease, and the speed with which the correct conclusions were reached show what can be done with a concerted all-out effort and a little bit of luck! The Epidemiological Reports deal with the prevalence of Mediterranean Fever amongst British troops in Malta in 1905 (38-42) and amongst the population of Gibraltar (43).

Naval Entomologists

Royal Navy Surgeons Edward H Ross (the brother of Sir Ronald Ross) and G Murray Levick were both very keen entomologists, and in the course of their shipbound Mediterranean travels aboard the cruiser HMS Lancaster in 1904-1905 they carried out numerous experiments and investigations into blood-sucking insects (44-45). They strove very hard to prove their hypothesis that Mediterranean Fever was mosquito-borne, just like malaria. Dr T Zammit in Malta, who had been corresponding on the subject with Sir Ronald Ross, helped them out by performing many bacteriological studies for them.

Serendipity

The great breakthrough for the MFC came in June 1905 when Dr (later Sir Themistocles) Zammit, the only Maltese member of the MFC, successfully incriminated the Maltese Goat as the animal host of *Micrococcus melitensis*, by his discovery that the blood of experimental goats reacted to Mediterranean Fever using his agglutination test, and by his isolation of the *Micrococcus melitensis* in pure culture from goats' blood. It was only a temporary shortage of monkeys upon which to experiment that led to goats being procured for the 'in vivo' work — truly a case of 'serendipity': "These two experiments led me to the belief that goats are susceptible to Malta Fever, and that the disease may be spread to human beings by goats" (46). This seminal contribution is an editor's dream: only two pages long! Previously goats had been regarded as immune because injection of cultures into them seemed

to have no effect. However, when Dr Zammit found that their serum agglutinated the organism, he concluded that though it had caused no symptoms the organism must have lived and multiplied in the tissues — a condition later recognised as “inapparent infection”. His colleague Major W H Horrocks (later to become editor of the Corps Journal) showed that some of the goats in every herd examined were affected by Malta Fever, and confirmed that *M. melitensis* was exuded in the milk of these infected goats (47). This discovery was to have worldwide repercussions, as well as having serious financial implications for Maltese goatherds, for the hardy Maltese goat was renowned for its milk-producing qualities, and had been exported throughout the British Empire.

Controversy and Vexed Milkmen

As is so frequently the case in medical discoveries, controversy was to dog the footsteps of researchers in brucellosis. Zammit's contention that infected goats' milk might be the mode of transmission of infection was hotly disputed by Surgeons E H Ross and G Murray Levick who were still pursuing mosquitoes around the Mediterranean (48). They claimed to have drunk such milk without coming to harm, and they issued a challenge to the milk marketing authorities, offering to drink naturally infected milk to disprove Zammit's findings. However their offer was refused, and they could not stay in Malta long enough to obtain for themselves naturally infected milk!

The findings of Zammit and Horrocks were corroborated by further investigations (49) which revealed that up to 50 per cent of the 20,000 goats in Malta were infected and that some 10 per cent were actually excreting the organism in their milk.

In recognition of their strenuous exertions and the importance of their research, and to encourage them for the forthcoming struggle to implement effective preventive measures, the new members of the Mediterranean Fever Commission were feted out to dinner by the RAMC in April 1906 (50).



Fig 2. “Goat-Herd Milking, Malta”; by David Bruce.

Acknowledgement to Wellcome Institute Library, London.

The Maltese goatherds and milkmen, who for centuries had driven their herds through the streets to deliver their milk fresh (and unadulterated!) on the doorsteps of their customers (Fig 2), saw their livelihood apparently threatened. They rose up in protest and went on strike from 15 May to 1 June 1906, plastering placards listing their grievances all over Malta. A translation of this placard headed “No More Milk!!!! We cannot stand it any more! We cannot do any more!” and signed “The Vexed Maltese Milkman” was published in the Corps Journal (51). A copy of the original placard in Maltese is held in the RAMC Muniment Collection.

