‘A near-run thing’: The foundation and early years of 1 Malaria Research Laboratory, forerunner of the Australian Army Malaria Institute, 1963–1969 (Part 4 of ‘Pioneers of Australian military malariology’)

Ian Howie-Willis

Abstract

During the 25 years following World War II, malaria re-emerged as a major threat to Australian military personnel deployed to malarious regions in South-East Asia. By 1952, malariologists in Britain knew that drug-resistant strains of the malaria parasites *Plasmodium falciparum* and *Plasmodium vivax* had emerged in Malaya.[1] Successive contingents of Australian soldiers serving in Malaya from the mid-1950s to the early 1970s and then in Vietnam from the early 1970s encountered drug-resistant malaria. They suffered a series of malaria outbreaks and epidemics.

Drug-resistant malaria was an issue causing severe tensions between the Royal Australian Army Medical Corps (RAAMC) medical officers serving in the field in South-East Asia and their superiors in the Army Medical Directorate (AMD) in Melbourne and later Canberra. The Directorate had adopted an orthodoxy which required that the anti-malarial drug Paludrine (also called Proguanil) be taken prophylactically in accordance with strict AMD-ordained guidelines by all troops posted to malarious regions. Disagreements soon developed between the AMD and RAAMC medical officers in the field. The AMD dogmatically maintained that outbreaks of malaria resulted from slack ‘malaria discipline’, including soldiers’ failing to take their Paludrine tablets regularly. The field medical officers, however, realised that because the soldiers were strictly observing the discipline but still contracting malaria, the parasites’ acquired drug resistance was probably the reason.

These tensions and the reality of Paludrine-resistant malaria parasites in Malaya and Vietnam prompted the establishment of a new Army malaria research facility in 1966. This was the 1 Malaria Research Laboratory (1MRL). Modelled on the Army’s Land Headquarters Medical Research Unit (LHQMRU) of World War II, 1MRL eventually developed into the present Australian Army Malaria Institute (AAMI). That the 1MRL would survive was, however, doubtful, because its early years were troubled and it could do little to stem the rising tide of drug-resistant malaria in Vietnam during the late 1960s.

As with Parts 1 to 3 in this series of articles, Part 4 tells its story biographically, through reference to the lives and work of the Army’s medically trained administrators, field officers and scientists who led the struggle against malaria in Malaya and Vietnam. The article profiles three senior Army medical officers who were significant in the early development of 1MRL — Major General W.O. Rodgers, Professor R.H. Black and Major General C.M. Gurner.

Introduction: 'a near-run thing' and 'necessity is the mother of invention'

In his field headquarters after the Battle of Waterloo on 18 June 1815, the victorious field marshal, Arthur Wellesley (1769–1852), the 1st Duke of Wellington, was heard to remark that his victory had been 'a near-run thing'.[2] What the Duke probably meant by this expression was that the outcome of the battle had never been certain until near the end. His decisive victory could easily have become a spectacular defeat.

However interpreted, *'a near-run thing'* is a phrase that comes readily to mind when the student of military-medical history contemplates the early years of 1MRL. In that context the phrase suggests survival by the skin of the institutional teeth. Like the 'Iron Duke's' victory at Waterloo, during the Laboratory's first three years, there was no certainty about its continuation and every chance it might be shut down.

In arguing that case, this article will also use another phrase — the proverb *'necessity is the mother of invention'*. The proverb suggests that the primary driving force for innovation is need; and when a need becomes critical, people find ways of satisfying it. That, too, is an idea applicable to the 1MRL in its early years. The article argues that the Laboratory was brought into being and then allowed to survive because of escalating malaria infection rates among Australian soldiers in Vietnam during the mid to late 1960s.

To appreciate the pertinence of the two phrases just used in relation to 1MRL, the reader must step back two decades from the foundation of the Laboratory to World War II and the years immediately following the end of the war.

The period 1945–1963: new drugs and drug-resistance

A series of major epidemics of malaria had occurred in Papua New Guinea[3] among the Allied military forces in 1942–1943 as they struggled to halt the Japanese advance through the chain of islands to Australia's north. The senior medical officers of the Australian Army Medical Corps (AAMC) [4] responded to the threat of malaria by establishing a remarkable research unit in Cairns, north Queensland, to investigate the disease. This was the Land Headquarters Medical Research Unit, which in the time it was active, 1943–1946, became the world leader in malariological research. The LHQMRU task was to experiment with the available anti-malarial drugs, using soldier volunteers as subjects. The aim was to determine the levels of drug intake required for both prophylactic and treatment regimens in order to quell malaria sufficiently to enable the Army to keep fighting in Papua New Guinea. As seen in Part 3 in this series of articles, the LHQMRU's experimental program was developed and supervised by the Army's Director of Medicine, Brigadier (later Professor Sir) Neil Hamilton Fairley FRS, arguably the greatest Australian malariologist of all time.

Alarmingly for the Army Medical Directorate (AMD) and the medical officers of the RAAMC, drug-resistant strains of malaria parasites emerged during the 1950s in the post-World War II conflicts in South-East Asia, particularly in Malaya and later Vietnam. This phenomenon had first become apparent during the last few months of World War II, when an Atebrin-resistant strain of *falciparum* malaria was discovered in the Sepik District of Papua New Guinea.[5]

For the previous two years, Atebrin had been trumpeted far and wide as the new anti-malarial 'wonder' drug. The orthodox position of the Medical Corps was that, if taken prophylactically in accordance with established guidelines, Atebrin was guaranteed to protect soldiers against malaria and would also cure both the *falciparum* and *vivax* forms of the disease.[6]

The next anti-malarial drug of choice was Paludrine, trialled late in World War II by the LHQMRU at Cairns, a detailed history of which, *Malaria Frontline*, Dr Tony Sweeney, a 1MRL staff member, published in 2003.[7]

As soon as Paludrine became commercially available in sufficient quantities, it replaced Atebrin as the Australian Army's anti-malarial drug of choice. During the Malayan Emergency in the mid-1950s to early 60s, Paludrine remained the frontline defence against malaria. The Paludrine prophylaxis regimen became an article of faith, an orthodoxy of the AMD as strictly adhered to as that of Atebrin in Papua New Guinea in 1944 and 1945.

The new orthodoxy, however, was soon challenged by the experience of the units sent to northern Malaya during the Emergency. The frontline Regimental Medical Officers (RMOs) of the Royal Australian Regiment (RAR) quickly realised that even the strictest supervision of the Paludrine prophylactic regimen could not prevent malaria from erupting among their troops. A Paludrine-resistant strain of the *falciparum* parasite seemed to have evolved rapidly in South-East Asia.

