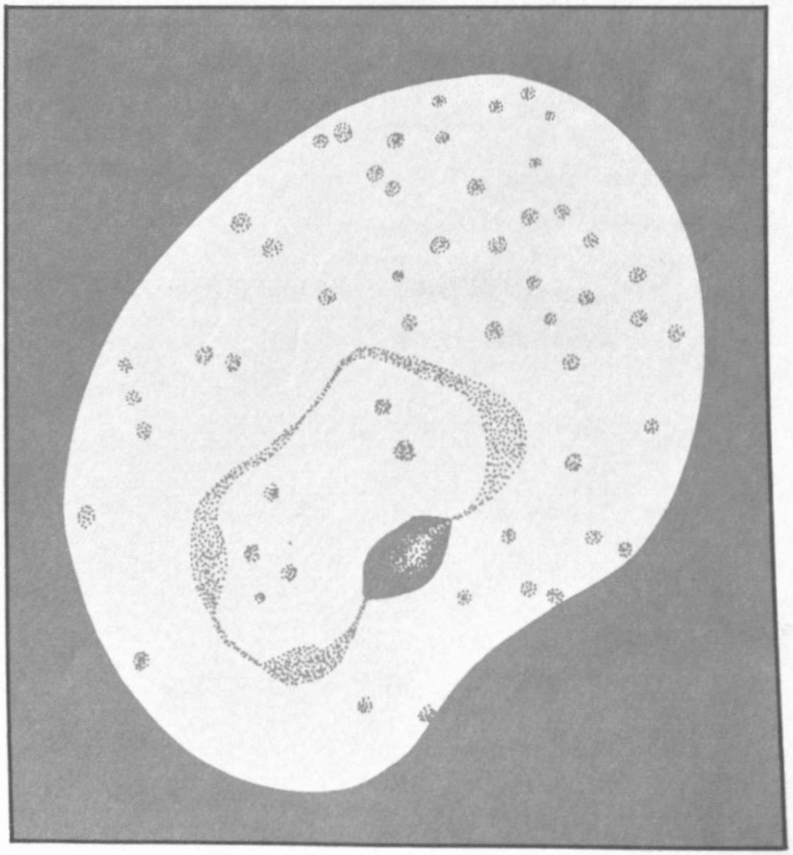
ANNUAL SUMMARY 1978
Issued August 1979

CENTER FOR DISEASE CONTROL

MALARIA

SURVEILLANCE



U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE • Public Health Service

PREFACE

This report summarizes information received from state health departments, medical departments of the Armed Forces, and other pertinent sources. It is intended primarily for the use of those with responsibility for disease control activities. Anyone desiring to quote this report should contact the original investigator for confirmation and interpretation.

Contributions to the Surveillance Report are most welcome. Please address them to:

Center for Disease Control
Attn: Malaria Surveillance
Parasitic Diseases Division
Bureau of Epidemiology
Atlanta, Georgia 30333

SUGGESTED CITATION

Center for Disease Control: Malaria Surveillance Annual Summary 1978
Issued August 1979

I. SUMMARY

In 1978, 616 cases of malaria were reported in the United States, a 28.3% increase compared with the 481 cases reported in 1977. Only 31 cases (5.1% of all cases reported in the United States) were in military personnel in 1978. As in previous years, imported Plasmodium vivax infections were more common than P. falciparum (64.1% versus 19.4%).

In 3 cases infection was induced by transfusion, in 2 cases infection was transmitted congenitally, and in 1 infection was induced by kidney transplantation. No introduced malaria was reported. Six deaths attributed to malaria were reported in 1978, compared with 3 in 1977. Four of the deaths occurred in civilians who had traveled to Africa, 1 in a seaman who was infected in Brazil, and 1 in a civilian who received a transfusion in Mexico. All were due to P. falciparum except the last case which was due to P. malariae. The P. falciparum malaria case-fatality ratio of 4% was higher than the ratio of 1.6% for the 10-years 1966-1975.

II. TERMINOLOGY

The terminology used in this report is derived from the recommendations of the World Health Organization (1,2). The definitions of the following terms are included for reference purposes.

A. Autochthonous

1. Indigenous - malaria acquired by mosquito transmission in an area where malaria is a regular occurrence.
2. Introduced - malaria acquired by mosquito transmission from an imported case in an area where malaria is not a regular occurrence.

B. Imported

Malaria acquired outside of a specific area (the United States, Puerto Rico, and Guam in this report).

C. Induced

Malaria acquired through artificial means, i.e., blood transfusion, common syringes, or malariotherapy.

D. Relapsing

Renewal of clinical activity occurring after an interval from the primary attack greater than that due merely to periodicity.

E. Cryptic

An isolated case of malaria not associated with secondary cases as determined through appropriate epidemiologic investigation.

III. GENERAL SURVEILLANCE

In 1978 (1978 case reports received January 1, 1978 through April 15, 1979), 616 cases* of malaria, with onset in 1978 in the United States and territories, were reported to the Parasitic Diseases Division, Center for Disease Control; this represents a 28.3% increase over the number seen in 1977 when 481 cases were reported. As in 1977 most of the reported cases were in civilians, which comprised 95% of all cases diagnosed in this country (Fig. 1). The number of cases that occurred in military personnel in 1978 (31) was higher than the number seen in 1977 when 11 cases were reported. The number of military cases, however, remained far below the levels seen during the Vietnam War years (Table 1).

In 6 of the 585 civilian cases and in none of the military cases, patients acquired their infection in the United States. Three were transfusion-induced cases: 1 each of P. falciparum, P. vivax, and P. malariae. Two congenital cases occurred: 1 P. falciparum and 1 P. vivax. In 1 case infection followed a kidney transplant. (See Section VI for case reports). No introduced cases occurred.