The strike coincided with the institution of vigorous Public Health measures in May 1906, with the banning of goats' milk from the diet of the regiments and from military and naval hospitals, and its substitution by tinned milk imported from England. The first RAMC unit to discontinue goats' milk was the Forrest Hospital on the 18th May 1906. The milkmen's strike proved distinctly useful in getting the use of goats' milk discontinued, for as the goatherds themselves had stopped supplies, they could hardly complain when their customers, having made other arrangements, refused to go back to them.

Full use was made of the Regimental system of authority in enforcing the ban on goat's milk. Thus, Major T McCulloch, on behalf of the MFC, delivered a lecture on the 1st June 1906 on “The Means of Prevention of Malta Fever” to all Quartermasters, Quartermaster Sergeants and Regimental Sergeant Majors of the Garrison at the Office of the Colonel of the General Staff, actively enrolling them in the fight against Malta Fever (51). A copy of this lecture is held in the RAMC Muniment Collection.

Requiem for a Victim

Maybe it was fortunate for Surgeons Ross and Levick that they could not obtain infected goats' milk, for Malta Fever was no respecter of rank or occupation. Inevitably, many of the hospital staff caring for its victims or investigating it fell victim themselves to its ravages before the mode of infection was discovered, sometimes succumbing to it in those pre-antibiotic days. In 1905, Colonel W O Wolsley, Principal Medical Officer in Malta from November 1903 to June 1905, fell ill with the disease. Despite being invalided home to Tilbury, he died on the day of his arrival in England, thereby earning the unwanted distinction of being the most senior British officer ever to die of brucellosis. He was held in great esteem (52-56), and a photograph of the memorial brass erected by the Officers of the Corps in his memory appears in the Corps Journal (55). This large brass was erected in the Royal Army Medical College (54), but it is now prominently displayed in the RAMC Museum. Another account describes the unveiling by the Governor of the Island of the memorial tablet erected by

Colonel Wolseley's wife at the Barracca Church in Malta (56).

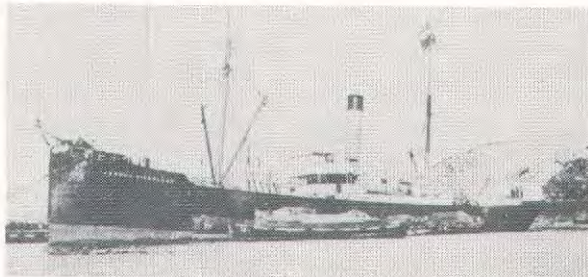


Fig 3. S.S. Joshua Nicholson (in Valletta Harbour, Malta). Acknowledgement to Wellcome Institute Library, London.

S.S. Joshua Nicholson (Fig 3)

Just as the mode of transmission of cholera was elucidated by John Snow in the famous Broad Street Water Pump epidemic of 1824 in London, so a similar fortuitous epidemic of brucellosis, this time aboard ship, was to figure in the history of brucellosis. The first intimation of this epidemic was published in the Corps Journal in 1906 as a short letter to Bruce from Dr N Armand Ruffer, Maritime Quarantine Officer in Egypt (57). The Corps Journal published further details of the epidemic as they became available (58-62). The epidemic was later fully described by Staff-Surgeon Clayton RN (63), and subsequently elaborated on by H H Scott (64).

The merchant vessel S.S. Joshua Nicholson, trading between Antwerp and Egypt, anchored at Malta for one day in August 1905. It took on board 65 milch goats bound for Washington, where the Bureau of Animal Industry of the United States Department of Agriculture had decided to import Maltese goats, good milk producers, in order to encourage goat keeping amongst peasant immigrants from Southern Europe. En route back to Antwerp, practically the whole of the ship's crew drank the goats' milk unboiled, and within weeks all those who had drunk the milk were struck down with Malta Fever. This gave the clearest possible proof of the connection of Malta Fever in man with the Maltese goat.

