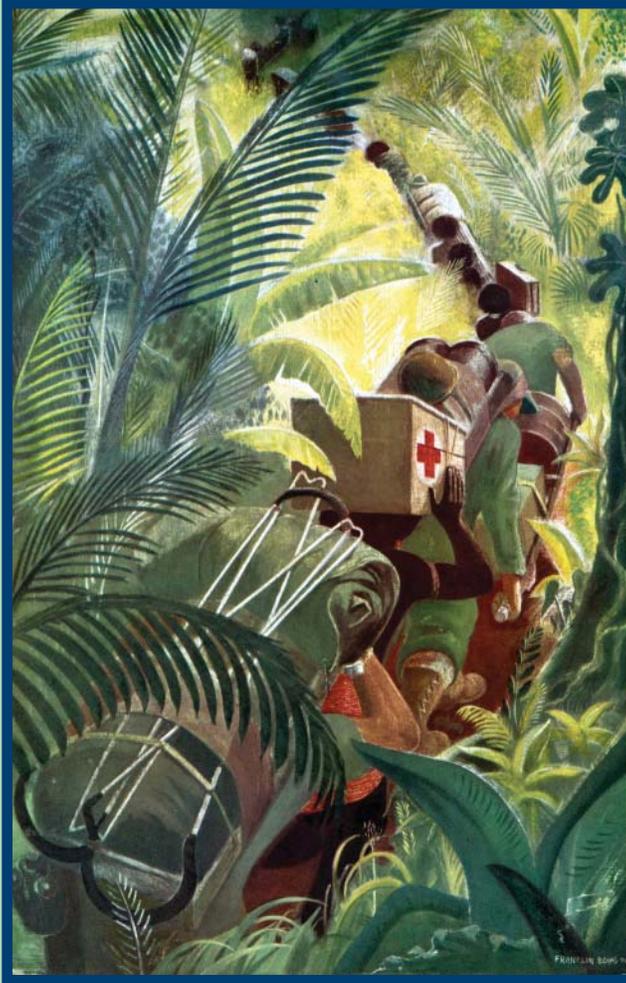


By Franklin Boggs



Jungle Trail. The members and porters of a medical unit transport the components of a portable surgical hospital over the Owen Stanley Range in Papua.

“Hhealth conditions were among the worst in the world. The incidence of malaria could only be reduced by the most rigid and irksome discipline and even then the dreaded disease took a heavy toll. Dengue fever was common while deadly blackwater fever, though not so prevalent, was no less an adversary. Bacillary and amoebic dysentery were both forbidding possibilities, and tropical ulcers, easily formed from the slightest scratch, were difficult to cure. Scrub typhus, ringworm, hookworm, and yaws all awaited the careless soldier. Millions of insects abounded everywhere. Clouds of mosquitoes, flies, leeches, chiggers, ants, fleas, and other parasites pestered man night and day. Disease was an unrelenting foe.

General Headquarters, U.S. Army Forces, Far East,
*Reports of General MacArthur*¹

The Fight against Malaria in the Papua and New Guinea Campaigns

By John T. Greenwood

Disease has been an unrelenting foe of military leaders since the beginning of recorded history. It was not until the Russo-Japanese War (1904–1905) that the Imperial Japanese Army became the first army in modern history to suffer fewer deaths from disease than it did in battle. By that time modern military medicine had finally gained an advantage over some of its deadliest foes, such as smallpox, typhoid, cholera, and dysentery. That is not to say that it had “defeated” those foes. History has also shown quite clearly that even with the weapons of modern medicine, we will never completely defeat these diseases and their endless permutations. Military medicine must always be prepared to defend the health of the fighting force against their ravages.

After the attack on Pearl Harbor and the loss of the Philippines, which had been the U.S. Army’s operational base in the Far East, continuing Japanese offensives in the southwest Pacific shifted the focus of Allied operations in that area to Australia in early 1942. The establishment in March 1942 of the Southwest Pacific Area as an Allied theater command under General Douglas A. MacArthur meant that one of the most primitive, remote, and disease-infested tropical areas in entire world would become the scene of major military operations. MacArthur, who assumed command of both the theater’s Allied and U.S. Army Forces, faced enormous challenges in building the foundations for a viable strategic theater of operations some 7,000 miles from his main supply base in the continental United States. While securing his base of operations in Australia, MacArthur had to establish a medical system that would protect the well-being of his forces in one of the world’s most unhealthy areas and keep them fit enough to conduct military operations. In addition, that medical system had to assure the swift delivery of quality

medical care for those soldiers who became wounded, injured, or sick. To accomplish these critical tasks, the U.S. Army Medical Department in the theater had to be built from the ground up. The period of roughly two years from the establishment of the American presence in Australia early in 1942 through the end of Operation CARTWHEEL in the Admiralty Islands in the Bismarck Archipelago in early 1944 was a very challenging time for the forces in the Southwest Pacific Area, especially for the Medical Department. With trained medical personnel, medical units, and Army hospitals just beginning to arrive in the theater; a threatened line of communications; and few established sources of much-needed medical supplies, the Medical Department faced challenges in early 1942 that appeared almost insurmountable.² Two years later, many of these challenges had been conquered through trial and error and sheer hard work, allowing the Army to provide a high level of medical support to the combat and service forces in Australia, Papua, and northern New Guinea. Other problems, some of them self-inflicted, remained to bedevil the leaders and forces of the Medical Department. As it is impossible for this essay to address the full range of the Army Medical Department’s experience and operations in the Southwest Pacific Area during these early years of the war, I will focus on just the critical area of preventive medicine and the impact of disease, specifically malaria, on the troops.

Preventive Medicine and Malaria

Among the many challenges that initially faced the Army Medical Department in the Southwest Pacific Area, disease may well have been the most difficult to combat effectively. Some of the diseases were familiar and common, such as syphilis and influenza, but others were more exotic tropical diseases that were often unfamiliar even to those Army tropical medicine specialists who had worked in Panama and the Philippines. Dysentery and diarrheas were the results of

This is a revised version of a paper delivered by the author at the U.S. Army–Japanese Ground Self-Defense Force Military History Exchange held in Tokyo in February 2001.