Fig. 1 CASES OF MALARIA IN U.S. CIVILIANS AND FOREIGNERS, UNITED STATES, 1970-1978

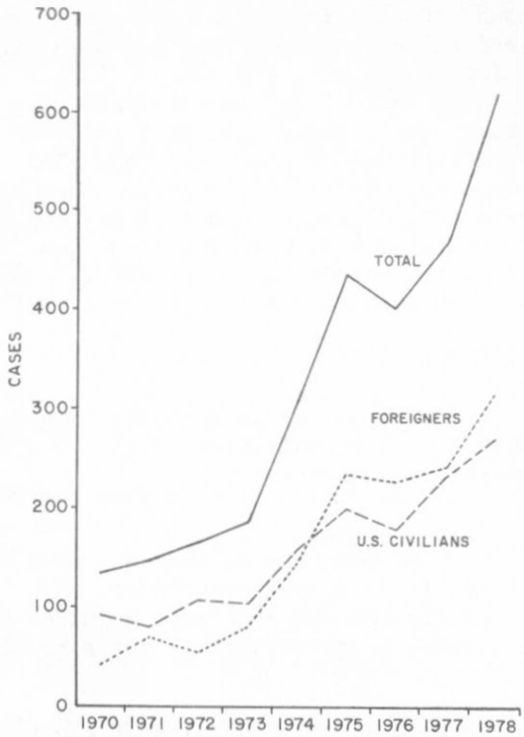


Table 1 Primary Military and Civilian Cases, United States, 1966-1979*

Year	Military	U.S. Civilian	Foreign Civilian	Unknown	Total
1966**	621	89	32	22	764
1967**	2699	92	51	15	2857
1968**	2567	82	49	0	2698
1969**	3914	90	47	11	4062
1970**	4096	90	44	17	4230
1971**	2975	79	69	57	3180
1972**	454	106	54	0	614
1973**	41	103	78	0	222
1974**	21	158	144	0	323
1975**	17	199	232	0	448
1976**	5	178	227	5	415
1977**	11	233	237	0	481
1978	31	270	315	0	616

*Onset of illness in the United States and Puerto Rico.
**Figures for these years have been updated to include cases reported after the publication of previous annual summaries

*A "case" is defined as an individual's first attack of malaria in the United States, regardless of whether or not he had experienced previous attacks of malaria while outside the country. A subsequent attack in the same person caused by a different Plasmodium species is counted as an additional case. Repeat attacks in this country caused by the same species are considered relapses, not additional cases. All cases included in this report were diagnosed as malaria on the basis of a positive peripheral blood smear examined in the local or state health department laboratory. Doubtful cases were referred to the National Malaria Repository, CDC.

The proportions of cases caused by each Plasmodium species generally showed little change in 1978 from 1977 (Table 2).

The countries in which the 616 patients contracted malaria are shown in Table 3. Asia accounted for 52.1% of cases, Africa for 28.9%, Central America and The Caribbean for 12.0%, South America for 2.2%, Oceania for 1.8%, and North America for 3.0%. The number of malaria cases reported from Asia in 1978 is a 22.9% increase over the number of cases reported in 1977. This increase reflected a marked increase in the number of cases from India (241 cases in 1978 compared with 188 cases in 1977). As in 1977 the largest number of cases from any single country was reported from India, comprising 39.4% of all reported cases in 1978.

Table 2 Malaria Cases by Plasmodium Species, United States, 1978

Species	Total	Percent
P. vivax	395	64.1
P. falciparum	120	19.4
P. malariae	43	7.0
P. ovale	14	2.3
Mixed Infections	3	0.5
Undetermined	41	6.7
Total	616	100.0

Of the imported cases a large number of patients acquired their infections in Nigeria (47), the Philippines (24), Kenya (17), El Salvador (16), Ghana (15), and Honduras (15).

Figure 2 shows the geographic distribution of the 1978 malaria cases by the state in which the patient first developed clinical symptoms of the disease.