Ironically, the ordinary soldiers, too, realised that

their experience invalidated the Paludrine orthodoxy. In their scepticism they were ahead of the AMD in Melbourne, where faith in Paludrine remained firm. Regarding the RMOs in the field as heretics, the AMD threatened disciplinary action; however, as further evidence of Paludrine-resistant malaria parasites accumulated in Cambodia, Thailand and Vietnam their faith weakened as well.[8]

Major General William Rodgers (1936–)

Major Bill Rodgers was typical of the young frontline RMOs who served in Malaya during the Emergency and earned the displeasure of the AMD hierarchy in Melbourne by questioning its Paludrine orthodoxy. His disagreements with the AMD paralleled those of other RMOs who had served in Malaya before he did.

Lieutenant Colonel (later Major General) W.O (Bill) Rodgers OBE, about 1967 (AWM photograph no. P01002.073).

William ('Bill') Orrill Rodgers was born in Naracoorte, South Australia, on 1 December 1936. His father was a policeman and his mother a dairy farmer's daughter. He received his primary schooling in Wolseley (near the Victorian border) and his secondary education at Birdwood High School in the Adelaide Hills. A bright student, he topped the State in Latin, Physics and Chemistry in his final year of school.[9]

Bill Rodgers wished to be a veterinarian but thought he was too soft-hearted for that; and so after being awarded a Commonwealth Scholarship to study medicine, he chose medical training instead. Coming from a humble background, he earned money to support himself by trapping water rats and selling the pelts. He entered the University of Adelaide at the age of 16 and graduated at age 21 in 1958. In his third year, he was granted an Army scholarship, one of 17 offered the first time such awards were made to prospective Army medical officers. He then remained in the Army until his retirement in 1990.

After his graduation, Rodgers spent a year, 1959, as a resident at the Royal Adelaide Hospital. His first Army posting was as the RMO at 1 Recruit Training Battalion at the Kapooka Recruit Training Centre at Wagga Wagga in southern New South Wales. His next appointment was as the CO of the 7th Camp Hospital at Kapooka in 1961. He spent the period from late 1961 until 1963 as the RMO of the 2nd Battalion of the Royal Australian Regiment (2RAR) in Malaya. Among other duties during his time in Malaya, during 1962 he was sent to South Vietnam to investigate disease patterns. He spent several weeks travelling the length and breadth of the nation in a light plane.

The officers of the 2nd Battalion, Royal Australian Regiment at Malacca, Malaya, November 1961. The Regimental Medical Officer, Captain W.O. Rodgers, is seated at the left end of the front row. The Commanding Officer, Lieutenant-Colonel Alan S. Stretton, is seated at the centre (AWM photograph no. P09707.003).

While serving in Malaya, Rodgers had to manage an outbreak of Paludrine- and Chloroquine-resistant malaria among 2RAR troops stationed near the Thai border. He incurred the wrath of the AMD by issuing Chloroquine tablets in addition to the regulation daily dosage of 100-milligram Paludrine tablets. Eventually he was vindicated when Professor Robert H. Black of the School of Public Medicine and Tropical Health at the University of Sydney investigated the outbreak and found that drug-resistant *falciparum* parasites had indeed been responsible for the outbreak.

Major Rodgers (as he then was) spent 1964 in the UK, studying for a Diploma in Tropical Health and Medicine at the Hospital for Tropical Diseases in London. After returning from his studies in London,

he was appointed as the Deputy Assistant Director General of Medical Services in Melbourne (DADGMS). At that time the DGMS was Major General Andrew J. Clyne, who had severely criticised his management of the *falciparum* malaria outbreak in Malaya in 1961–1962, and had even threatened to have him court-martialled.

Rodgers' next appointment was as a lieutenant colonel and the Commanding Officer (CO) of the 2nd Field Ambulance at Puckapunyal, north of Melbourne, where he spent three months preparing the unit for service in Vietnam. He took the unit to Vietnam, arriving there in April 1966. In 1967 he was awarded an OBE for his service in Vietnam. After his year with the unit in Vietnam, he was posted to the 1st Military Hospital at Yeronga in southern Brisbane as CO. He spent two years in the position, 1968–1969, before the unit was moved to the Enoggera Barracks in Brisbane's northern suburbs.

After Rodgers had undertaken a second tour of duty in Vietnam, this time as the Assistant Director of Medical Services, Major General Colin Gurner, who had succeeded Clyne as DGMS in 1967, suggested that Rodgers should seek specialist qualifications. (Like Clyne, Gurner has criticised Rodgers' management of the outbreak of drug-resistant malaria in Malaya.) Rodgers opted to become a physician and spent the next 18 months at the Royal Adelaide Hospital qualifying for a Fellowship of the Royal Australasian College of Physicians (FRACP). In 1982 he earned a second Fellowship when appointed as a Fellow of Royal Australasian College of Surgeons (FRACS).

Papua New Guinea was the next move for Lieutenant Colonel Rodgers, in 1970. The country was making its transition to Independence in 1975; and during this period the two Pacific Islands Regiment battalions were readying themselves to become the Papua New Guinea Defence Force. On returning to Australia, he was promoted to colonel in 1974 after 11 years as a lieutenant colonel. As such, he held two appointments, Colonel in charge of Professional Services and Colonel in charge of Army Health. In 1980 he was promoted to brigadier. His posting was to the Department of Defence headquarters in Canberra. In 1985 he was promoted to major general and appointed to succeed Major General W.B. ('Digger') James as Director General of Army Health Services (DGAHS). He spent the next five years in the position, until his retirement in 1990. From 1986 he also held the position of Surgeon-General to the Australian Defence Force.

After retiring from the Army, Rodgers was appointed Principal Medical Officer Repatriation in the Department of Veterans Affairs in Canberra. He then moved to Noosa on the Queensland Sunshine Coast in 1991. He spent 15 years 1991–2006 as the Medical Superintendent of the Nambour General Hospital, a Queensland Health Department appointment.

Major General Rodgers remained a strong advocate of Army-sponsored medical research, as conducted by the AAMI at Enoggera. Convinced that the Army's future deployments would be in malarious regions, he believed that if the activities of the AAMI were to be curtailed there would be adverse consequences for soldiers' health. Civilian research organisations and the universities would not necessarily be interested in Army medicine and could not accordingly be relied on to undertake the Army-oriented medical research that was the AAMI forté.