Goats and Fever on "The Rock"

In addition to the epidemic of Malta fever on board S.S. Joshua Nicholson, further proof of the connection with goats' milk was provided by Major Horrocks in his new role as Sanitary Officer in Gibraltar in 1907. He made the important observation that, whereas in 1883 all the goats on the Rock were Maltese and Malta Fever was then very common, the disease had disappeared in 1904 with the cessation of importation of Maltese goats due to the withdrawal of grazing passes and the increase in the cost of shipment, and their replacement by Spanish goats (43).

Victory

Colonel Bruce gave a complete update on the epidemiology of Malta Fever, summarising all the findings of the MFC, to the Epidemiological Society in

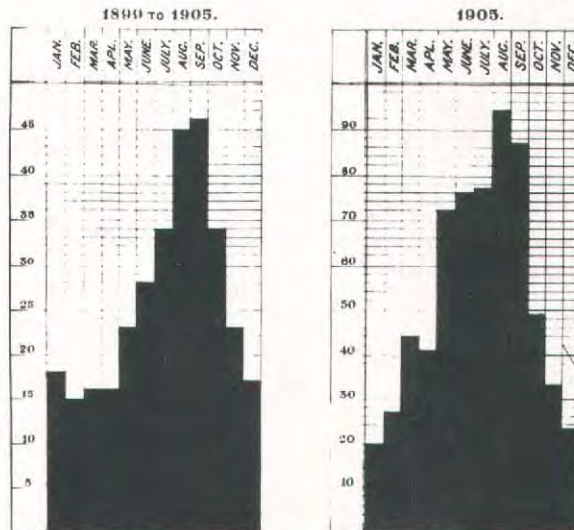


Fig 4. "Prevalence of Malta Fever in the Garrison, per 1,000 Servicemen, 1899 to 1905"; by David Bruce.

Acknowledgement to Wellcome Institute Library, London.

Feb 1907 (65). A similar resumé was presented by Fleet-Surgeon P W Bassett-Smith RN to the United Services Medical Society in December 1907 at the Royal Army Medical College, Millbank (66).

The most striking feature of each presentation was the contrast shown between the incidence of Malta Fever before and after the banning of the supply of goats' milk in June 1906 to the Garrison and Military Hospitals of Malta (Fig 4-5), the cases of Malta Fever rapidly dropping to one-tenth of what would have been their

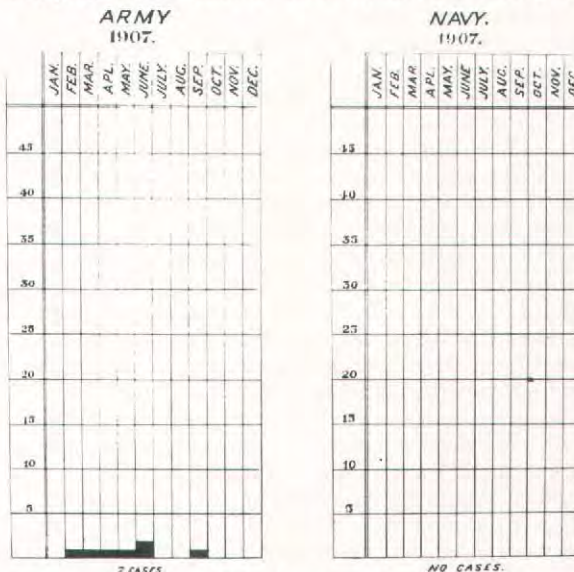


Fig 5. "Prevalence of Malta Fever, per 1,000 Servicemen, after Banning of Goats' Milk"; by David Bruce.

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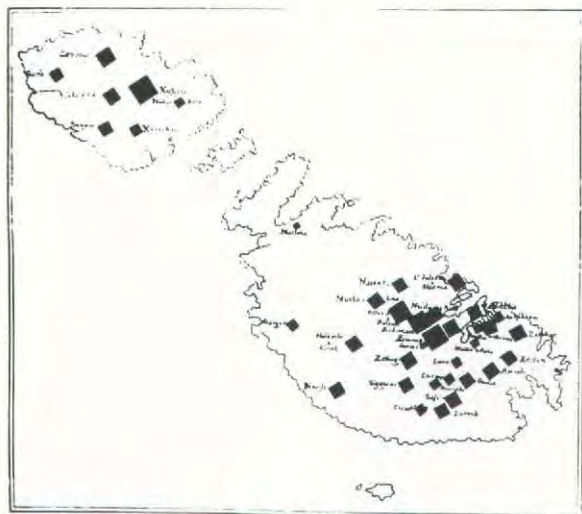


Fig 6. "Map of Maltaq and Gozo, Showing the Distribution of Malta Fever in the Various Towns and Villages of the Two Islands"; by David Bruce.