Fig. 2 GEOGRAPHIC DISTRIBUTION OF MALARIA CASES WITH ONSET IN UNITED STATES, 1978

TABLE 3 MALARIA CASES BY DISTRIBUTION OF *PLASMODIUM* SPECIES AND AREA OF ACQUISITION, UNITED STATES, 1978*

Area	*vivax*	*falciparum*	*malariae*	*ovale*	mixed	unknown	total
AFRICA	**37**	**89**	**16**	**13**	**1**	**20**	**176**
Africa, South**	1	1	1	0	0	0	3
Africa, West & Central**	6	12	0	3	0	1	22
Africa, Unspecified**	6	7	1	2	0	0	16
Angola	1	1	0	0	0	0	2
Cameroon	0	2	1	1	0	0	4
Central African Empire	0	0	0	1	0	0	1
Congo	2	7	2	0	0	1	12
Egypt	0	1	0	0	0	0	1
Ethiopia	0	1	0	0	0	0	1
Gabon	0	0	1	0	0	0	1
Ghana	1	11	1	0	0	2	15
Guinea	0	1	0	0	0	0	1
Ivory Coast	1	2	0	0	0	0	3
Kenya	5	8	3	1	0	0	17
Liberia	2	3	2	2	0	1	10
Libya	0	1	0	0	0	0	1
Mali	0	0	0	0	0	1	1
Niger	0	0	0	0	0	1	1
Nigeria	8	24	4	3	0	8	47
Senegal	0	1	0	0	0	1	2
Sierra Leone	1	1	0	0	0	1	3
Sudan	2	1	0	0	0	0	3
Tanzania	0	2	0	0	1	1	4
Togo	0	2	0	0	0	1	3
Uganda	1	0	0	0	0	0	1
Upper Volta	0	0	0	0	0	1	1
ASIA	**272**	**10**	**20**	**1**	**0**	**14**	**317**
Asia, Southeast**	7	0	3	0	0	0	10
Asia, Unspecified**	2	0	1	0	0	0	3
India	209	7	14	1	0	10	241
Indonesia	5	0	0	0	0	1	6
Iran	1	0	0	0	0	0	1
Laos	2	0	0	0	0	0	3
Middle East	1	0	0	0	0	0	1
Oman	1	0	0	0	0	0	1
Pakistan	10	0	1	0	0	0	11
Philippines	22	1	0	0	0	1	24
Qatar	1	0	0	0	0	0	1
Saudia Arabia	1	0	0	0	0	2	3
Thailand	3	2	0	0	0	0	5
Turkey	5	0	0	0	0	0	5
Vietnam	2	0	0	0	0	0	2
CENTRAL AMERICA AND CARIBBEAN	**52**	**13**	**2**	**0**	**1**	**5**	**73**
Central America**	5	0	0	0	0	0	5
Belize	7	0	0	0	0	1	8
Costa Rica	1	0	0	0	0	0	1
El Salvador	12	0	2	0	1	1	16
Guatemala	4	4	0	0	0	1	9
Haiti	2	7	0	0	0	1	10
Honduras	12	2	0	0	0	1	15
Nicaragua	8	0	0	0	0	0	8
Panama	1	0	0	0	0	0	1
NORTH AMERICA	**14**	**5**	**3**	**0**	**0**	**0**	**22**
Mexico	12	1	2	0	0	0	15
United States	2	3	1	0	0	0	6
Canada	0	1	0	0	0	0	1
SOUTH AMERICA	**10**	**3**	**1**	**0**	**0**	**0**	**14**
South America**	4	0	0	0	0	0	4
Brazil	0	2	0	0	0	0	2
Colombia	2	0	0	0	0	0	2
Ecuador	3	0	0	0	0	0	3
Peru	1	0	1	0	0	0	2
Venezuela	0	1	0	0	0	0	1
OCEANIA	**8**	**1**	**0**	**0**	**1**	**1**	**11**
New Guinea	8	1	0	0	1	1	11
TOTAL	**392**	**119**	**42**	**14**	**3**	**40**	**613**

*Onset of illness in the United States and Territories
**Country not specified

In 1978, as in 1977, the seasonal distribution of malaria cases showed a distinct pattern; a definite peak in cases (excluding cases with unknown date of onset) was apparent in the late spring and summer months (Fig. 3). A general increase in travel by Americans during the summer months probably accounts for the pattern.

For cases on which the exact date of arrival in the United States and the date of onset of illness were available, clinical malaria developed within 30 days of arrival in the United States in 79.5% of persons with P. falciparum infection and in 30.9% of those with P. vivax infection (Table 4). Within 6 months after returning to this country 96.2% of patients with P. falciparum malaria and 70.2% of those with P. vivax malaria developed clinical symptoms. Twenty-one patients (4.1%) became ill with malaria 12 months or longer after the last possible exposure to malaria abroad.

Fig. 3 MALARIA CASES, BY MONTH OF ONSET, UNITED STATES, 1978

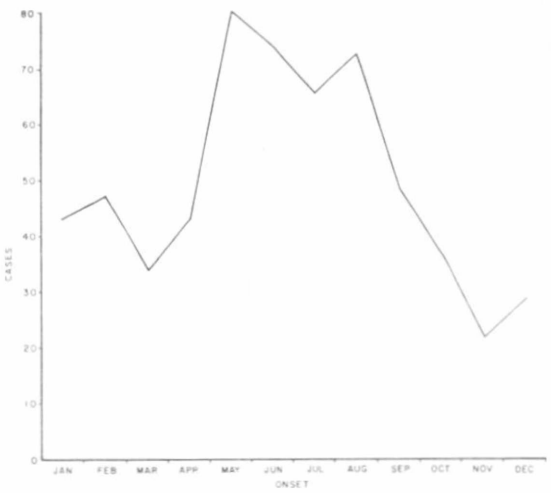


Table 4 Malaria Cases by Period Between Date of Entry Into the United States and Onset of Illness, and by Plasmodium Species, United States, 1978*

Period (in months)	Plasmodium Species								All Cases	
	vivax	(%)	falciparum	(%)	malariae	(%)	ovale	(%)		
< 1	111	(30.9)	84	(80.0)	14	(42.4)	1	(7.7)	210	(40.7)
1-2	74	(20.6)	14	(13.3)	8	(24.2)	2	(15.4)	98	(19.4)
3-5	67	(18.7)	3	(2.9)	5	(15.2)	6	(46.1)	81	(16.0)
6-11	91	(25.3)	1	(1.0)	5	(15.2)	3	(23.1)	100	(19.7)
≥ 12	16	(4.5)	3	(2.8)	1	(3.0)	1	(7.7)	21	(4.2)
Total	359	(100.0)	105	(100.0)	33	(100.0)	13	(100.0)	510	(100.0)

*Cases acquired in the United States (7), cases with species undetermined (40) or mixed (3), and cases with exact entry date or onset of illness date unknown (56) are not included.

Of the 616 cases reported in 1978, and for which the status of hospitalization was known, 86.6% of patients required hospitalization. The majority of patients were initially treated in civilian hospitals (65.5%), military hospitals (5.0%), and Public Health Service hospitals (1.5%) (Table 5). The Armed Forces and Veterans Administration have made complete malaria reporting a major responsibility of their hospital staffs. Reporting by civilian physicians, however, is largely a matter of individual initiative, even though malaria is a reportable disease in every state. Thus, the above percentages probably underestimate the extent to which civilian physicians see patients with malaria.