Rodgers was a career Army medical officer in the best RAAMC tradition. He spent his entire Army career before his retirement within the RAAMC, rising from captain to Major General and head of the Corps. Although he was not a specialist malariologist, he learned much about malaria through practical experience as a RMO in the field, backed up by postgraduate training in tropical medicine. As he demonstrated in Malaya, he was enterprising in his determination to protect the health of the soldiers for whom he was responsible. By tackling drug-resistant *falciparum* malaria in the field with the resources available to him, he set in train a series of events which eventually led to the establishment of 1MRL, the AAMI forerunner.

1963–1966: a period of gestation in Army malaria research

Confronted by the mounting evidence of drug-resistant malaria among Australian troops serving in Malaya during the Emergency, in 1963 the AMD turned for answers to the Army's consultant on tropical diseases, Professor Robert H. Black. Black, formerly a captain on the LHQMRU staff in Cairns 1943–1946, was by now the Professor of Tropical Medicine in the School of Public Health and Tropical Medicine at the University of Sydney. He was also Australia's leading malariologist.

Professor Robert Hughes Black (1917–1988), Australia's leading malariologist from the 1950s to the 1970s and the Army's chief malariological adviser. A complex character, Black persevered with his vision for developing an enterprising, world-class Australian Army malaria research facility.

A new war, in Vietnam, added urgency to the quest for new solutions to the age-old problem of how to defeat malaria. Paludrine-resistant malaria was already emerging in Vietnam as the first Australian soldiers were being sent there in July-August 1962.

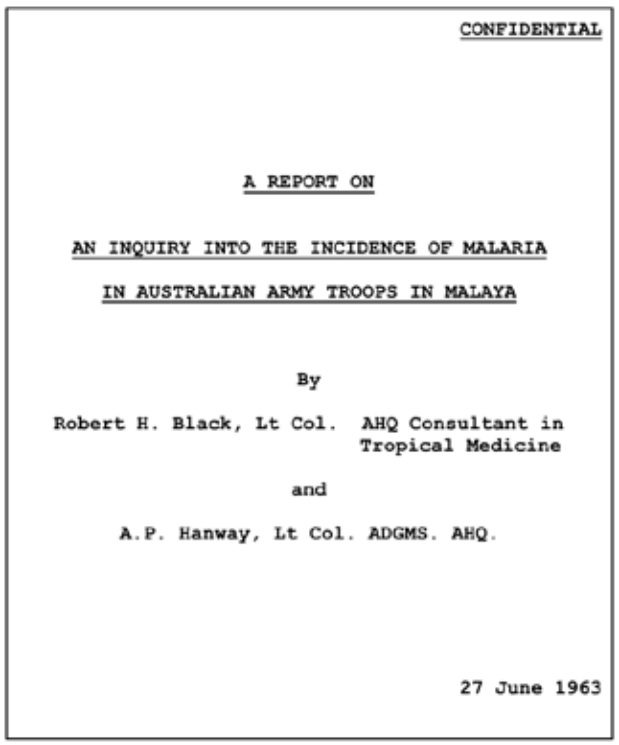
Professor Black began contemplating the possibility of creating a latter-day version of the LHQMRU. The event prompting him was a visit that he and the Assistant Director General of Medical Services (ADGMS), Lieutenant Colonel Aidan P. ('Paddy') Hanway, made to Malaya in June 1963, to inquire into the incidence of malaria among Australian troops there.

Adhering to the AMD's Paludrine orthodoxy, Major General Clyne, the Director General of Medical Services (DGMS) and his deputy (and successor), Brigadier Colin Gurner, were maintaining that the hospitalisations for malaria in Malaya, approaching 500 by 1963, resulted from slipshod 'malaria discipline'. That is, they believed the troops in Malaya were not taking their Paludrine pills, were not sleeping under mosquito nets and were not buttoning up their shirts and rolling their sleeves down at night.[10]

The young RMOs in the field, however, knew that the troops were punctiliously adhering to the malaria discipline but were still contracting malaria. They concluded that Paludrine-resistant parasites were the cause and that Paludrine had become ineffective in controlling them. They accordingly experimented with the drug regimen, increasing the Paludrine dosage and adding Chloroquine. Clyne and Gurner at AMD headquarters in Melbourne saw the RMOs rejection of the Paludrine orthodoxy as insubordination; and that led to threats of severe disciplinary action.

Black and Conway spent a fortnight in Malaya, interviewing the RMOs in the field, consulting the Australian Commander in Malaya, Lieutenant Colonel Alan Stretton, and discussing malaria with the senior members of the British RAMC.

On their return from Malaya, Black and Hanway submitted a detailed report to Clyne. In tone it was generally condescending to the RMOs in the field. It found fault with those who, like Major W.O. Rodgers, were openly sceptical of the Paludrine orthodoxy. Black and Hanway were, however, convinced that Paludrine- and Chloroquine-resistant strains of *falciparum* malaria were indeed present in Malaya. That in turn persuaded Black that the AMD and the RAAMC should conduct research analogous to that of the LHQMRU during World War II.[11]



CONFIDENTIAL

A REPORT ON

AN INQUIRY INTO THE INCIDENCE OF MALARIA

IN AUSTRALIAN ARMY TROOPS IN MALAYA

By

Robert H. Black, Lt Col. AHQ Consultant in Tropical Medicine

and

A.P. Hanway, Lt Col. ADGMS. AHQ.

27 June 1963

An unpretentious but epoch-making document — typescript of the cover of the Black-Hanway report on malaria among Australian troops in Malaya, 27 June 1963. This report set in motion the chain of events leading directly to the foundation of 1 Malaria Research Laboratory three years later.

During the months that followed, Black discussed the research possibilities with Major General Clyne, What they had in mind at that stage was 'a research

project into drug resistance in malaria similar to the investigation conducted by Sir [Neil] Hamilton Fairley [at the LHQMRU] in Cairns during the last war'.[12] By June 1964 their ideas had progressed to the point where Clyne could formally notify the Adjutant General of their wishes and request permission for their project to use soldier volunteers in experiments.[13]

Major General Andrew J. Clyne, Australian DGMS (second from left) visiting 2nd Field Ambulance, Vietnam, March 1967. Two years earlier, Clyne had formally set in motion the train of events leading to the establishment of 1 Malaria Research Laboratory on 14 June 1966. Earlier, during the Malayan Emergency, he had been highly critical of the actions of the junior medical officers in the field who varied the established Paludrine prophylactic regimen in order to cope with outbreaks of drug-resistant falciparum malaria (AWM photograph no. CUN/67/0170/VN).