Construction nears completion on an extension to the 42d General Hospital in Brisbane, Australia, May 1943.

unhealthy water supplies, poor sanitation, and inadequate waste-disposal practices, but they could be controlled through better water treatment, field sanitation, and hygienic procedures. However, insect-borne tropical diseases, such as malaria, dengue fever, and scrub typhus (Tsumugamushi fever), were endemic and hyperendemic in the tropical areas of northern Australia, Papua, and North-East New Guinea. Of these diseases, a variety of malarias, all spread by mosquitoes, posed the greatest threat to the health of the military forces. In the 1930 edition of his *Military Preventive Medicine*, a classic text that was used by every Army Medical Department officer, Col. George C. Dunham listed malaria as “an important disease from a military standpoint because of the non-effectiveness produced by the disease and by the long course of treatment required to prevent relapse and effect a cure.” In its campaign against disease in the Southwest Pacific Area, the Army Medical Department drew heavily on its long tradition of preventive medicine, implementing a strategy aimed at doing everything possible to prevent or control the spread of disease among the troops and to maintain their health and fitness for military operations.³

The Army’s basic manual on tropical medicine during World War II stated directly that “Malaria is an acute and

chronic infection characterized by fever, anemia, splenomegaly [enlargement of the spleen] and often serious or fatal complications.” The cause is a protozoal parasite of the genus *Plasmodium* that is ingested by an anopheline mosquito with the blood of an infected person, breeds and matures within the mosquito, and is then spread to other persons when the mosquito feeds on them. The four types of malaria that affect man are *Plasmodium vivax*, *falciparum*, *malariae*, and *ovale*. Of these, the *P.falciparum* (malignant tertian malaria) is both the most virulent and

dangerous and also the most prevalent form in Papua and North-East New Guinea. *P.vivax* (benign tertian malaria) and *P.malariae* (quartan malaria) also were present, but to a lesser extent, and they are much less dangerous to man. Malaria in all of its forms was by far the most significant and widespread health problem in Papua and the rest of New Guinea owing to the heavily infected native population and the generally favorable breeding conditions for anopheline mosquitoes. Infected troops could be incapacitated for days or weeks and rendered thoroughly unfit for duty. Moreover, they become human reservoirs of the parasites and targets for attack by anopheline mosquitoes, which then spread the disease to uninfected persons.⁴

The Medical Department’s experience with tropical diseases in the Spanish-American War in 1898, combined with the huge amount of damage that malaria had inflicted on American forces on Bataan, should have alerted American military and medical leaders to the impending danger. Even if this specifically American experience were ignored, the knowledge that most of the planned operations in the Southwest Pacific Area would have to be conducted in highly malarious areas, combined with the information that



Brig. Gen. Percy Carroll, center, introduces Brig. Gen. William C. Chase, on crutches, to Under Secretary of War Robert Patterson, left, as he tours the 42d General Hospital, August 1943.

*Table 1. Malaria and All Other Infectious or Parasitic Disease Admissions
Southwest Pacific Area, September 1942–January 1943⁹*

<i>Month</i>	<i>Malaria</i>		<i>All Diseases</i>		<i>Malaria Percentage</i>
	<i>Total Cases</i>	<i>Rate/1000/Annum</i>	<i>Total Cases</i>	<i>Rate/1000/Annum</i>	
Sep 1942	63	7.6	859	104	7.3
Oct 1942	493	53	1,588	171	31
Nov 1942	807	93	1,866	214	43
Dec 1942	2,773	295	4,472	476	62
Jan 1943	3,517	382	5,287	574	66

Australian troops in Papua were suffering heavily from malaria, should have immediately made the disease a major concern. Malaria, however, only surfaced as a significant health threat and problem for American commanders after U.S. Army forces moved to bases in Papua in the summer of 1942 and launched major ground operations against the Japanese strongholds in and around Buna on the north shore of Papua.⁵

On 15 December 1942, Col. Percy J. Carroll, the chief surgeon of U.S. Army Services of Supply (USASOS), Southwest Pacific Area, in Australia, submitted to the surgeon general in Washington an extensive report on the medical services in the Southwest Pacific Area that warned of a significant malaria problem. In an attached report on sanitation and vital statistics, Lt. Col. James W. Bass not only clearly identified malaria as one of the most important public health problems throughout New Guinea but also warned that returning troops could possibly spread it to previously uninfected areas of Australia. Bass noted that malaria was already very prevalent among U.S. and Australian troops in New Guinea, reaching rates of 1,000 per 1,000 per annum for American forces at Milne Bay, Papua, and 4,000 per 1,000 per annum for Australian troops. In his next report on 1 January 1943, Carroll warned that “The high incidence of malaria, especially prevalent among the troops in New Guinea, has presented additional problems in malaria control. With the contemplated increase in the number of our forces occupying areas where malaria is very prevalent, it will be necessary to increase our malaria control measures.”⁶

Theater officers devoted little attention to developing an antimalaria program during 1942, however, because of their focus on more immediate operational requirements. As a result medical officers could not obtain the level of priority required for the shipment of antimalarial supplies into or even within the theater. Even when such supplies did reach Australia, they were often not moved forward to Papua. Shipment priorities simply reflected the continuing preoccupation of line commanders and theater planners with operational matters and their of lack of interest in the malaria threat. Effective control of malaria in base and combat areas required commanders to educate their troops and strictly enforce personal protection measures. In most areas, line commanders were not sufficiently concerned to do this. Moreover, the theater lacked clear, centralized theater medical leadership that could push an effective theater-wide preventive medicine and antimalaria program in cooperation with the Australians.⁷

MacArthur himself seems to have fully understood the threat posed by malaria. In September 1942 he told Lt. Col. George W. Rice, who had just become the surgeon in the G-4 Section at MacArthur’s small General

Headquarters (GHQ), that malaria had played such an important part in his defeat in the Philippines that he wanted to keep the disease under control in New Guinea.⁸ However, Colonel Rice did not translate his words into any significant theater-wide malaria program.