Acknowledgement to Wellcome Institute Library, London.

normal number. By 1908, Malta Fever had been almost eliminated amongst the troops, whereas the civilian population (who for generations had watched goats being milked on their doorstep and could not accept the fact this milk might make them ill) continued to drink goats' milk, and showed no corresponding fall in the incidence of the disease — providing a striking control test to the experiment on the garrison (Fig 6). Thus, in 1918, Colonel William Thorburn was able to make the telling comment in his review of war surgery in Malta and the Mediterranean during the Great War that "Malta Fever . . . is now practically unknown among the British, who use only tinned milk, but it is still endemic among the civil population" (67). In fact, Malta Fever was to remain rife amongst civilians for many years, its incidence only beginning to fall when the Government of Malta established a Goats' Milk Pasteurisation Centre under the management of Stanley Barnes in May 1938 (68). It was only when the sale of raw milk was banned throughout Malta and milk pasteurisation became compulsory in 1957 that the disease was conquered amongst the civilian population, after which time it became limited to dairy workers and to persons eating raw goats' milk cheeselets, "gbejniet", a popular local delicacy (69).

The Royal Society's efforts were duly acknowledged in 1908 in the House of Commons (70). In the same year, Colonel Bruce resigned as Editor of the Journal due to his being posted back to Uganda as Chairman of the Royal Society's third Sleeping Sickness Commission. His place was taken by Major W H Horrocks (71).

Captain James Crawford Kennedy ended his tour of duty in Malta in October 1906 (72), and two years later, on 17th October 1908, he was awarded the Medical

Faculty Gold Medal by the University of Edinburgh for the excellence of his MD thesis on "Malta Fever" (73). This thesis was based on research on the tremendous number of patients with Malta Fever under his care whilst officer in charge of the Acute Fever Wards in the Station Hospital, Valletta, a unique and unrepeatable experience. During the ceremony it was noted with pride that both Colonel Sir David Bruce and Captain Kennedy were graduates of Edinburgh University, and that "their success had practically added the services of a whole regiment to the strength of the garrison station of Malta." Individual copies of this thesis are held in the University of Edinburgh, in the Library of the Royal Army Medical College, Millbank, and in the RAMC Muniment Collection.

The victory over this dread disease was celebrated in grand and merry style in Malta at the Royal Army Medical Corps Ball held on the 10th March 1909 in the Great Ward of the Station Hospital, Valletta (Fig 7), which had been bereft of patients by that simple measure of banning goats' milk. As a newspaper reporter wrote in his account of the Hospital and the Ball: "the darkest days of its existence will scarcely have compared with the period, fresh in memory, when the capacity of the building with its rows and centre rows of beds — and an army of doctors, nurses and attendants, was still insufficient to accommodate and attend to the number of those who fell an easy prey to the ravages of Mediterranean Fever. All this is happily a thing of the past." (74). This "memorable and red-letter day in the annals of the Corps in Malta" marked "the success of an investigation which, by the eradication of Malta fever, has permitted the transformation of perhaps the largest hospital ward in the world into that of a dazzling and brilliant ballroom" (75).