Table 5 Malaria Cases by Type of Initial Hospital Admission, United States, 1978*

Type of Hospital	Number of Patients	Percent
Military	30	5.0
Veterans Administration	3	0.5
Civilian	395	65.5
Public Health Service	9	1.5
Other	85	14.1
Not Hospitalized	81	13.4
Total	603*	100.0

*Hospital unknown for 13 patients

IV. MILITARY MALARIA

In 1978, 31 cases of malaria in military personnel were reported. Although this represented a 282% increase over the number reported in 1977 (11 cases), the total number of military cases still remained far below the levels observed during the Vietnam War years (Table 6).

Table 6 Malaria Cases in Military Personnel, by Branch of Service, United States, 1978

Branch of Service	Cases	
	Number	Percent
Air Force	5	16.1
Army	2	6.5
Navy	4	12.9
Marine	18	58.0
Unknown	2	6.5
Total	31	100.0

V. CIVILIAN MALARIA IMPORTED FROM ABROAD

The number of imported civilian cases continued to increase in 1978. This trend has been evident for the last 10 years, but was masked by the large number of military cases during the Vietnam War years. The 25.5% increase in civilian cases between 1977 and 1978 brought the number to 585. The increase was evident among U.S. civilians and foreign civilians. The percentage distribution of cases by the purpose of travel in malarious areas has shown no appreciable change in the past 10 years. The 1978 data (Table 7) show that students and teachers comprised the largest group among both U.S. and foreign civilians. Tourists and businessmen also made up a significant proportion of U.S. citizens contracting malaria. The distribution of cases by age and sex is shown in Table 8. As in previous years, males between 20 and 29 years of age contributed the largest number of cases.

Table 7 Imported* Civilian Malaria Cases, by Occupation, and Nationality, United States, 1977

Occupation	U. S. Citizen	Foreign Visitor	Total	Percent
Tourist	45	7	52	9.0
Businessman	32	11	43	7.4
Government Representative	8	12	20	3.5
Missionary	24	4	28	4.8
Peace Corps	5	0	5	0.9
Seaman	10	10	20	3.4
Student or Teacher	45	92	137	23.7
Other	42	107	149	25.7
Unknown	53	72	125	21.6
Total	264	315	579	100.0

*Induced cases (4) and congenital cases (2) not included.

Table 8 Civilian Malaria Cases, by Age and Sex, United States, 1977

Age Group	Male	Female	Unknown	Total	Percent
0- 9	23	28	1	52	9.3
10-19	71	34	1	106	18.9
20-29	117	50	4	171	30.5
30-39	83	26	5	114	20.4
40-49	35	18	0	53	9.5
50-59	26	16	0	42	7.5
60-69	4	9	1	14	2.5
≥ 70	5	3	0	8	1.4
Total	364	184	12	560	100.0

VI. MALARIA ACQUIRED IN THE UNITED STATES

In 1978, 2 congenital malaria cases, 3 transfusion cases, and 1 case induced by renal transplantation were reported in the United States. In addition 1 transfusion-induced case which occurred in 1976 and was not previously reported is described below (Case 5). No introduced cases of malaria were reported (Fig. 4).

A. Induced Malaria

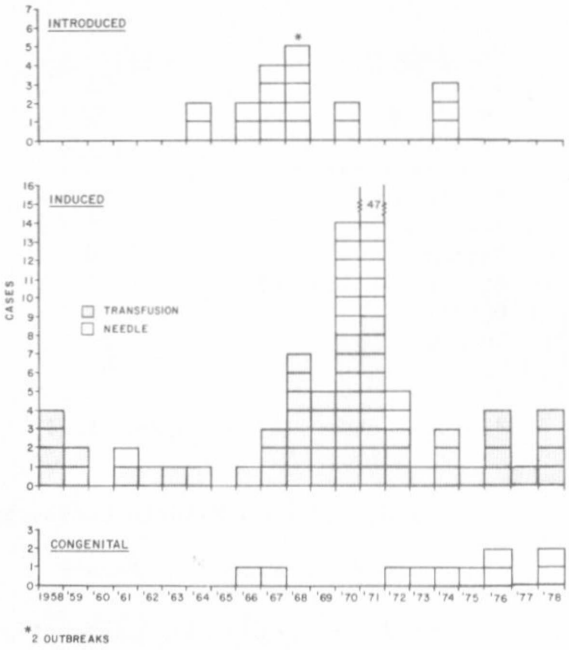
Case 1 - On January 15, 1979, a case of malaria due to P. malariae infection was reported in a 46-year-old white man from Dallas, Texas. The patient underwent coronary bypass graft surgery on November 8, 1978. He received 2 units of packed red blood cells on November 10 and was discharged on November 15. The patient was readmitted on December 16 with the sudden onset of chills, fever to 104.2,F and diaphoresis. His physical examination was unremarkable. An antinuclear antibody titer was reported to be 1:5120, and indomethacin was begun. The fever recurred, and the patient was given prednisone. P. malariae was noted in the blood smears on January 12. Prednisone was

discontinued, and chloroquine phosphate was prescribed (2.5 grams over 3 days). The patient became afebrile and was discharged on January 27.

The 2 blood donors were traced. One was seronegative. The other donor was of Mexican descent with no previous history of malaria. He had a 1:4096 indirect immunofluorescence titer for P. malariae. He had lived in the United States since 1968 although he had been in Mexico for visits as recently as 1978.

(Reported by E. Goodman, M.D., D. Johnson, M.T., (ASCP), V. Bryan, M.D., Presbyterian Hospital of Dallas; C. R. Webb, Jr., M.D., State Epidemiologist, Austin, Texas; and Parasitic Diseases Division, Bureau of Epidemiology, CDC.)

Fig 4 MALARIA ACQUIRED IN THE UNITED STATES, 1958-1978



Case 2 - On October 2, 1978, a 65-year-old white female with no history of travel abroad underwent open commissurotomy for mitral stenosis. She received 5 units of packed red cells, 3 units of whole blood, and 4 units of fresh frozen plasma intraoperatively.