MacArthur assigned the task of taking Buna to the three regimental combat teams of the 32d Infantry Division in coordination with the Australians, and these forces launched operations in October 1942. The initiation of these operations produced almost immediately a huge jump in hospital admissions in the theater resulting from malaria, and these increases continued well into early 1943. (See Table 1.) Such sick rates meant that large numbers of men had to be hospitalized for longer periods of care than previously anticipated. The large patient load strained not only the Army’s limited medical services and facilities in the advanced areas but also the entire system of evacuation back to hospitals in the base sections in Australia. From October 1942 to April 1943, 30 percent of all hospital admissions in the Southwest Pacific Area were for malaria.¹⁰

Malaria rates for the American combat and service units assigned to the

Table 2. Malaria Rates in the Advanced Base, New Guinea¹¹

<i>Dates</i>	<i>Rate Per 1,000 Per Annum</i>
6 March–17 October 1942	95
12–26 December 1942	1,600
9–22 January 1943	1,374
6–20 February 1943	1,672
20 February–6 March 1943	1,560
6–20 March 1943	1,288



Main ward of the 18th Station Hospital at Iron Range, Australia, March 1943

Advanced Base in New Guinea were much higher than the overall Southwest Pacific Area rates. (See Table 2.) From mid-October to mid-December 1942, malaria rates for U.S. troops in Papua skyrocketed from an average of 95 per 1,000 per annum for the March–October period to 1,600 for the period 12–26 December. American troops at Base A at Milne Bay on the eastern end of the island, a highly malarious area, had a crippling malaria rate of 3,308 per 1,000 per annum in January 1943.¹² The overall malaria rate in New Guinea peaked at 1,672 per 1,000 per annum in mid-February 1943 and did not fall below 1,000 until April 1943.¹³ A closer look at the major ground combat units involved in the drive on Buna provides an even more revealing perspective on the ravages of malaria and other diseases. The 163d Infantry, an element of the 41st Infantry Division, which augmented the 32d Infantry Division late in the Buna fighting, reported in February 1943 suffering 2 men killed, 13 wounded, and 925 sick—661 with fevers of undetermined origin (FUO), mostly malaria of one sort or another, and 264 definitely diagnosed with malaria. From January through March 1943, the regiment evacuated 220 wounded in action and 1,945 for FUO and malaria. These sicknesses did not disable the soldier for just one or two days; the soldier with malaria in 1943 lost an average of 15–26 effective days per admission to a medical facility. It is

not hard to imagine the potentially devastating impact that such losses could have on a fighting unit, as 1,945 men represented 58 percent of the regiment's nominal strength of 3,333.¹⁴

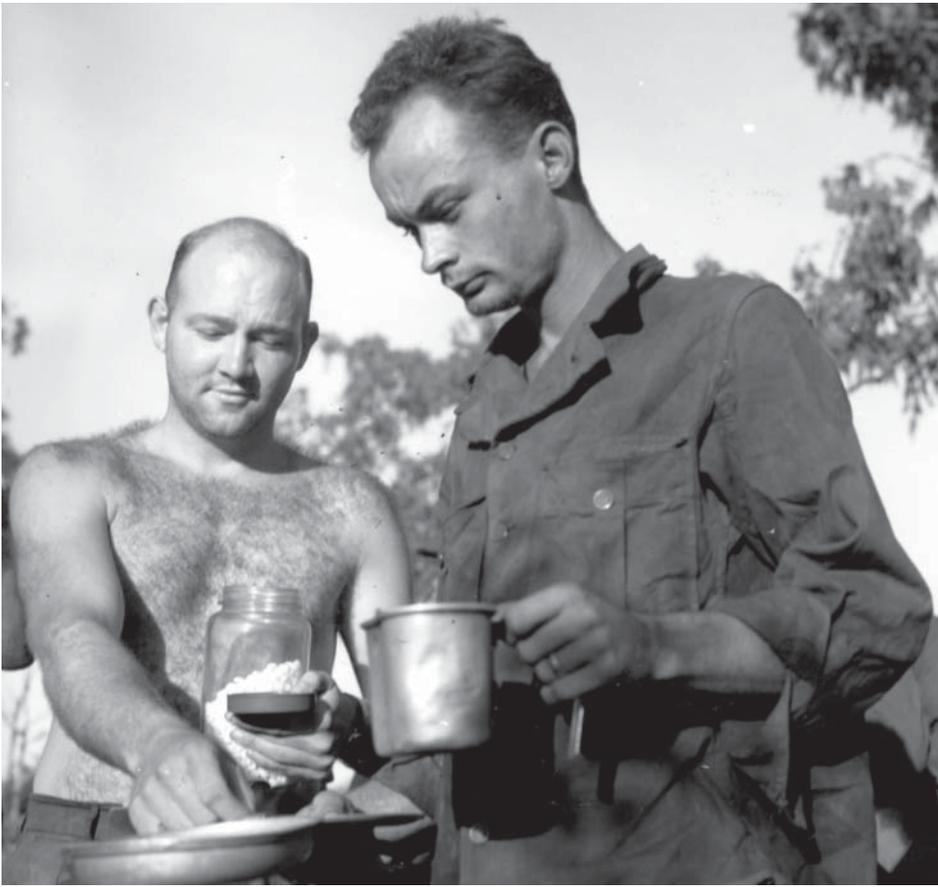
The Papua campaign ended in late January 1943 with the capture of the area around Sanananda, and the 32d Infantry Division, which had borne the brunt of the fighting, reported that it had suffered a total of 10,960 troops killed, wounded, injured, or sick during the period from 26 September 1942 to 28 February 1943. Of this total, 2,387 were classified as battle casualties (707 killed and 1,680 wounded), and 8,286 were listed as sick on account of disease. Of those sick from disease, 5,358 suffered from one of various forms of malaria or FUO, with 70–80 percent of the latter usually representing undiagnosed malarias. These figures corresponded to rates of 1,674 per 1,000

per annum for fevers and malaria and 2,589 per 1,000 per annum for all diseases. Fully 65 percent of all diseases were ascribed to malarias or FUO. In contrast, the division's average combat strength during the drive on Buna was 7,679.¹⁵

In his report on the 32d Infantry Division's medical service from January to June 1943, Lt. Col. Francis L. DePasquale, the division surgeon, commented extensively on the continuing effects of malaria on the division even after its return to Australia for rest and rehabilitation. Despite prophylactic and cure programs for malaria, the division's units began suffering enormously from new and recurrent attacks (relapses) of malaria originally acquired in New Guinea. Malaria cases remained so numerous among division troops that from late March to early May 1943 the division's 107th Medical Battalion had to operate its casualty clearing station at Camp Cable, Australia, to relieve pressure on the 155th Station Hospital that was supporting the division. The clearing station alone compiled combined average patient censuses of 200–600 daily in this period, mainly due to malaria and FUO. DePasquale lamented, "Malaria, its treatment and control, furnishes the greatest problem the Division Medical Service has ever had to face, and as of 30 June 1943 is still the greatest problem. There has been no want of help, no dearth of suggestions, no lack of complete cooperation, both from higher



Two thatched-roofed native structures and an Army tent house the 1st Portable Surgical Hospital near Oro Bay, Papua, February 1943.