Meanwhile, Black had been discussing the proposal with colleagues among the malariologists of the World Health Organisation and in the US at the University of Chicago and the National Institute of Health at Atlanta.[14] He also advised the AMD that Sir Edward Ford, a great World War II Australian Army malariologist and head of the School of Public Health and Tropical Medicine, had agreed to have a young Army biochemist attached to his (Black's) Department of Tropical Medicine.[15] This was Lieutenant G.M. Galvin, whom the AMD had referred to Black after he had expressed an interest in research work within Black's department.[16]

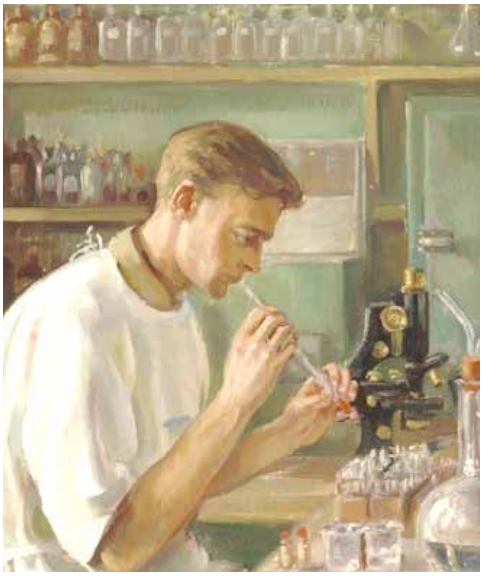
Professor Robert H. Black, the Army's consultant on tropical diseases 1959–1979

The AAMI owes its existence to Robert Hughes Black, the Professor of Tropical Medicine at the School of Public Health and Tropical Medicine of the University of Sydney 1963–1982. Without his vision and perseverance, the AAMI might never have been conceived or could have died in infancy. Because he was both 'parent' and 'midwife' at the birth of 1MRL, at this point the reader should appreciate who Black was and why his achievement was important.

Professor Robert Hughes Black (second from left), 1985, with fellow members of the Army Malaria Advisory Board. (Australian Army Malaria Institute photograph).

Black was born in Willaura, Victoria, on 20 December 1917, the son of a bank manager. He attended many schools but completed his secondary education at Parramatta High School in Sydney. He then went on to study medicine at the University of Sydney. He graduated MB BS in 1939, winning a University Medal. He spent 1940 as a resident at the Royal Prince Alfred Hospital in Sydney and then another year in Innisfail, Queensland, as a senior resident at the local hospital. At the end of that year he married another medical practitioner, Dr Dorothy R.E. Tandy, in Innisfail. They divorced in 1952.[17]

In November 1941 Black enlisted as a captain in the AAMC, serving as a militia officer at first. In July 1942 he transferred to the 2nd AIF. He was posted first to the 19th Field Ambulance and then to the 117th Australian General Hospital (117 AGH) at Toowoomba. In August 1943 he was posted to the 106th Casualty Clearing Station and accompanied the unit to New Guinea. In Lae and later with the 2nd Blood and Serum Unit in Sydney he experimented with cultivating *falciparum* malaria parasites in red blood cells *in vitro*.



Captain Robert H. Black, titrating sera in a laboratory at the 2nd Australian Blood and Serum Preparation Unit in Sydney, 1944: an oil on hardboard portrait by the war artist Nora Heysen, who became Black's second wife (AWM picture no. ART22409).

In December 1943 Black joined the staff of the LHQMRU at Cairns, where he used his *in vitro* technique to demonstrate that anti-malarial drugs metabolised in the body were active against cultured parasites. At the LHQMRU he became a key member of the research team conducting experiments on volunteers to ascertain the correct dosage levels of Atebrin for use in anti-malaria prophylaxis.

After his discharge in June 1946, Black spent a year as a bacteriologist at the Institute of Medical Research at the Royal North Shore Hospital in Sydney. In 1947 he earned a MD degree from the University of Sydney for a study of the chemotherapy of malaria. He then travelled to the UK, working his way as a ship's surgeon. He spent two years 1946–1948 working and studying at the Liverpool School of Tropical Medicine, where he earned a Diploma in Tropical Medicine and Health.

On returning to Australia, Black gained a position in the School of Public Health and Tropical Medicine at the University of Sydney in 1949. He was promoted successively to lecturer, senior lecturer and in 1963 Professor of Tropical Medicine. By this stage he was one of Australia's few world authorities on malaria. He wrote over 200 journal articles and monographs on malaria. He participated in international malaria surveillance programs. He was called on as a consultant in malaria by several international agencies, notably the World Health Organisation and the South Pacific Commission. In Australia he maintained the central national register of malaria cases.

In 1959 Black had been appointed as the consultant in tropical diseases to the Australian Army headquarters and granted the rank of lieutenant colonel in the Citizen Military Force (CMF) branch of the RAAMC. As seen, in 1963 at the request of the AMD he undertook an investigation of outbreaks of drug-resistant *falciparum* malaria in northern Malaya, where malaria had erupted among Australian troops serving during the Malayan Emergency. In 1964 he was promoted to colonel. He subsequently advised the AMD on the use of drug combination therapy in cases of drug-resistant malaria during the Vietnam War. By this stage drug-resistant malaria had appeared in various locations in South-East Asia.

As a result of his experiences in Malaya and Vietnam, Black became the leading advocate for the creation of an Army malaria research unit analogous to the LHQMRU. In 1965 he proposed that an Army malaria research laboratory be established within his department at the University of Sydney. Permission was granted in 1966. A six-member unit known as the 1 Malarial Research Laboratory (1MRL) then formed and began work during 1966–67. 1MRL remained located within Black's department at the university until it moved into its own premises at the Ingleburn Army Camp in 1973.

Professor Robert H. Black (left), Sir Edward Ford (centre) and Dr Ian M. Mackerras (right) view the portrait of their World War II commander and colleague, the great wartime malariologist Brigadier Sir Neil Hamilton Fairley, in the 1st Malaria Research Unit at Ingleburn, 19 April 1974. All three, who were pioneering malariologists, were attending the unit's official opening in its new premises (Australian Army Malaria Institute photograph).

Colonel Black retired from the Army in 1979 and from the University of Sydney in 1982. Until a new

generation of specialists emerged during the 1980s, he remained Australia's foremost malariologist.

As a result of his research into drug-resistant malaria in South-East Asia, New Guinea and the Pacific Islands, Professor Black became interested in the sociological ramifications of malaria control. To understand this aspect of malariology better, he undertook studies in anthropology at the University of Sydney, for which he was awarded a Diploma in Anthropology in 1963. As part of this program he undertook a special study of life on a coconut plantation in the Solomon Islands. Following this experience, he advocated social science training for workers in malaria control programs.