The patient was discharged on October 15 but had to be readmitted on October 18 because of mental confusion. Examination of a peripheral blood smear showed P. falciparum. She received dexamethasone, quinine, and chloroquine, but her mental status continued to deteriorate. It was felt that she would benefit from the removal of the bulk of her parasitized cells (2-5% of the red cells). On October 20 she had an exchange transfusion of 10 units of blood. After exchange of 5 units, the patient appeared to be alert and fully oriented. Her mental confusion gradually improved over the following 2 weeks of hospitalization.

All donors were tested serologically, and all were seronegative. Although 3 of the donors had a history of military service in Southeast Asia, they were unlikely sources of P. falciparum because they had not been in a malaria endemic area for over 3 years. The suspected source of the patient's malaria was another donor, a native of Ghana who has resided in the United States for the past 6 years. He gave a history of malaria during childhood, and, after a visit to Ghana in December 1977, he experienced an acute, flu-like illness which remitted spontaneously.

(Reported by R. L. Yarrish, M.D., J. S. Janas, M.D., R. G. Douglas, Jr., M.D., J. S. Nosanchuk, M.D., and A.L.R. Herman, Ph.D., Rochester, New York; Parasitic Diseases Division, Bureau of Epidemiology, CDC.)

Case 3 - On July 28, 1978, a 71-year-old white male underwent coronary artery bypass grafting in an Oklahoma City hospital. During and shortly after this procedure, he received 7 units of modified whole blood and 2 units of fresh frozen plasma. His convalescence was unremarkable until August 11 when he became anorectic and developed fever of 102 F, profuse sweating, chills, and malaise. A pattern of febrile spikes and chills every 48 hours ensued. On August 19, malarial parasites were noted on a blood smear. Subsequent thick smears revealed trophozoites and schizonts of P. vivax. On August 20, therapy with chloroquine phosphate was begun orally. The patient's temperature returned to normal and he remained afebrile. He did not receive primaquine. He was discharged on September 3 and has remained well.

Investigation revealed that the patient was a native of Oklahoma and had never traveled outside the United States. There was no history of recent insect bites, no history of prior malaria or unexplained febrile illness, and no history of prior recent transfusion or parenteral drug abuse.

All 9 donors of the blood products received by this patient were interviewed, and blood was collected from each for serologic testing. Each denied parenteral drug use as well as receipt of transfused blood. Only 1 donor had a positive serologic test for malaria. He was a 25-year-old Nigerian male who had most recently been in a malarious area in December 1977 when he traveled to Nigeria, Liberia, and Cameroon. Thick and thin smears were negative for malarial parasites. However, after a negative G6PD screening the donor was treated with chloroquine and primaquine.

(Reported by S. N. Bullock, M.D., Merle Center, V. Ramgopal; H. Neisler III, M. A. Roberts, M.P.H., Oklahoma State Health Department; Parasitic Diseases Division, Bureau of Epidemiology, CDC.)

Case 4 - A 26-year-old female immigrated to the U.S. from Ghana in 1971 and returned to Ghana in mid-1973. Because of renal failure due to toxemia she received a kidney transplant on January 26, 1978. The donor was the patient's mother who came from Ghana expressly for the purpose of donating a kidney. Her daughter developed fever on February 10, and retrospective review of her slides revealed P. falciparum as early as February 6. The patient received intraoperative blood transfusions, but the donors were seronegative by the indirect immunofluorescence test for malaria.

The patient was treated with immunosuppressive drugs after her transplant. The patient's titers preoperative were 1:64 for P. vivax, 1:1026 for P. falciparum and 1:64 for P. malariae, and there were no significant postoperative changes. Her mother's titers were 1:256, 1:4096 and 1:256 for P. vivax, P. falciparum, and P. malariae, respectively.

The patient was successfully treated with chloroquine, but she rejected the kidney which was subsequently removed. The malaria was thought to be due to transfer of infected red blood cells in the donor kidney. Although it is possible that she had a recrudescence of a previous infection, this is unlikely since P. falciparum generally terminates within 3 years and she had not been in a malarious area for 5 years.

(Reported by J. Frame, M.D., and J. Marr, M.D., City Epidemiologist, New York City; and Parasitic Diseases Division, Bureau of Epidemiology, CDC.)

Case 5 - On March 10, 1976, a 35-year-old woman underwent orthopedic surgery at a hospital in San Diego, California. She received 7 units of blood intra- and post-operatively and did well until March 26 when she developed fever, malaise, myalgia, and nausea. On March 30 she was readmitted to the hospital, delirious and with severe hemolysis. A blood smear revealed infection with P. falciparum (196 parasites/100,000 RBC). She was treated with intravenous quinine, oral dapsone, and pyrimethamine, made a good recovery, and was discharged on April 12.

The patient was born in the United States and had no recent travel history except to Tijuana. She had no history of previous malaria or drug abuse. Of the 7 units of blood she had received, 5 were from a military blood bank and 2 were from a civilian blood bank. During screening prior to blood donation, all 7 donors denied travel to malaria-endemic areas within 6 months, prior history of malaria, and treatment for malaria.

Follow-up of the 7 donors revealed that 1 of the military donors, a 26-year-old recruit, had been born in Liberia and had lived there until 1971 when he immigrated to the United States. He returned to Liberia for a visit from April to November 1975. In June and December 1975 he was ill with fever and chills, diagnosed as "flu." He had taken antimalarial drugs about 8 years before he donated blood, but had not taken malaria chemoprophylaxis during his return visit to Liberia.

Indirect immunofluorescent antibody studies on the implicated donor revealed a titer of 1:4096 to P. falciparum. The serologic tests on the other 4 military donors and 1 civilian donor were negative, and test results were not available on the second civilian donor. No malaria parasites were noted on thick and thin smears of the 7 donors.