Soldiers taking quinine tablets in Papua, December 1942

headquarters and by commanding officers within the division.”¹⁶ The 32d Infantry Division was basically noneffective on account of malaria for four to six months after its return from Papua, and 67 percent of its personnel showed clinical symptoms of malaria during the ten months after its withdrawal from New Guinea.¹⁷

Fortunately, the means to combat the malaria threat were actually already at hand. Col. (later Brig. Gen.) James S. Simmons, chief of the Preventive Medicine Division of the Office of the Surgeon General, had realized before the United States entered the war that American forces might be called upon to fight in areas where tropical diseases presented serious threats to the health of the force. Even before malaria and other tropical diseases began to account for growing sick rolls in the Caribbean, South America, Africa, the Middle East, and the China-Burma-India Theater, Simmons and the Preventive Medicine Division launched a massive effort to build a worldwide antimalaria

program. They emphasized training and deploying malaria survey and control units that could identify and plan the eradication of the mosquito populations that transmitted the disease. Simmons’s division oversaw the development of new residual insecticides, larvicides, and insect repellants, along with synthetic antimalaria drugs, protective clothing and shelters, spraying equipment, and other items. To these new weapons in the war on malaria, the division added a massive, worldwide troop education program aimed at informing soldiers about the dangers of malaria and how to protect themselves against the disease and the mosquitoes that carried it. In October 1942 the surgeon general offered theater army commanders the assistance of his malaria specialists, new malaria control and malaria survey units, and the antimalarial supplies and equipment. On 1 December 1942, Colonel Carroll in Sydney formally requested the immediate shipment of seven malariologists, three survey units, and twelve control units to the

Southwest Pacific Area to help combat the emerging malaria menace.¹⁸

With assistance on the way and the malaria caseload clearly on the rise in early 1943, initiating antimalarial measures assumed the utmost importance for the preventive medicine program in the Southwest Pacific Area. Sick rates due to malaria were threatening to incapacitate a large part of the fighting and service forces in Papua, and, as Colonel Bass had predicted, the soldiers returning to Australia were bringing the disease back with them. However, the theater’s malaria control program was not developing at a pace sufficient to meet the growing threat. One factor contributing to the weakness of the program was an ongoing struggle over who would control the theater medical program: Colonel Rice at GHQ, MacArthur’s small planning and operational headquarters, or Rice’s senior Colonel Carroll, who served first at USASOS, MacArthur’s service command, and then after February 1943 at U.S. Army Forces in the Far East. This struggle prevented the emergence of any strong medical leadership at the theater level and meant that antimalarial efforts were often implemented in piecemeal fashion, frustrated by uncooperative line officers, and hindered by inadequate command emphasis. Carroll nonetheless instituted a strong antimalaria training program for units headed into combat and on 5 February 1943 issued a detailed theater directive on preventive measures. His success, however, was mixed at best.¹⁹

Strong command emphasis and support down to the smallest units were always the critical elements in the antimalaria campaign and other preventive medicine and health programs. In many combat commands the needed emphasis and support was often lacking. Shortly after Lt. Gen. Walter E. Krueger moved part of his Sixth Army headquarters from Brisbane to Milne Bay to serve as Headquarters, Alamo Force, Col. William Hagins, the Sixth Army surgeon, began reporting to Carroll increasing noncompliance with

theater antimalaria directives. MacArthur then sent Carroll to New Guinea to speak with Krueger about his responsibility as the commander to implement these measures. Krueger was unenthusiastic about shouldering this burden until Carroll asked, "Now, do you want me to go back and tell General MacArthur that you told me that you didn't want to do it?" That got Krueger's attention. After an ensuing detailed discussion with Carroll and Hagins on noncompliance in Sixth Army units, Krueger turned to Carroll and said "Carroll, you tell General MacArthur that we'll take all steps possible and [conform] as much as possible to the instructions . . . to enforce the malaria orders." Krueger's final answer was then and remains today the correct one—the health of the force was ultimately the commander's responsibility—and he kept that promise to Carroll throughout the rest of the war.²⁰

Through the early months of 1943 it was sadly clear that the Southwest Pacific Area lacked a comprehensive, theater-wide preventive medicine program and organization that could attack and solve the threats presented by malaria and other tropical diseases. Major changes, expert assistance, and close cooperation with the Australians

were mandatory, but so too was strong and definite support from MacArthur and the GHQ. Buna and its aftermath finally brought MacArthur and GHQ to realize the danger that diseases such as malaria posed to the entire Allied campaign. In February 1943 Carroll's major initiatives were just beginning to produce results—the initial theater directive was issued; the first three malaria survey units arrived; and Col. Howard F. Smith, a malaria expert from the U.S. Public Health Service, was appointed theater malariologist. In March 1943 MacArthur set up the United States–Australian Combined Advisory Committee on Tropical Medicine, Hygiene, and Sanitation to establish overall policies for the Allied Forces and report directly to MacArthur's headquarters. As more information and resources became available for the antimalaria campaign, Carroll distributed to all Army commands in the Southwest Pacific Area the revised and more specific "Sanitary and Prevention Measures for the Control of Malaria" that U.S. Army Forces in the Far East issued on 18 April 1943. This directive encapsulated all of the individual and organizational malaria control policies and practices that became the standard operating

procedures for the Southwest Pacific Area's combat and service forces for the remainder of the war. Once MacArthur's attention was gained, he responded quickly, forcefully, and effectively, and the attack on malaria advanced steadily thereafter.²¹

In late April 1943, Carroll emphasized the problems and activities of the theater's antimalaria program in one of his periodic letters to the surgeon general of the Army. He reported that one of his most difficult problems was convincing the forces in the forward areas in New Guinea "that the main fight is against contracting malaria and not against the treatment." The antimalaria program was multifaceted, Carroll stressed, but the troops focused their concerns on the taking quinine or atabrine (quinacrine hydrochloride). Atabrine, a synthetic quinine substitute developed by the Germans in the early 1930s, was an effective malaria suppressant that slowed the progress of the infection and prevented the onset of the disease's clinical symptoms. However, it did not prevent malaria and debilitating symptoms would frequently arise, even after troops returned to nonmalarious areas, if the administration of atabrine was suspended. Moreover, atabrine caused a yellowing of the skin and,



Australian soldier directs local residents in spraying mosquito breeding ground in Papua, January 1943.