Black's honours and awards included election to a Fellowship of the Royal Australasian College of Physicians in 1965. In 1986 he was awarded the Darling Foundation Medal of the World Health Organisation, a prestigious prize presented for significant contributions to malariology.

Black's second marriage, in 1953, was to the war artist, Nora Heysen, whom he had met during his time in the Army in New Guinea in 1943. She subsequently produced several sensitive portraits of him carrying out his research at the LHQMRU. Their marriage ended in 1972. In 1976 he married Gail Lorraine Grimes, a nurse who was 28 years his junior. He died of cancer on 17 March 1988, survived by his third wife and his son from his first marriage.

Some of Robert Black's associates found him difficult to deal with. His biographer, Yvonne Cossart, hinted at this by writing that 'frequent travel abroad, coupled with a reserved manner and introspective temperament, sometimes impeded his professional collaboration and placed a strain on his personal relationships'.[18]

Whatever his personal foibles, Robert Black was a towering figure in Australian malariology for over 30 years. He trained several generations of malariologists at the University of Sydney. His legacy to the Australian Defence Force was his advocacy of the unit that evolved into the Australian Army Malaria Institute. AAMI remains a monument to his vision and persistence.

A prolonged labour: birth of 1 Malaria Research Laboratory, 1965–1966

In early March 1965 Professor Black visited Army Headquarters in Melbourne to discuss his ideas for an Army-sponsored malaria research project with Brigadier Gurner, the DDGMS. Gurner later told the DGMS, Clyne, that Black believed that the unit could become one of the three leading centres for malaria research in the world and would 'greatly increase the status of the RAAMC'.[19]

Shortly after the conversation between Gurner and Black, Clyne submitted a minute to his superiors formally proposing the establishment of a new 'RAAMC Malaria Research Laboratory'. The unit would be located at the University of Sydney and would have a staff of six comprising a major as commanding officer, two captains and three sergeant laboratory technicians, all of whom would be seconded from medical field units.[20]

In the months that followed, Clyne's proposal gained increasing urgency as reports from Vietnam indicated that the US Army medical units were grappling with Chloroquine-resistant strains of *falciparum* malaria.[21] The AMD began receiving reports on this issue in May 1965 as the Australian government was preparing to commit operational troops to the war in Vietnam.[22]

The reports kept coming during the following months.[23] In September Clyne provided the Minister for the Army (Alexander James ['Jim'] de Burgh Forbes MC) with a briefing on 'Malaria — A New Strain'.[24] After several months of negotiation between the AMD, Black and the Army's Director of Personnel Administration (DPA) over staffing levels and service conditions at the proposed Malaria Research Laboratory (MRL), the DPA approved the recommended staffing establishment on 13 May 1966.[25]

Army Headquarters in Canberra then authorised the setting up of the MRL a month later, on 14 June 1966. The notice of authorisation, 'Raising Instruction [no.] 26/66', was circulated to all branches of the Army and to its seven regional Commands. This half-page document advised its many recipients that '1 Malaria Research Laboratory' would be 'a Regular Army unit administratively allotted to Eastern [i.e. New South Wales] Command but located at the School of Tropical Medicine at the University of Sydney.'[26] If institutions may be said to have 'birthdays', 14 June 1966 would be the AAMI's; and 'Raising Instruction 26/66' would be the AAMI 'birth certificate'.

(Chief of the General Staff)

Army Headquarters
Russell Offices
CANBERRA ACT

Quote in Reply
605/R2063/2

8 June 66

E Comd (10)

RAISING/DISBANDING INSTRUCTION 26/66
1 MALARIA RESEARCH LABORATORY RAAMC

1. Approval is given for the raising of 1 Malaria Research Laboratory, RAAMC, on establishment IV/131/1 (HE). The Unit has a total of six all ranks (three officers and three NCOs). A copy of the establishment is attached.

2. 1 Malaria Research Laboratory is to be an ARA AHQ unit and is allotted to E Comd for local administration. It is to be located at the School of Tropical Medicine, Sydney University.

3. The three officers are to be provided from the establishment of 2 General Hospital. In order that provision is made on the establishment for three other rank laboratory technicians, the establishment of 2 General Hospital (IV/370/2 (TE)) is to be restricted by three Pte Med Orderlies (ECN 564). Suitable amendment to the 2 General Hospital establishment will be advised separately.

4. The authority for the issue of stores and equipment is HET 1631. Pending the issue of this HET, the provision of such items of stores and equipment which are considered necessary, is to be the subject of a separate instruction.

5. The costing of officers and OR is to be the subject of separate advice from AHQ (MS and DAR respectively).

6. AHQ is to be advised when this instruction has been implemented.

7. Amendments to the ORBAT are to be advised separately.

(illegible signature with initials 'SRC'] fr at
pa (G.D. Solomon)
Brigadier
DSD

Enclosures 1. Copy of establishment

Copies to:

AG Branch (10), QMG Branch (10), MGO Branch (10), Secretary's Branch (12), DMO and P (2), IMT (4), DAR, CARO (6), MS (2), MA to CGS, PA to DCGS.

Copies for information: N Comd, S Comd, T Comd, C Comd, W Comd, NT Comd, PNG Comd.

Internal:

SD (Coord), SD (P and EC) (2), SD (ORBAT), SD (Estb) (2), SD (Gen Org) (2).

Ref 5900 (copy) on 11901

Typescript of an institutional 'birth certificate' — Raising/Disbanding Instruction 26/66: 1 Malaria Research Laboratory, RAAMC. A legible copy of the original is unavailable. The only known copy is a nearly illegible poor photocopy of a faint carbon-copy of the original, in the archival holdings of the Australian War Memorial. Its Army jargon and frequent acronyms are a challenge for the uninitiated; however, even an uninformed lay person will realise that this is an important 'raising instruction'.

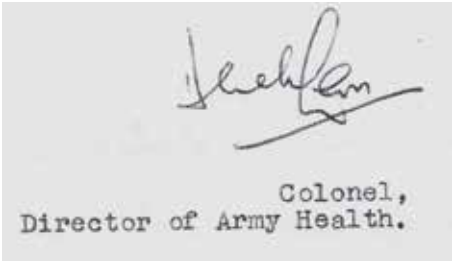
The inception of 1 Malaria Research Laboratory, 1966

A fortnight after Army Headquarters had authorised the establishment of 1MRL, Professor Black wrote to Brigadier Gurner to say how he envisaged the Laboratory developing, outlining the role he thought that 1MRL ought to perform. He believed it should fulfil three basic functions, which he described as being the investigation of: (1) the activity of anti-malaria drugs against malaria parasites using human volunteers and mosquito-transmitted malaria; (2) malaria strains suspected of being resistant to certain anti-malarial drugs; and (3) associated clinical, parasitological, entomological and biochemical research.[27]

Black saw the 1MRL progressively taking on its role through three main stages. Stage I would involve recruiting and training the staff. Stage II, into which he hoped 1MRL would move in early 1967, would entail 'advanced training and development of techniques'. Stages I and II could be undertaken within his department at the university, but Stage III, 'the carrying out of research projects', would require 1MRL to 'move to a hospital unit'.[28] That was more or less how things turned out, though not quite in the manner that Black had foreseen.