(Reported by S. Mayhew, M.D., D. Scott, M.D., Scripps Hospital; V. Du Prattie, M.D., Director, San Diego Blood Bank; C.F. Bishop, Capt., M.C., U.S.N. and Lt. Cdr. M. L. Pratt, Naval Regional Medical Center, San Diego; and M. Ginsberg, M.D., San Diego County Health Department; R. R. Roberto, M.D., State Epidemiologist, California State Department of Health; Parasitic Diseases, Bureau of Epidemiology, CDC.)

B. Congenital Malaria

Case 1 - A woman came to the United States from India in July 1977 and had an attack of malaria 2 weeks after arrival; she reportedly took unknown medication for a few days. She was pregnant but had had no symptoms of malaria during pregnancy and had delivered a full-term female infant on July 7, 1978. On July 27, the baby was noted to have a fever to 103 F, with an alternate day fever pattern. The baby was seen by several physicians and treated with ampicillin. She was hospitalized August 7, and a diagnosis of malaria was made. The patient was treated with chloroquine and discharged after clearance of the parasitemia.

Examination of the peripheral blood smear was consistent with P. vivax. The baby's serologic titers were 1:64 for P. vivax, 1:16 for P. falciparum, and 1:256 for P. malariae. The mother's titers were 1:256, 1:16, and 1:10, respectively. Because the examination of the peripheral blood smear was negative and because of the absence of clinical symptoms, the mother was not treated.

(Reported by R. Seeler, M.D., Pediatric Hematology, Cook County Hospital, Chicago, Illinois, Illinois State Health Department; Parasitic Diseases Division, Bureau of Epidemiology, CDC.)

Case 2 - On January 17, 1979, a 3-month-old Filipino girl was admitted to a California hospital with a history of fever to 102 F every other day for 2 months and a 1-month history of sneezing and coughing.

Past medical history revealed that her mother had lived in Nigeria during the first 6 months of pregnancy and did not take malaria chemoprophylaxis. A febrile illness diagnosed as "malaria" occurred during the sixth month of pregnancy and was treated with chloroquine. At 8 months of gestation, after arrival in California, the mother developed a febrile illness; Plasmodium falciparum was identified on her blood smears, and she was started on chloroquine. Eight hours later she delivered a full-term, 5-pound, 5-ounce baby.

On the day of admission, the baby's liver was 3 centimeters below the right costal margin. The spleen was firm and smooth and palpable to 8 centimeters below the left costal margin. Thick and thin blood smears revealed typical P. falciparum parasitic forms, including trophozoites, erythrocytic merozoites, and numerous gametocytes. On January 18 the patient was started on chloroquine phosphate 5 mg/kg, orally once a day for 5 days. She was discharged on January 19 and recovered.

(Reported by R. Hindi, M.D., P. H. Azimi, M.D., Oakland Children's Hospital Medical Center; Dr. H. G. Lammel, Vallejo General Hospital; E. G. Lopez, M.D., Health Officer Solano County Health Department: R. R. Roberto, M.D., California State Health Department; Parasitic Diseases Division, Bureau of Epidemiology, CDC.)

VII. MALARIA DEATHS AND COMPLICATIONS IN THE UNITED STATES

A. Malaria Deaths

Six deaths attributed to malaria were reported in the United States in 1978. Infection in 4 imported cases was acquired in Africa and 1 in Brazil. Death occurred in 1 patient who had had a blood transfusion in Mexico, and later developed clinical symptoms in the United States.

Case 1 - On July 31, 1978, a 40-year-old man returned to Ohio after a 2-week tour in Kenya in which 11 other Americans participated. He had not taken any malaria chemoprophylaxis. On August 1, he noted fever, chills, and abdominal pain. Over the next few days nausea, vomiting, jaundice, shortness of breath, and blurred vision also developed. He neither sought nor accepted medical attention, and on August 8,

he died at home. A postmortem blood smear was positive for P. falciparum, and autopsy revealed congestion of the lungs and hepatosplenomegaly. On microscopic examination, malaria pigment was noted in pulmonary alveolar histiocytes, in liver and spleen sinusoids, and in red blood cells. Intraerythrocytic parasites consistent with P. falciparum were noted within blood vessels in tissue sections of the brain, lung, liver, spleen, and in casts in the distal tubules of the kidneys.

During the first week of August the patient's wife, who was also on the tour and also did not take prophylaxis, developed malaise, weakness, and intermittent fever, chills, diaphoresis, and muscle tremors. She, too, was reluctant to seek medical attention. After her husband's death, however, she was persuaded to be evaluated, and on August 12 she was hospitalized. On admission she was noted to have slow mentation, icterus, and fever of 100 F, hypotension, and oligura. Her hemoglobin was 5 gm 100 ml and a blood smear showed P. falciparum parasites. She was treated with chloroquine phosphate and blood transfusion. Her clinical condition improved; she was discharged on August 18 and completed a course of primaquine. During her follow-up visit of August 29, she was noted to still be anemic and was hospitalized again. She had been asymptomatic and a blood smear showed no evidence of malarial parasites. She received another blood transfusion and was then discharged. During the 5 months since the second hospitalization, she has reportedly had no more episodes of fever, chills, weakness, or jaundice, and has decided to have no further medical follow-up.

All other tour members were notified of their risk of malaria exposure and advised about chemoprophylaxis.

(Reported by T. Borman, D.O., H. Frazier, D.O., Cuyahoga Falls; A. H. Kynakides, M.D., Coroner's office, Summit County, M. Nelson, M.D., Health Commissioner, Summit County Health Department; F. Holzhauer, B.S., T. Halpin, M.D., M.P.H., State Epidemiologist, Ohio Department of Health; Field Services Division, and Parasitic Diseases Division, Bureau of Epidemiology, CDC.)