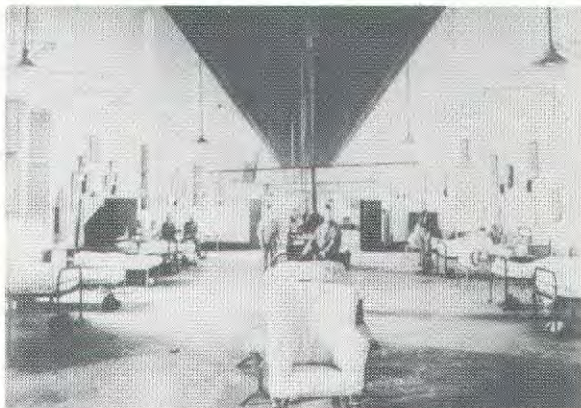


Fig 7. The Great Ward, Station Hospital, Valletta.

Acknowledgement to Wellcome Institute Library, London.

Epidemiology

In those heady days of the British Empire before the Great War, there were ample opportunities for RAMC doctors to pursue epidemiological researches around the

world on Mediterranean Fever, in addition to the ongoing research and case studies in Malta (50,76-95).

Surgeon E H Ross, after a hectic three weeks in Egypt in 1905, reported on the prevalence of Mediterranean Fever in Port Said, seeking evidence to prove that Malta Fever was mosquito-borne (96). A later report of his in 1911, after he had become Health Officer there, and an older and wiser man, gave details on the elimination of the illness from Port Said by the eradication of infected goats (97). In 1906 Lieutenant-Colonel C Birt and Dr Strachan both reported that they had found Malta Fever to be endemic in the Orange River Colony in South Africa and that goats' milk was much used in the district (98-99), and in 1909 they updated their report confirming the presence of a widespread epizootic of Malta fever amongst the goats of South Africa (100). Colonel Bruce, during his work in Uganda in 1909 with the Sleeping Sickness Commission, investigated the local disease 'Muhinyo', proving it to be Malta Fever (101). There were also a number of case reports from Gibraltar (102-103), from the Orange River Colony (104), the Blue Nile (105) and Sudan (106-108).

"Poor Maltese Goat . . . !"

It occurred to Captain Crawford Kennedy that the Reports of the MFC might prove rather heavy going for some readers of the Corps Journal, so he supplied some delightful humorous quotes from local newspapers reflecting the strongly held beliefs of the civilian population on the innocence of the Maltese goat (109). Two will suffice here:

"Why, instead of inventing Maltese fevers, do they not suggest to their countrymen not to overtire themselves under the scorching rays of the sun for hours and hours playing the Savage game called Rugby?";

"Poor Maltese goat! What a war has been waged against her! How she has been humbled all over the world as a filthy and poisonous animal! . . ."

Several "Notes from Malta" in the Corps Journal (83,110) mention in passing the work on Malta fever, but really are much more interesting for the picture they paint of a Garrison in peacetime, whose concerns were understandably more on recreation than on illness.

The ongoing controversy on the goats' role in the transmission of Mediterranean Fever was however to fuel a vigorous correspondence in local newspapers and international journals for several years (111), with occasional literary gems such as the satirical poem "Bruce and the Microbe" (112), two of whose eight stanzas run as follows:

*David found a little Germ —
Its name, of course, you know;
For everywhere that David goes
That name is sure to go.*

*He found it in a Spleen one day,
And raised a cultured stock;
"With you," he said "I'll demonstrate
The postulates of Koch.."*

*David knew a little Boat
That was for New York bound,
With five-and-sixty little goats
That yielded milk all round.
And in the milk that microbe lurked.
(Hence David would forbid it),
And when the men got sick and ill,
"Twas germs," he said, "that did it."*

Brucellosis and cows

In 1914 Major J Crawford Kennedy sounded warning bells when he drew attention to the possibility of a *melitensis* infection in cows in England (113) after discovering that the milk and serum of certain apparently healthy London cows agglutinated the *Micrococcus melitensis*. This agglutination had already been noted in passing by Major Horrocks in Gibraltar (43). Subsequent research, especially after the distraction of the First World War, clarified the relation of contagious abortion in cattle to Mediterranean Fever, with the realisation that the causative organism, *Bacillus abortus*, isolated in December 1895 by Professor L F Benhard Bang (an outstanding Danish veterinary pathologist and bacteriologist) was actually a separate strain of the *Brucella* genus (114-117). This led to it being renamed *Brucella abortus*. An editorial by Colonel Sir William Horrocks in 1938 (118) reviewed the results of epidemiological investigations in France, fully describing the differences between the *melitensis*, *abortus* and *sis* strains of *Brucella* (responsible for the caprine, bovine and swine types of Undulant Fever).