Anopheles Home Front. *A Sanitary Corps officer directs an attack on mosquito breeding grounds in New Guinea.*

particularly at high dosages, frequent gastrointestinal upsets during early administration and some instances of psychoses. Perhaps most important to the GIs, it was also widely rumored to cause impotency. While personal measures were always important, Carroll noted that they were of secondary importance compared to eliminating the mosquitoes that transmitted the disease and their breeding places. Carroll enclosed a copy of his newly issued theater directive and a six-page summary entitled "Malaria in the Southwest Pacific Area" that outlined the extensive malaria control program that was already partially underway. Carroll observed that "The Commanding General is greatly interested in our fight on malaria and has been convinced that malaria is just as great an enemy of our forces as are the Japanese troops themselves."²² During May and June 1943 Col. Paul F. Russell, chief of the Tropical Disease and Malaria

Control Branch of the Preventive Medicine Division at the Office of the Surgeon General and an Army expert on malaria, visited the Southwest Pacific Area and met with General MacArthur to discuss the malaria threat. After the meeting MacArthur said, "Doctor, this will be a long war if for every division I have facing the enemy I must count on a second division in hospital with malaria and a third division convalescing from this debilitating disease!" Russell concluded that "The general was not at all worried about defeating the Japanese, but he was greatly concerned about the failure up to that time to defeat the *Anopheles* mosquito."²³

Russell's visit served more than just to brief MacArthur. He came to review the entire antimalaria program in the Southwest Pacific Area to determine its effectiveness. He did not like what he saw. The Surgeon General's Office had designed the malaria control program to

function under a theater surgeon who would operate under the authority of the theater commander and oversee the medical needs of all of the Army's ground, air, and service forces within that theater. A unified Army medical structure of this sort that could impose a strict malaria control program simply did not then exist in the Southwest Pacific Area. Candidly criticizing the medical command structure, Russell noted that "the anopheles did not respect command channels and that it infected men within specific areas regardless of the command to which they were assigned." He recommended changes that were accepted and resulted in better coordination of the entire malaria control program. However, the continuing lack of an effective theater-wide Army medical command structure repeatedly frustrated these efforts.²⁴ From April to June 1943 Brig. Gen. Charles C. Hillman, the chief of professional services



By Francis Criss. Courtesy of the U.S. Army Medical Department Museum

The surgeon general, Maj. Gen. Norman T. Kirk, pen in hand, with his staff at the Washington office. The officers include, at far left, Brig. Gens. Charles C. Hillman and Hugh J. Morgan and, at far right, Brig. Gen. James S. Simmons, all standing.

at the Office of the Surgeon General in Washington, visited the South Pacific and Southwest Pacific theaters to examine their full range of medical activities. He focused particular attention on the problems presented by malaria. Before he left Australia, Hillman gave Carroll a copy of his preliminary observations in which he noted:

It appears that your headquarters is cognizant of the seriousness of the malaria situation. However, it is my opinion that most junior officers, and even some general officers and others in responsible positions, are not fully aware of the disastrous results that are invited by anything less than the maximum effort to control this disease, by far the greatest cause of ineffectiveness of the military forces in this area. . . . It should be realized that there is much greater danger of defeat of the American Forces in this theater by this disease alone than as a result of casualties inflicted by the [Japanese].²⁵

In his more detailed report submitted to the surgeon general in July, General

Hillman wrote "This disease has proved to be by far the greatest cause of noneffectiveness of military personnel in both theatres. Its importance as an adverse factor in the success of military operations in New Guinea, the Solomon Islands, and the islands to the north cannot be overemphasized." He noted that the 32d Infantry Division in late May was "still unfit for combat service and, without extensive replacements, will be for some time to come." He concluded: "In view of these experiences it becomes evident that no measure which will contribute to the solution of this serious menace to the success of military operations should be neglected." He emphasized that an aggressive educational program was needed among the junior officers and enlisted personnel so that they would recognize their personal responsibilities in fighting malaria. In addition, Hillman stressed that more malaria survey and control units, insecticides, repellants, and equipment were needed and that they were being requisitioned for the theater.²⁶

Despite the progress, malaria was still a virulent threat to the combat forces in New Guinea. In May 1943 Col. William J. Miede, surgeon of Maj. Gen. Robert Eichelberger's I Corps, reported that "Malaria is becoming the most serious problem in New Guinea in spite of the intensive prophylactic medical measures and suppressive medication."²⁷ Two months later

Miede reiterated his view that "Malaria continues to be of paramount importance in all operations to be accomplished in this theater. The strength of any unit, which is composed of personnel who have had recurrent attacks of malaria or fever of undetermined origin, will, without question, be severely reduced when the unit is called upon to function under adverse conditions of any sort."²⁸

Another high-level visitor from Washington, Brig. Gen. Hugh J. Morgan, chief of medical services at the Office of the Surgeon General, strongly echoed Miede on the threat that malaria posed to American forces in comments

*Table 3. Malaria Control Personnel, Southwest Pacific Area
(In Theater and En Route)*³¹

	<i>13 Feb 43</i>	<i>15 Jul 43</i>	<i>15 Feb 44</i>	<i>30 Sep 44</i>
Malariologists	7	13	NA	21
Malaria Survey Units	3	3	17	32
Malaria Control Units	12	12	27	66

he directed to Carroll following his visit to the theater in late July and early August 1943: "The greatest threat to successful military operations in this theater is malaria. The strength of units in the forward areas is affected adversely first by malaria. The Japanese are responsible for only 10 to 15% of the evacuation from the front. Malaria is responsible for over 50%. Thus, the enemy's influence upon our non effective rate is negligible as compared to the effect of malaria."²⁹

Morgan believed that greater effort had to be expended on antimalaria efforts in the forward areas where combat troops operated because that was where the highest infection rates were. "Here," Morgan said, "malaria will produce non-effectiveness 5 to 10 times as often as will the enemy's guns." He urged increased initial doses of atabrine, along with quinine, as the preferred prophylactic for malaria and a review of the previous requisitions for malaria control and malaria survey units to make sure that they were being sent to the theater.³⁰

With new units, drugs, equipment, priorities, and strong command support, American and Australian field and medical forces now focused their primary attention on the greatest threat—malaria. In February 1943 Medical Department malariologists, malaria control and malaria survey units, and smaller malaria control and survey detachments, all trained in the United States, began arriving in the theater to attack the malaria threat head on. (See Table 3.) These carefully trained teams effectively identified malaria problem areas, tracked infections and types of malaria, and began a widespread program of eradicating the mosquitoes' breeding grounds by oiling, filling, and draining standing water and by ground and aerial spraying of insecticides, including DDT

(dichlorodiphenyltrichloroethane). So effective were the malaria control and malaria survey units that by the end of 1943 each division had been permanently assigned one of each of these units. All operational task forces also had one or more units of each type attached as part of the basic force so that antimalarial measures could be initiated as soon as the force landed on a hostile shore. In addition, new policies on personal protection were promulgated to prevent transmission of the disease, including the mandatory wearing of clothing with minimal skin exposure (long-sleeve sheets and long pants), the use of mosquito bars and netting while sleeping, the screening of all buildings, the plentiful application of mosquito repellants, and the use of aerosol insecticides in quarters and buildings. Above all else, these active measures were combined with an increasingly stringent prophylactic policy that involved administering increased dosages of atabrine, which soldiers in all units that were located in the malarial areas of New Guinea now took daily in strictly enforced quantities.³²

As the antimalaria measures became increasingly effective during 1943, the malaria rate per 1,000 per annum in the Southwest Pacific Area dropped from 382 in January to 105 in December 1943. That rate would continue to decline rather steadily until it reached a low of 29 in November 1944.³³ The immediate aftermath of the Papua campaign marked the low point in the Medical Department's war against malaria. The programs and measures introduced as a result of this malaria crisis of early 1943 eventually proved successful against this tenacious foe.