The 22-year old Lieutenant (later Captain) Galvin formally took up duty with 1MRL during late June 1966. He was given the task of raising the unit; and he became its first Commanding Officer. Apart from himself, 1MRL had three Army privates with previous laboratory experience, two of whom were National Servicemen.[29] They were accommodated in a room barely large enough for them let alone the laboratory equipment and supplies they would soon accumulate. Among Galvin's first tasks was the ordering of equipment and supplies. In lieu of administrative and accounts staff, he also performed clerical duties. While he undertook these tasks the three privates worked in the laboratories of the Entomology and Parasitology departments of the School under Black's supervision.[30]

The AMD in Melbourne closely monitored 1MRL during the unit's first months. At the end of July 1966 the Director of Army Health, Colonel (later Major General) Derek G. Levis (1911–1993), a RAMC officer on secondment to the RAAMC, travelled to Sydney to inspect 1MRL and discuss its needs with Lieutenant Galvin. Levis subsequently reported to the DGMS that the most urgent priorities for 1MRL included: (a) definitive terms of reference to guide the unit; (b) the appointment of a Commanding Officer; (c) the securing of adequate accommodation for staff, equipment and storage; and (d) the recruitment of permanent technical staff rather than short-term National Servicemen.[31]



No known photograph of Colonel Levis is available; however, his distinctive signature (above) appears on much correspondence about 1 Malaria Research Laboratory during 1966-1967.

Levis also drafted a set of four terms of reference for 1MRL. First among these was 'the evaluation of alternative drugs which may be suitable for the treatment or suppression of malaria in human subjects'. Second was 'the investigation and classification of strains of malaria which are resistant or suspected of being resistant to known anti-malaria drugs'. Third was to conduct such evaluations and investigations using 'human volunteers who had been infected with mosquito-transmitted malaria under controlled laboratory and hospital conditions'. Fourth, 'the mosquitoes to be used should include the known or suspected vectors from those areas of South-East Asia where resistance of the malaria parasite to known anti-malarial drugs has been proven or is suspected'.[32]

After receiving Levis's report, Clyne sent Black a long memorandum setting out the terms of reference for 1MRL that Levis had drafted. The memorandum also adopted the three-stage development of the 1MRL role that Black had proposed earlier. It then went on to ask Black a series of pointed questions about the relationship of 1MRL to the School of Public Health and Tropical Medicine. For example, Clyne wished to be advised what separate laboratory space 1MRL would be granted. He told Black that such issues must be resolved swiftly.[33]

A struggling unit, 1967–1968

A year after its foundation, 1MRL was still struggling. This became obvious in a long memorandum that Galvin sent to Levis detailing the difficulties the unit was experiencing.[34] A particular difficulty was finance. 1MRL had no separate financial allocation or budget of its own. Instead, the unit drew whatever equipment and supplies it needed from Eastern Command medical stores base. Galvin opined that unless such issues were swiftly resolved, the unit would make little progress.[35] Evidently dissatisfied, in 1968 he transferred to another position away from 1MRL.[36]

Further difficulties centred on Professor Black. In the opinion of Colonel Levis, Black was spending too little time with 1MRL staff and giving them insufficient supervision. He often travelled overseas in connection with his WHO work, and while away was unavailable to either the 1MRL staff or the AMD. Levis believed that when Black was present he regarded 1MRL as a source of additional staff for his own research projects provided by the Army at no cost to his School.[37] Levis concluded that the best strategy for the AMD would be to place the unit 'in a state of suspended animation' — shut it down — for the time being, until such time as it could be co-located with one of the Army hospitals.[38] Black responded very defensively to such implied criticism, giving assurances that things would improve soon.[39]

Despite the difficulties, the 1MRL staff had begun a program of experimental work designed more to give them training in malaria research procedures than to yield any findings immediately applicable in the field in Vietnam. They were accordingly functioning at the Stage II level of Professor Black's scheme for development. The first of the four small-scale projects they pursued was the development of strains of the mouse malaria, *Plasmodium berghei*, that were resistant to the anti-malarial drugs Paludrine and Pyrimethamine. The experiments with mouse malaria yielded some useful results, demonstrating the potentiation of anti-malarial activity by the drugs Paludrine and Dapsone.[40]

Associate Professor Libby Kalucy BSc (Hons), MSc, Dip Ed, OAM. As Lieutenant Elizabeth Kalucy, she was 1 Malaria Research Laboratory's first entomologist. She had the distinction of publishing 1MRL's first scientific research paper.

Meanwhile, the work of the unit's entomologist, Lieutenant Elizabeth Kalucy, was progressing well. She had established a colony of a local species of anopheline mosquito, *Anopheles annulipes*.[41] Kalucy had the distinction of publishing 1MRL's very first research paper, which had the title 'Transmission of *Plasmodium berghei* by *Anopheles annulipes Walker*'. Not only that, but the paper appeared in the very prestigious British journal, *Nature*. The mouse malaria transmission model developed by Kalucy was still being used almost half a century later by 1MRL's successor, the AAMI.[42]

During May and June 1968 a team of 1MRL staff undertook mosquito surveys in Papua New Guinea

around the Igam Barracks of the Pacific Islands Regiment near Lae and also around the Moem Barracks near Wewak. The team also undertook blood analysis in two Markham Valley villages inland from Lae.[43].

A female Anopheles annulipes *mosquito taking a blood meal. The species, widely distributed in Australia, was used in establishing 1MRL's first mosquito colony. This particular female has become so engorged with blood she has begun exuding globules of blood from her anus. (Photograph by Richard C. Russell, Department of Medical Entomology, University of Sydney.)*

In the months following the surveys in Papua New Guinea 1MRL lost both its officers. Captain Galvin, perhaps tiring of the Laboratory's slow progress, sought a transfer away from the unit. (He is thought to have undertaken medical training later and to have entered General Practice in Perth.) Lieutenant Kalucy resigned in 1969. (She entered secondary teaching but eventually specialised in community health, a field in which she published widely. At her retirement in 2010, she was an Associate Professor at Flinders University, South Australia.) For a time, it seemed that Kalucy's colony of *An. annulipes* mosquitoes might not survive; however, Captain Tony Sweeney, the entomologist who succeeded her, took it over, which in turn enabled the experimentation with *P. berghei* to continue.[44]

Major General Colin Gurner, the Army's Director General of Medical Services 1967–1975

At this point the reader needs to appreciate something of the background of Major General Gurner, who succeeded Major General Clyne as DGMS in 1967. It was during Gurner's eight years as DGMS that 1MRL came closest to being shut down and then at last secured its own survival by succeeding in demonstrating its usefulness to the Army.