Literature reviews

Over the years, the Corps Journal has published several book reviews or abstracts from articles on brucellosis published in other journals. As the disease was gradually recognised as having a very wide geographical distribution, one can trace the progression of the fight against brucellosis in specific countries, e.g. India (119), Tunisia (120), England (121), Algeria (122-123), France (124-125), South Africa (126-127), and Italy (128). Thus one comes across the appeal for the illness to be renamed "Bruce's Septicaemia (129), mention of the first cases of Malta Fever recorded from German South-West Africa (130), and research on the Maltese Goat itself (131). There are also reviews on the influence of Tuberculosis on the development of *Brucella* infection (132), and on *Brucella abortus* infection in man (133-136), which was eventually recognised as a major cause of undulant fever in many

parts of the world, and a couple of case reports (137-138). Of most interest perhaps is an extensive review of H Harold Scott's monumental work in two volumes, "A History of Tropical Medicine", based on the Fitzpatrick Lectures 1937-1938 delivered before the Royal College of Physicians of London. This work honours the memory and details the medical achievements of many distinguished officers of the RAMC in relation to the history of tropical medicine. It includes a comprehensive chapter on Undulant Fever and a biography of David Bruce (139).

Let us now praise famous men . . .

a. *Obituaries*. Major J C Weir became the first member of the MFC to die, succumbing to cholera in India in December 1909 (140). The end of an era came with the deaths of Major-General Sir David Bruce on 27 November 1931 in Artillery Mansions, Victoria, London (within four days of the death of his wife, Lady Mary Elizabeth Bruce, who had so ably supported his work throughout their lives) and Colonel Sir William Horrocks on 26 January 1941. Both men had figured prominently in the history of brucellosis, yet, as their obituaries so ably demonstrate (Bruce's obituary incidentally was penned by Horrocks), this starring role had only been one aspect of their multi-faceted and much-honoured careers and lives. They had both been prolific and gifted research workers as well as being profoundly happy in their own married lives. They had both been editors of the Journal of the Royal Army Medical Corps, one of them for an unrepeatable 32 years spanning two world wars, and both were dedicated to the Journal as well as to the Corps itself (141-143).

b. *Memorials*. Bruce was one of the Corps' greatest pathologists, for he not only discovered the causative organism of Malta Fever (since 1920 named *Brucella melitensis* in his honour), but he also performed sterling work on the Sleeping Sickness Commission (for instance, demonstrating that nagana, a fatal disease of cattle, was due to a trypanosome (later named *T. brucei*) conveyed by the bite of the tsetse fly, and later elucidating with Castellani the causative role of *T. gambiense* in sleeping sickness in man). He was Assistant Professor of Pathology at Netley from 1889 to 1894, and later investigated dysentery, enteric fever, and, during the First World War, as Commandant of the Royal Army Medical College, he chaired War Office Committees on trench fever and tetanus.

It was therefore very fitting that the British Military Hospital at Mtarfa, Malta was renamed "the David Bruce Military Hospital" in 1951 in honour of his work on undulant fever (144), and that the Army Vaccine Laboratory, 'in lineal descent of those at Netley in which he worked and those of the College which he subsequently commanded', was renamed the David Bruce Laboratories in the same year (145-147). The Corps Journal also saw fit to reproduce a letter written

during the siege of Ladysmith in 1902 by Lady Bruce to her brother (148).

The David Bruce Military Hospital was rebuilt in 1969-70, and was formally re-opened and renamed as "the David Bruce Royal Naval Hospital, Malta" in October 1970, to coincide with the handing over of the old Royal Naval Hospital at Bighi, overlooking the Grand Harbour, to the Malta Government (149).