Case 2 - A 73-year-old woman was brought to a hospital emergency room in New York City on July 27 complaining of fever of 1-week duration and drowsiness of 3 to 4 days. She denied headaches, vomiting, nausea, cough, chills, and was not jaundiced. She was treated for an upper respiratory infection and returned on July 28 with a fever of 106 F and lethargy. She was admitted with a differential diagnosis of viral encephalitis, meningitis, malaria, and gram-negative sepsis. Smears taken for malaria arrived in the laboratory the day of her death on July 31. P. falciparum was found on the smears. The patient had been on a tour to Gambia, Liberia, the Ivory Coast, and Senegal from July 7 to July 23 and had become febrile 2 to 3 days prior to leaving Africa. She apparently had not taken malaria prophylaxis. Postmortem findings included splenomegaly with a splenic infarct; findings in the brain were consistent with cerebral malaria. In addition, there were findings consistent with her history of hypertension. The travel agency was contacted and the 156 other people on the tour were notified of their potential risk. The tour group had been informed about malaria prophylaxis prior to departure.

(Reported by Z. Wessely, M.D., H. Laufer, M.D., D. Edwards, M.D., New York, New York; J.S. Marr, M.D., Department of Health, City, New York; Parasitic Diseases Division, Bureau of Epidemiology, CDC.)

Case 3 - While vacationing in Mexico, a 74-year-old white woman from California slipped on a floor and fractured her left hip. An open reduction and internal fixation was performed, and she received two units of blood. Five weeks later, she was admitted to the hospital with fever, confusion, abdominal pain, and tachycardia. The physical examination was unremarkable. CBC showed a white count of 11,400, hemoglobin of 8.4, and hematocrit of 25.1. Four malaria parasites, later identified as P. malariae, were found.

The patient was started on quinine dihydrochloride 600 mg IV; however, she died the same day from shock. The postmortem examination revealed bilateral pleural effusions with 900 ml of liquid in each pleural cavity, severe atelectasis of both lungs,

multiple petechial hemorrhages in gastric mucosa, and multiple small subependymal hamartomas in cerebral ventricles.

(Reported by R.M. Butler, Medical Record Administrator, Riverside General Hospital, California; R. R. Roberto, M.D., California State Health Department; Parasitic Diseases Division, Bureau of Epidemiology, CDC.)

Case 4 - A 49-year-old white male missionary returned from a 1-month trip to Nigeria, Rhodesia, and Kenya on March 6, 1978. After spending 2 days at home in North Carolina, he traveled to Dallas, Texas, where he did some teaching. He became fatigued in Dallas and on about March 10 noted fever, headache, nausea, muscle aches, and watery diarrhea. He returned to Asheville where he became progressively weaker. He refused medical treatment, and on March 23 he became delirious and comatose. Blood smears obtained the next morning showed many ring forms, and the diagnosis of P. falciparum malaria was made. His hematocrit was 36 with a white blood count of 30,000. He had 3+ proteinuria and 3+ hematuria. Treatment was begun with parenteral chloroquine, quinine, and dexamethasone. Despite vigorous supportive therapy, he died on March 26. The other missionaries who were traveling with him were notified of their need for prophylaxis.

(Reported by W. J. Simons, M.D., J.N. Sloan, M.D., Asheville, North Carolina; J. Tenney, M.D., Health Department, Asheville, North Carolina; M. P. Hines, D.V.M., State Epidemiologist, Raleigh, North Carolina; Field Services Division and Parasitic Diseases Division, Bureau of Epidemiology, CDC.)

Case 5 - On May 3, 1978, a 30-year-old white seaman had an attack of high fever and chills abroad ship. On May 10 he was hospitalized at Presbyterian Hospital in San Juan, Puerto Rico. P. falciparum malaria was identified on a blood smear, and the patient reported some ports of call on the West Coast of Africa during the previous months. Despite treatment the patient died on May 11.

(Reported by V. Valentin, Puerto Rico Department of Health; H. Negron, M.D., State Epidemiologist, San Juan, Puerto Rico; Parasitic Diseases Division, Bureau of Epidemiology, CDC.)

B. Malaria Complications

Sixty-five complications of malaria, aside from death, were reported in 1978 (Table 9).

Table 9 Malaria Complications by Species of Infecting Organism, United States, 1978

	Vivax	Falciparum	Malariae	Ovale	Mixed	Undetermined	Total
Hemolysis	22	23	2	2	0	2	51
Cerebral	1	6	0	0	0	1	8
Renal	0	6	0	0	0	0	6
Total	23	35	2	2	0	3	65
Total Number of Cases Diagnosed	395	120	43	14	3	41	616

VII. REPORT FROM THE NATIONAL MALARIA REPOSITORY - 1978

The presence of *Plasmodium* species or agreement that there were no parasites present was confirmed in blood films from 215 patients submitted to the National Malaria Repository in 1978. In 1 case the film submitted as *P. falciparum* and in 2 of those submitted as *Plasmodium* species, respectively, were later found to be negative at CDC. No specimens submitted as negative were later found to be positive at CDC. In 16 instances the species diagnosis of the National Malaria Repository differed from that of the institution submitting the slide. The origin and species diagnosis of malaria smears examined by the Repository are shown in Table 10 and 11.