When he left the Southwest Pacific Area in December 1943 for reassignment to the United States, then-Brigadier General Carroll sent a

lengthy memorandum to the commander of the Services of Supply about the medical situation in the theater. In it he made several observations and recommendations. As to malaria, he reemphasized some of the key points that had highlighted his antimalaria campaign:

Malaria is the most potent enemy we have so far had to contend with in the SWPA [Southwest Pacific Area]. It causes far more losses and non-effectives than all other causes combined. Not only does it cause the actual loss of personnel for prolonged periods of time, but it also causes a great loss of efficiency of troops remaining with their organizations. . . . I firmly believe that *malaria can be reduced to the point where it would almost cease to be a menace in any way. How?* By strict enforcement of all malaria control measures as propagated by our Chief Malariologist. . . . I am leaving the SWPA, but naturally will be greatly interested in the work here. I cannot possibly ask for anything now with the hope of personal gain. Therefore, I ask that the malaria control problem be given more consideration by all commanders from the top down.³⁴

The Outcome

Writing about malaria in the Southwest Pacific Area in the Army Medical Department's preventive medicine volume on malaria in World War II, Dr. Thomas Hart and retired Col. William Hardenbergh concluded:

As a result of the control program in the Southwest Pacific, military operations after the middle of 1943 were not seriously handicapped by malaria. The campaign in this area was the first one in which so many U.S. Army troops had fought under such highly malarious conditions. The lack of experience in controlling malaria under combat conditions, the absence of any organization suitable for control, and the mental unreadiness of both combat and medical officers represented very serious problems which had to be, and were, overcome.³⁵

Colonel Russell, the leading Army malariologist who had paid an

important visit to the theater in mid-1943, observed that experience in the Southwest Pacific and other areas taught

that it is impossible to control malaria effectively in military forces in highly malarious areas unless commanding officers from highest to lowest echelons are malaria conscious. Training and education of both medical and line officers in regard to malaria and its control are essential. Malaria control in the army is a military problem. A malaria policy must not only be formulated; it must be enforced. Malaria discipline is absolutely necessary to an army's success in fighting the *Plasmodium*-mosquito axis.³⁶

Once these critical obstacles were overcome, special malaria control organizations and the supplies and personnel they required had to be given the proper priorities, mobilized, and deployed to fight the war against malaria. "The military experience," Russell continued, "taught once again that the prevention of malaria is neither automatic nor simple but is compounded of law and persuasion, organization and training, supplies and technical application. Once the fundamental lessons were learned, the military malaria problem was solved."³⁷

The importance of winning the fight against malaria and other tropical diseases is made evident by the figures in Tables 4–6. Although only 771 American soldiers in the Southwest Pacific Area died from all infectious and parasitic diseases from 1942 through 1945 (126 of them from malaria),³⁸ even a cursory review of these figures indicates the potential that these debilitating diseases had for incapacitating large numbers of troops for long periods of time.

The Army Medical Department's struggle against malaria in the Southwest Pacific Area from 1942 to 1944 confronted numerous obstacles, natural as well as man-made. After a slow and shaky start, the Medical Department successfully waged and won the arduous battle to protect the health of the troops so that military

Disease	1942	1943	1944
Malaria	4,432	39,797	25,980
Dengue	4,224	6,436	27,670
Scrub typhus	26	677	3,340
Dysentery	959	2,802	5,330
Total All Diseases	16,085	57,617	81,770
Malaria Rate/1000/Annum	62.2	209.5	48.2
Malaria as Percentage of Total	27.6	69.1	31.8

Disease	1942–45	1942	1943	1944
Malaria	19	26	25	14
Dysentery, amebic	45	66	44	65
Dengue	8	7	8	8
Scrub typhus	93	69	43	99

Disease	1942	1943	1944
Malaria	115,232	994,925	363,720
Dengue	29,568	51,488	221,360
Scrub typhus	1,794	29,111	330,660

operations could be prosecuted. Throughout the war in the Southwest Pacific Area, disease indeed remained an unrelenting foe. Success against these microscopic enemies and their insect allies was difficult to achieve, even on a temporary basis, and could be maintained only through constant vigilance. The unrelenting nature of the attack of the anopheles mosquito and the *plasmodium* parasite required the Army Medical Department to plan and wage an equally unrelenting campaign against them.

In analyzing the military contest in New Guinea, the *Reports of General MacArthur* place the importance of the Medical Department's achievement in the fight against malaria in its proper context:

One of the important victories won by General MacArthur's forces was their triumph over the anopheles

mosquito. It was a battle involving science and discipline, waged by the troops, both officers and men, under the guidance of the Medical Corps. During the first stages of the New Guinea fighting, malaria had been as bitter and deadly a foe as the enemy. On the Papuan front, it had been responsible for more non-effectives than any other single factor. By the time General MacArthur was ready to go into the Philippines, however, it was reduced to secondary importance as a cause of disablement and no longer deserved serious consideration in planning tactical operations.⁴¹

The Author

Dr. John T. Greenwood has been chief of the Office of Medical History in the Office of The Surgeon General, U.S. Army, since 1998. He earlier served as chief of the Office of History, U.S. Army Corps of Engineers, and chief of the Field Programs and Historical Services Division at the Center of Military History.

NOTES

1. General Headquarters, U.S. Army Forces, Far East, *Reports of General MacArthur*, 2 vols. (Washington, D.C., 1966), 1: 42–43.

2. The 153d Station Hospital, which arrived in Brisbane on 9 March 1942 and admitted its first patient ten days later, was apparently the first U.S. Army hospital to operate in Australia. See Mary Ellen Condon-Rall and Albert E. Cowdrey, *The Medical Department: Medical Service in the War against Japan*, United States Army in World War II (Washington, D.C., 1998), pp. 68–69.