On 25th June 1980, the 75th anniversary of Sir Themistocles Zammit's discovery of the germ of undulant fever in the blood of a goat, the restored old Laboratory where Bruce, Horrocks, Kennedy, Zammit and the other members of the Mediterranean Fever Commission had carried out their research was opened to the public "as a revered trysting spot for our colleagues from overseas during their medical pilgrimages to Mediterranean lands" (150).

c. *Special Centenary Issue*. The centenary of Sir David Bruce's birth (on 29 May 1855) was commemorated by a special Centenary Issue of the Corps Journal in April 1955, containing several relevant or specially commissioned articles in appreciation of him and his work (151-156).

d. *Bibliography*. The Librarian of the Royal Army Medical College, M Davies, painstakingly compiled a bibliography of the work of Sir David Bruce for the Centenary issue (155), and followed this with another on Sir William Heaton Horrocks (157). The occasion of the Clinical Meeting of the British Medical Association in Malta in 1969 prompted a commemorative article and another bibliography (158) this time belatedly marking the centenary in 1967 of the birth of Surgeon-Captain Matthew Louis Hughes, who coined the term "Undulant Fever", and whose classic monograph in 1897 won for him a permanent place in medical history (6).

e. *Philately*. The only two postage stamps in the world referring to brucellosis were issued by the Malta Post Office on the 14th April 1964 to commemorate an international congress held in Malta by the Food and Agriculture Organisation of the United Nations to discuss the control of brucellosis in the Mediterranean countries. The 2d stamp features portraits of Sir David Bruce and Sir Themistocles Zammit, and the 1s 6d stamp depicts a goat and a microscope of the sort used by Bruce and the other members of the MFC, symbolising the fight against the disease (159-160).

Epilogue

a. *Vella*. Recent years have seen a renewal of the links between Malta, brucellosis and the Royal Army Medical Corps and its Journal through the person of Colonel Ethelwald (Wally) Vella, now retired (Fig 8). Of Maltese origin, ever entertaining, knowledgeable and instructive, Colonel Vella has had a lifelong interest in brucellosis. As Assistant Professor of Army Pathology (and therefore a direct successor of Bruce), and as Honorary Assistant Editor of the Corps Journal from 1970 until he



Fig 8. Colonel Ethelwald E Vella L/RAMC.

retired in 1985, he was a prolific and gifted writer, contributing many articles to the Corps Journal, including several on brucellosis and an excellent biography of Bruce (161-164). He brought new insights into the history, aptly nicknaming brucellosis "the Corps Disease" (164), highlighting the relationship between the British Army Medical Service and Malta Fever (165), and bringing Bruce 'to life' again for us.

b. *RAMC Muniment Collection*. The historical archives of the Royal Army Medical Corps were previously housed in the College Library at Millbank, and then moved to the Muniments Room in the Corps Museum at Keogh Barracks, Aldershot. The Collection has recently been deposited on permanent loan for safe keeping and cataloguing in the Library of the Wellcome Institute for the History of Medicine, in Euston Road, London, where it is available for consultation (166). Besides Captain Kennedy's thesis on Malta Fever and other memorabilia of the Mediterranean Fever Commission, of particular interest is Bruce's own collection of lantern slides taken by himself and his wife, from which several of the illustrations in this article have been taken.

c. *David Bruce Lectures*. Since 1982, the Department of General Practice at Millbank has honoured Sir David Bruce, who worked for two years as a general practitioner in Reigate before joining the Army, through a series of annual 'David Bruce Lectures' by eminent General Practitioners. Three of these lectures have been published in the Corps Journal, describing the Evolution of General Practice in the British Army (167), Research (168), and Audit (169). These illustrate how far General Practice in the British Army has evolved since the early 1960s, such that it is now a specialty on a par with medicine and surgery, with a professor of General

Practice at the College, a flourishing Department, and first-rate vocational training schemes. This shows "what can be achieved with sound sense, perseverance, perspiration, application, demonstration and inspiration" (167), these being the same characteristics of, and the same principles followed by, David Bruce, and thus is a true example of Bruce's continuing legacy to the Royal Army Medical Corps.

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