Major General Colin M. Gurner, about 1975 (photograph from Australian Radiology, *2007).*

Colin Marshall Gurner was born in Adelaide, South Australia, on 26 December 1919. His father, also called Colin, was a radiologist. Both Colin Gurners, father and son, enlisted in the AAMC during World War II.[45] Gurner Snr. had joined the AAMC as a temporary captain in June 1918, five months before the end of World War I, while he was a fifth year medical student. He served with the Corps for the next year, spending all that time at the Keswick Barracks in Adelaide. He re-enlisted in August 1939 three days before World War II broke out, again as a captain. During 1940 and 1941 he served with the 2/1st, 2/2nd, 2/3rd and 2/9th Australian General Hospitals (AGH) in the Middle East. After returning to Adelaide in March 1942 he was promoted to major. He then spent the rest of the war as a specialist radiologist in a series of Army hospitals within Australia, including 2/9 AGH, 101 AGH, 105 AGH and 121 AGH.

Colin Gurner Jnr. received his schooling at Prince Alfred College in Adelaide. He then studied medicine at the University of Adelaide. While still a medical student, in 1939 he joined the part-time Army, the CMF. A keen sportsman, he played district cricket in Adelaide and was awarded blues in both cricket and football while at university. He enlisted in the AAMC as soon as he could after his graduation. He joined as a captain in December 1942. He subsequently served in various Army hospitals in both Australia and Papua New Guinea, including the 101 AGH at the same time as his father. At his discharge in September 1946 he was a captain attached to the 2/2nd Field Ambulance.

After his discharge in 1946, Gurner Jnr. trained as a radiologist at the Royal Adelaide Hospital. He gained his Membership in the Royal Australasian College of Physicians in 1950. He then studied radiation

therapy at the Memorial Sloan-Kettering Cancer Centre in New York, where he gained a Diploma in Radiation Therapy. On his return to Adelaide he became a junior partner in his father's radiological practice on North Terrace. He also held honorary appointments at the Royal Adelaide Hospital and the Adelaide Children's Hospital.

Gurner rejoined the CMF in 1948. He continued as a part-time CMF medical officer for the next 12 years. In that time he commanded two CMF medical units and was promoted to colonel. He returned to full-time Army service in 1960, when he accepted an offer to become the Deputy DGMS in the Regular Army. He was promoted to brigadier in 1961 and to Major General in 1967 when appointed DGMS, succeeding Major General Clyne in the position. He remained DGMS for the next eight years, 1967–1975. (In 1974 the position was renamed 'Director General of Army Health Services.)

Among other achievements as DGMS, in 1968 Gurner relocated the Army Medical Directorate from Melbourne (where it had been based for the past 66 years) to Canberra to give the AMD greater access to Defence headquarters and the Minister for the Army. His main contribution to the AMD was to shepherd the Army Medical Services through the Vietnam War — the Army's largest and longest overseas military involvement since World War II. A notable accomplishment here was to solve the perennial problem of providing medical officers for such conflicts by recruiting specialists to undertake three-month tours of duty in Vietnam.

Although Gurner was not a malariologist, as DGMS he was obliged to acquire an extensive knowledge of tropical medicine generally and malaria in particular. His time as both DDGMS and DGMS extended through the last three years of Australia's commitment to the Malayan Emergency and then across the entire period of Indonesia's Confrontation of Malaysia and the Vietnam War. As a result of this experience, malaria control became one of his principal medical interests.

Gurner worked closely with the Army's adviser on malaria, Professor Black, and was the DDGMS at the time when the new 1 Malaria Research Laboratory was established within Black's department at the University of Sydney in 1967. Gurner was in frequent contact with 1MRL in its early years to ensure that it developed into the kind of organisation that would be of maximal value to the Army.

During the successive outbreaks of drug-resistant malaria in Vietnam in the late 1960s, Gurner monitored closely his medical officers' efforts to contain the disease. At times this led to disputes with the RAAMC officers in Vietnam, but it was always he as DGMS who bore ultimate responsibility when Australian soldiers suffered and died from the disease. In a time of widespread public opposition to the war, high malaria casualty rates were a politically sensitive issue for the Australian government; and so it was from Gurner that successive government ministers in the Defence portfolios sought advice.

As DGMS, Gurner was responsible for the establishment in 1969 of the Army Malaria Advisory Board, which oversaw the activities of 1MRL and its institutional successors. In 1970 the Board decided that 1MRL should be renamed, becoming the 1st Malaria Research Unit (1MRU). Gurner also appointed the first of 1MRU's successive Directors, Dr A.P. Ray, an eminent Indian malariologist who held the position 1973–1977. By the time of Gurner's retirement in 1975, 1MRU was well established. It was working purposefully and productively in purpose-built premises at the Ingleburn Army Camp near Campbelltown south of Sydney. The unit had moved from Sydney University to Ingleburn in December 1973.

After his retirement from the Army, Gurner retained his medical-administrative interests. He served terms as President of the Royal Australasian College of Radiologists, as the Joint [Military] Services Medical Adviser, the inaugural Commissioner of the St John Ambulance Brigade in the Australian Capital Territory (ACT), the Chairman of the ACT Medical Board and the Medical Director of the Australian Kidney Foundation. His many honours and awards included Fellowships in the Royal Australasian Colleges of Physicians, Radiologists, Surgeons and Medical Administrators and the [British] Royal College of Radiologists. He was awarded the CBE in 1969 and the AO in 1978.

Late in life Gurner emerged as a military-medical historian. He returned to university in his 70s and gained a Diploma in Journalism. In 2003 he published *The Royal Australian Army Medical Corps 1945–1975*, a short history of the Corps in the post-World War II era.[46] Of necessity, the book dealt at length with the RAAMC medical officers' struggle against malaria in Vietnam.

Colin Gurner married Cynthia Miller, a physiotherapist, in 1943. They lived in Melbourne during the last 20 years of his life. After his death there at the age of 86, he was survived by Cynthia, three of their four children and their grandchildren.