3. Thomas A. Hart and William H. Hardenbergh, “The Southwest Pacific Area,” in Ebbe Curtis Hoff, ed., *Preventive Medicine in World War II*, Medical Department, United States Army, 8 vols. (Washington, D.C., 1955–76), 6: 513–26; Thomas T. Mackie, George W. Hunter III, and C. Brooke Worth, *A Manual of Tropical Medicine* (Philadelphia, 1945), pp. 213–31; Fred H. Mowrey, “Statistics of Malaria,” in W. Paul Havens, Jr., ed., *Internal Medicine in World War II*, Medical Department, United States Army, 3 vols. (Washington, D.C., 1961–68), 2: 449–63; Michael Worboys, “Tropical Diseases,” in W. F. Bynum and Roy Porter, eds., *Companion Encyclopedia of the History of Medicine*, 2 vols. (London, 1993), 1: 512–32; Allan S. Walker, *Clinical Problems of War, Australia in the War of 1939–1945* (Canberra, 1952), pp. 75–79; Stanhope Bayne-Jones, *The Evolution of Preventive Medicine in the United States Army, 1607–1939* (Washington, D.C., 1968), pp. 174–75; George C. Dunham, *Military Preventive Medicine* (Carlisle Barracks, Pa., 1930), pp. 783–84.

4. Mackie, Hunter, and Worth, *A Manual of Tropical Medicine*, pp. 213–15; James S. Simmons et al., *Global Epidemiology: A Geography of Disease and Sanitation*, 3 vols. (Philadelphia, 1944–54), 1: 402; Walker, *Clinical Problems of War*, pp. 81–83.

5. James O. Gillespie, “Malaria and the Defense of Bataan,” and Hart and Hardenbergh, “The Southwest Pacific Area,” in Hoff, *Preventive Medicine*, 6: 497–511, 513–26, respectively; Walker, *Clinical Problems of War*, pp. 77–95; Bayne-Jones, *Evolution of Preventive Medicine*, pp. 123–46, 174–75.

6. James W. Bass, “Sanitation and Vital Statistics,” pp. 4–5, in Rpt, Col Percy J. Carroll, CSurg, USASOS, SWPA, to Office of the Surgeon General (OTSG), “Medical Service in Australia,” 15 Dec 1942; and Rpt, Carroll to OTSG, “Medical Service in Australia,” 1 Jan 1943, with the quotation on p. 1, both in Folder 4, “Annual Rpts, U.S. Army Services of Supply, SWPA, 1942–43,” Box 12, The Medical Department: The Medical Service in the War Against Japan, U.S. Army Center of Military History (CMH) Refiles, Accession NN3-319-00-038, Record Group 319, National Archives (hereafter CMH Refiles, RG 319, NA).

7. Blanche B. Armfield et al., *Organization and Administration in World War II*, Medical Department, United States Army (Washington, D.C., 1963), pp. 442–43; Condon-Rall and Cowdrey, *Medical Service*, pp. 44–47, 56, 59; Paul

F. Russell, “Introduction,” in Hoff, *Preventive Medicine*, 6: 6; Interv with Lt Col G. L. Orth, 12 Jun 47, in “Interview—LTC Orth, 12 Jun 1947, Medical Activities SWPA,” Folder 21, Box 4, CMH Refiles, RG 319, NA.

8. Armfield, *Organization and Administration*, p. 443.

9. Frank A. Reister, ed., *Medical Statistics in World War II*, Medical Department, United States Army (Washington, D.C., 1975), pp. 768–69, 790, 878–79, 900.

10. Rpts, Carroll to OTSG, “Medical Service in Australia,” 15 Jan 1943, 1 Feb 1943, in Folder 4, Box 12, CMH Refiles, RG 319, NA; Rpt, OTSG, “Monthly Progress Report, Section 7: Health, Data as of 30 June 1943,” Office of Medical History files, Falls Church, Va.; Condon-Rall and Cowdrey, *Medical Service*, pp. 68–77, 137–47.

11. Rpts, Carroll to OTSG, “Medical Service in Australia,” 15 Dec 1942 and 1 Feb 1943; Rpts, Col F. H. Petters, Surg, USASOS, SWPA, “Medical Service in Australia,” 1 Mar and 1 May 1943, in Folder 4, Box 12, CMH Refiles, RG 319, NA.

12. Bass, “Sanitation and Vital Statistics”; Hart and Hardenbergh, “The Southwest Pacific Area,” 6: 578.

13. Rpt, Lt Col Delbert E. Stanard, Surg, 41st Inf Div, “Medical History of the 41st Infantry Division from 1 January 1943 to 31 March 1943,” n.d.; and “Monthly Activity Report (March 1943),” 9 Apr 1943, with encl, “Laboratory Report: Diagnosis of Patients of the 163rd Infantry Combat Team for month of February 1943,” n.d., in Folder 58, “Surgeon, 41st Inf. Div. Jan–Dec 1943,” Box 9, CMH Refiles, RG 319, NA.

14. Rpt, Carroll to OTSG, “Medical Service in Australia,” 15 Apr 1943, p. 2, in Folder 4, Box 12, CMH Refiles, RG 319, NA; Mowrey, “Statistics of Malaria,” 2: 459–60.

15. Rpt, Lt Col Simon Warmenhoven, Surg, 32d Inf Div, Table No. 1, “Total Casualties—32d Division—Buna Campaign 26 September 1942–28 February 1943,” n.d., p. 10, in “Warmenhoven, Papua Campaign, 1942–43,” Folder 14, Box 2, CMH Refiles, RG 319, NA; Rpt, “Total Casualties—32d Division—Buna Campaign, 26 September 1942–28 February 1943,” n.d., in Folder 53, “Annual Activity Reports, 32d Infantry Division, 1943–44,” Box 9, CMH Refiles, RG 319, NA.

16. Rpt, Lt Col Francis L. DePasquale, Surg., 32d Inf Div, “Medical History 32d Infantry Division, 1 January–30 June 1943,” n.d., with the quoted words on p. 7, in Folder 53, Box 9, CMH Refiles, RG 319, NA.

17. Hart and Hardenbergh, “The Southwest Pacific Area,” 6: 568.

18. Oliver R. McCoy, “War Department Provisions for Malaria Control,” in Hoff, *Preventive Medicine*, 6: 11–59; William A. Hardenbergh, “Control of Insects,” in Hoff, *Preventive Medicine*, 2: 179–232, especially pp. 205–18; Harry Most, “Clinical Trials of Antimalarial Drugs,” in Havens, *Internal Medicine*, 2: 525–98. For the development of antimalarial drugs, see E. C. Andrus et al., eds., *Advances in Military Medicine*, 2 vols. (Boston, 1948), 2: 665–716.