Army dissatisfaction with 1 Malaria Research Laboratory, 1968–1969

In the period two and three years after the establishment of 1MRL, i.e. during 1968–1969, the Army Medical Directorate was growing increasingly frustrated with the unit's failure to make progress beyond its early training phases. Following the Army's worst malaria epidemic since World War II, which had erupted among Australian troops in Vietnam during the second half of 1968, the Adjutant General, Major General Charles E. Long, was pressuring the DGMS, Gurner, for solutions. 'Recent events in South Vietnam have shown us to be extremely vulnerable to the ravages of malaria,' Long wrote. He then observed that 'our research effort at the moment is meagre, ineffective and totally inadequate'.[47] Abashed, Gurner could only agree with the Adjutant General that 'our research effort is negligible'.[48]

The AMD's exasperation with Professor Black and 1MRL is plain in the Directorate's correspondence files during this period. One brief note from the DDGMS, Colonel Hanway, to Gurner at the end of 1968 expresses the prevailing mood nicely. The problem with 1MRL, Hanway wrote, was 'the need for a Director with ability and qualifications if the Lab is going to do anything useful — which it is not doing at the moment'.[49] Hanway then suggested that 'as long as [1MRL] remains a hanger-on in the School [of Public Health and Tropical Medicine] at Sydney it will continue to operate on an *ex tempore* program of projects some of which are of no value to the Army who is footing the bill'.[50] In other words, Black's dominating influence over 1MRL was impeding the unit; the Army was gaining little from its investment in 1MRL; and so the unit should be removed from Black's *de facto* control.

1MRL's chances of survival were about to improve, however. During 1969 the unit succeeded in recruiting its first medically trained staff member. This was Dr Ian Saint-Yves, a Scottish specialist in tropical diseases currently working in Papua New Guinea. Professor Black persuaded him to join the 1MRL staff. He accordingly moved to Sydney, joined the Australian Army and was commissioned as a major. Posted to 1MRL, he filled the vacant position of Commanding Officer, hoping that as the unit developed further and acquired hospital facilities he might be appointed Director.[51]

1 Malaria Research Laboratory staff, January 1970. Left to right are Captain A.W. (Tony) Sweeney, Major Ian F.M. Saint-Yves, Corporal N. Tinney, Corporal R. Green and Corporal C. Gulley (Australian Army Malaria Institute photograph).

Although that did not happen, and Saint-Yves departed in frustration, his appointment had been a critical turning point in the unit's fortunes. He had spent the four years 1969–1973 developing 1MRL to the point where it could be detached from the School of Public Health and Tropical Medicine and relocated on the campus of a major Army barracks. The campus chosen for this move was the Ingleburn Military Camp, where the unit was housed in the grounds of the 2nd Military Hospital.

Changes of name and improving prospects for survival

A sign that the tide of events had turned in favour of 1MRL was a change of name, the first of three. In 1970 1MRL became the 1st Malaria Research Unit (1MRU), a name retained for the next 11 years. Renamed again in 1981, when it became the Army Malaria Research Unit (AMRU), the unit remained at Ingleburn for the next 16 years. In 1997 it became the AAMI and relocated to the Gallipoli Barracks at Enoggera, Brisbane.

The post-1970 history of 1MRU–AMRU–AAMI is beyond the scope of this article. That history has already been related in detail in a series of seven articles in this journal by Professor Karl Rieckmann and his AAMI colleagues between April 2012 and January 2016. The collected articles were published in a single volume later in 2016 to commemorate the AAMI's 50th anniversary.[52]

Conclusion

This article began with two sayings. The author hopes that he has demonstrated that *'necessity was the mother of invention'* in the case of 1MRL's

establishment. He also trusts that in view of the mini-saga of military-medical politics recounted in the article, readers might appreciate the point that the survival of 1MRL to become the 1st Malaria Research Unit and eventually the Australian Army Malaria Institute was indeed *'a near run thing'*.

Author's affiliations: Dr Ian Howie-Willis is a professional practising historian. His most recent book is ***An Unending War: The Australia Army's struggle against malaria, 1885–2015*** *(Big Sky Publications, Newport [New South Wales], 2016). The previous three parts of his series of articles on 'The pioneers of Australian military malariology' appeared in earlier editions of JMVH. His two current major research projects are a biography of Brigadier Sir Neil Hamilton Fairley and a history of the Australian Army's experience of sexually transmitted diseases.*

Corresponding author: Ian Howie-Willis
iwillis@ozemail.com.au
Authors I. Howie-Willis[1]
Author Affiliations:
1 St John Ambulance Australia - Historical Adviser

Abbreviations

1MRL	1 Malaria Research Laboratory
1MRU	1st Malaria Research Unit
2RAR	2nd Battalion, Royal Australian Regiment
AAMC	Australian Army Medical Corps (prefixed 'Royal' from 1948)
AAMI	Australian Army Malaria Institute
ADGMS	Assistant Director General of [Army] Medical Services
AGH	Australian General Hospital
AIF	Australian Imperial Force
AMD	Army Medical Directorate
AO	Officer of the Order of Australia
AWM	Australian War Memorial
CBE	Commander of the Order of the British Empire
CMF	Citizen Military Force
CO	Commanding Officer
DADGMS	Deputy Assistant Director General of [Army] Medical Services
DDGMS	Deputy Director General of [Army] Medical Services
DDMS	Deputy Director of Medical Services
DGAHS	Director General of Army Health Services
DGMS	Director General of [Army] Medical Services
DPA	Director of Personnel Administration [Australian Army]
DSD	Directorate of Staff Duties [Australian Army]
FRACP	Fellow of the Royal Australasian College of Physicians
FRACS	Fellow of the Royal Australasian College of Surgeons
FRS	Fellow of the Royal Society

HQ	Headquarters
KBE	Knight of the Most Excellent Order of the British Empire
LHQMRU	Land Headquarters Medical Research Unit
MB BS	Bachelor of Medicine and Bachelor of Surgery
MC	Military Cross
MD	Doctor of Medicine
MRL	Malaria Research Laboratory
OBE	Officer of the Order of the British Empire
RAAMC	Royal Australian Army Medical Corps
RAMC	[British] Royal Army Medical Corps
RAR	Royal Australian Regiment
RMO	Regimental Medical Officer
US	United States [of America].

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3 Until after the end of World War II, Australia controlled Papua and New Guinea as separately administered territories. In 1946 they were administratively combined as the 'Territory of Papua and New Guinea'. That name was retained until the granting of self-government in 1973, when the present name Papua New Guinea was adopted. This name has continued since the nation achieved independence in 1975. For convenience, this article uses the present name.

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