19. Condon-Rall and Cowdrey, *Medical Service*, pp. 48–54, 137–41; Armfield, *Organization and Administration*, pp. 442–47; Hart and Hardenbergh, “The Southwest Pacific Area,” 6: 536–51.

20. Condon-Rall and Cowdrey, *Medical Service*, pp. 137–39; U.S. Army Forces in the Far East (USAFFE), “Directive on Malaria Control,” in Hoff, *Preventive Medicine*, 6: 585–87; Interv, Mary Ellen Condon with Brig Gen Percy J. Carroll, U.S. Army, Retired, 26 Sep 1980, p. 45, containing the quotation, in folder 8, box 4, CMH Refiles, RG 319, NA; Walter Krueger, *From Down Under to Nippon: The Story of Sixth Army in World War II* (Washington, D.C., 1953), pp. 6–7, 24–25, 40, 134–35. The interview transcript used the word *inform*, where conform was evidently intended. Carroll recalled that General Krueger addressed him as General Carroll, but the medical officer had not become a brigadier general until 23 June 1943.

21. Hart and Hardenbergh, “The Southwest Pacific Area,” 6: 537–41; Armfield, *Organization and Administration*, pp. 443–45; Condon-Rall and Cowdrey, *Medical Service*, pp. 59–60; D. Clayton James, *The Years of MacArthur*, 3 vols. (Boston, 1970–85), 2: 475–76; USAFFE, “Directive on Malaria Control.”

22. Rpt, Carroll to the Surgeon General, “Medical Department Activities, S.W.P.A.,” 27 Apr 1943, with the quoted words on p. 1, in Folder 4, Box 12, CMH Refiles, RG 319, NA; Benjamin M. Baker, “The Suppression of Malaria,” in Havens, *Internal Medicine*, 2: 465–77; McCoy, “Provisions for Malaria Control,” 6: 30–32; Most, “Clinical Trials,” 2: 538–40; Condon-Rall and Cowdrey, *Medical Service*, p. 123.

23. Russell, “Introduction,” 6: 2, containing the quotations; Robert J. T. Joy, “Malaria in American Troops in the South and Southwest Pacific in World War II,” *Medical History* 43 (1999): 200.

24. Armfield, *Organization and Administration*, pp. 446–49, quote, p. 446; Memo, Col William L. Wilson, C Hospitalization and Evacuation Br, Plans Div, Army Service Forces, for the Surgeon General, 20 Oct 1943, encl to Brig Gen Raymond W. Bliss, C Operations Service, OTSG, to BG Charles C. Hillman, C of Professional Services, OTSG; BG James S. Simmons, C Preventive Medicine Div, OTSG; et al., 25 Oct 1943, in Folder 25, “Visit of Col. Wilson, et al., to SWPA, 20 Oct 1943,” Box 2, CMH Refiles, RG 319, NA.

25. Memo, Hillman for Deputy Chief of Staff, USAFFE, “Observations and Recommendations, Medical Service, in U.S.A.F.F.E.,” 23 May 1943, p. 4, Folder 18, “Report of Observations of Medical Services in SWPA & SPA—1943–Hillman,” Box 2, CMH Refiles, RG 319, NA.

26. Rpt, Hillman to Surgeon General, “Report of Observations of Medical Service in Southwest Pacific and South Pacific Areas,” 12 Jul 1943, with the quotations on p. 2, Folder 18, Box 2, CMH Refiles, RG 319, NA.

27. Rpt, Col William J. Mische, Surgeon, I Corps, “Medical History [1942], I Corps, U.S.

Army,” submitted 14 May 1943, p. 23, Folder 2, “Annual Rpt, I Corps, 1942,” Box 10, CMH Refiles, RG 319, NA.

28. Rpt, Mische, “Quarterly Reports of Medical Activities of Headquarters I Corps, U.S. Army for the period 1 April 1943 to 30 June 1943,” 16 Jul 1943, p. 5, in Folder 1, “Quarterly Reports, HQ, I Corps, 1 Jan 1943–31 Dec 1943,” Box 10, CMH Refiles, RG 319, NA.

29. Ltr, Brig Gen Hugh J. Morgan, C of Medical Services, OTSG, to Brig Gen Percy J. Carroll, CSurg, USAFFE, 12 Aug 1943, and encl Rpt, “Comments and Recommendations, Medical Department, USAFFE,” n.d., with the quotation on p. 4, in Folder 23, “Comments and Recommendations – Med. Dept. by Hugh J. Morgan,” Box 2, CMH Refiles, RG 319, NA.

30. Rpt, “Comments and Recommendations, Medical Department, USAFFE,” pp. 4, 5.

31. McCoy, “Provisions for Malaria Control,” 6: 17, 19, 20. The 30 September 1944 figures include 10 malariologists, 9 survey units, and 13 control units that were transferred from the South Pacific to the Southwest Pacific Area when their boundaries were adjusted on 1 July 1944.

32. Condon-Rall and Cowdrey, *Medical Service*, pp. 59–60; Hart and Hardenbergh, “The Southwest Pacific Area,” 6: 536–83; N. Hamilton Fairley, “Tropical Diseases with Special Reference to Malaria in the Eastern Theatres of War,” in Henry Letheby Tidy and J. M. Browne Kutschbach, eds., *Inter-Allied Conferences on War Medicine, 1942–1945, Convened by the Royal Society of Medicine* (London, 1947), pp. 94–97;

Baker, “The Suppression of Malaria”; Hardenbergh, “Control of Insects,” 2: 179–232.

33. Reister, *Medical Statistics*, pp. 900–01, 924–25.

34. Memo, Carroll to CG, USASOS, “Medical Service in the Southwest Pacific Area,” 8 Dec 1943, in Folder 21, “Carroll Departure,” Box 3, CMH Refiles, RG 319, NA.

35. Hart and Hardenbergh, “The Southwest Pacific Area,” 6: 578.

36. Russell, “Introduction,” 6: 5–6.

37. *Ibid.*, pp. 6–7, quote, p. 7.

38. Reister, *Medical Statistics*, p. 966.

39. *Ibid.*, pp. 768, 790, 812, 878, 900, 924.

40. *Ibid.*, pp. 554–55.

41. General Headquarters, U.S. Army Forces, Far East, *Reports of General MacArthur*, 1: 161.