Table 10 Institutions Submitting Positive Slides for Malaria to the National Malaria Repository*, 1976-1978

	ORIGIN						
	Army	Navy	VA Hosp	Air Force	Public Health Service & Health Dept. (State, County, City)	Other Hospitals Clinics, Physicians, etc.	Cumulative
Cumulative total positive 1978	0	0	1	4	94	48	147
Cumulative total positive 1977	1	1	0	3	79	37	121
Cumulative total positive 1976	3	0	1	1	66	63	134

*CDC

Table 11 Species of Malaria Identified by National Malaria Repository*, 1976-1978

Species	1978	1977	1976
P. vivax	79	73	79
P. falciparum	44	34	43
P. malariae	4	1	4
P. ovale	9	2	4
Plasmodium sp.	11	10	4
Negative	70	61	63
Total examined	217	182	197
Cumulative positive	147	121	134

*CDC

IX. PREVENTION OF MALARIA

The purpose of these tables is to provide international travelers with current information about the risk of acquiring malaria in areas of the world that they intend to visit. This information is abstracted from the World Health Organization's Weekly Epidemiologic Record 53: 190-196, 1978 (Also see Fig. 5.) Table 12 provides information on countries with no malaria risk. For detailed information on each country with a malaria risk see Table 13.

Table 12 Countries or Areas Malaria Free

AFRICA			
Chagos Arch.	French Southern and Antarctic Terr.	Lesotho	St. Helena
AMERICA, NORTH			
Antigua	Cuba	Montserrat	St Pierre and Miquelon
Bahamas	Dominica	Netherl. Antilles	St Vincent
Barbados	Greenland	Panama Canal Zone	Trinidad and Tobago
Bermuda	Grenada	Puerto Rico	Turks and Caicos I.
Brit. Virgin I.	Guadeloupe	St Kitts-Nevis-Anguilla	United States of America
Canada	Jamaica	St Lucia	United States Virgin I.
Cayman I.	Martinique		
AMERICA, SOUTH			
Brit. Antarctic Terr.	Chile	Falkland I.	Uruguay
ASIA			
Brunei	Israel	Kuwait	Macao
Cyprus	Japan	Lebanon	Mongolia
Hong Kong	Korea Dem. People's Rep. of		
EUROPE			
Albania	German Dem. Rep.	Liechtenstein	Spain
Andorra	Germany Fed. Rep.	Luxembourg	Svalbard and Jan Mayen I.
Austria	Gibraltar	Malta	Sweden
Belgium	Greece	Monaco	Switzerland
Bulgaria	Holy See	Netherlands	United Kingdom of Great Britain and Northern Ireland
Czechoslovakia	Hungary	Norway	Yugoslavia
Denmark	Iceland	Poland	
Faroe I.	Ireland	Portugal	
Finland	Isle of Man	Romania	
France	Italy	San Marino	
OCEANIA			
American Samoa	Cook I.	Nauru	Pitcairn I.
Australia	Fiji	New Caledonia	Samoa
Canton and Enderbury I.	French Polynesia	New Zealand	Tokelau I.
Christmas I. (Australia)	Gilbert I.	Niue I.	Tonga
Cocos	Guam	Norfolk I.	Tuvalu
	Johnston I.	Pacific I. (Trust Terr.)	Wake I.
	Midway I.		Wallis and Futuna I.
UNION OF SOVIET SOCIALIST REPUBLICS			

Offical information on the distribution of malaria in the USSR is not available. However, areas commonly visited by tourists are considered malaria free.

Table 13 Information on Countries with Malaria Risk

MALARIA RISK		
Country 1	Where? 2	When? 3
AFRICA		
Algeria	Ouargla Wilaya (= Dep.)	5-11
Angola	...	...
Benin	Whole country.	1-12
Botswana	Whole country excl.: Kgalagadi, Kweneng (part.), Ngwaketse, District; southern part of Central, Ghanzi, District; urban areas of Gaborone, Francistown, Lobatsi, Selebi-Pikwe.	11-5
Burundi	...	...
Cape Verde	...	...
Central African Emp.	Whole country.	1-12
Chad	Whole country.	7-11
Comoros	Whole country.	1-12
Congo	Whole country.	1-12
Djibouti	Occasionally, in the whole country.	...
Egypt	Nile delta, El Faiyum area, the oases, and part of Upper Egypt, excl. urban areas.	6-10
Equatorial Guinea	...	...
Ethiopia	Whole country below 2000 m.	1-12
Gabon	Whole country below 1000 m.	1-12
Gambia	Whole country.	1-12
Ghana	Whole country.	1-12
Guinea	Whole country.	1-12
Guinea-Bissau	...	...
Ivory Coast	Whole country.	1-12
Kenya	Whole country, but normally no risk in Nairobi Township and in the highlands (above 2500m) of Central, Rift Valley, Eastern, Nyanza, Prov.	1-12[1]
Liberia	Whole country.	1-12
Libyan Arab Rep.	2 small foci in the southwest of the country.	2-8
Madagascar	Whole country excl. areas above 1100 m. Ambatolampy, Ambohidratrimo, Andramasina, Antanifotsi, Antsirabe, Arivonimamo, Faratsiho, Manjakandriana, Tananarive, Tananarive-Banlieue, Sous-Prefectures.	9-3
Malawi	Whole country.	1-12
Mali	Whole country.	1-12[2]
Mauritania	...	...
Morocco	Azilal, Beni Mellal, Kenitra, Khemisset, Khouribga, Ouarzazate, Settat, Tiznit, Prov. excl. urban areas.	5-10
Mozambique	...	...
Namibia	...	...
Niger	Whole country.	7-11[3]
Nigeria	Whole country.	1-12
Rwanda	Whole country.	1-12
Sao Tome and Principe	...	...
Senegal	Whole country[4].	1-12[5]
Sierra Leone	Whole country.	1-12
Somalia	Whole country[6].	1-12
South Africa	North, east and western low altitude areas of Transvaal. Natal coastal areas north of 28° S (Richards Bay).	1-12

[1] Eastern Prov. (part.), North-Eastern Prov., Rift Valley Prov. (part.): 4-6 & 11-12.
[2] 4-6: Less risk –
[3] Agades Dep.: 8-10.
[4] Dakar (town – ville): No risk.
[5] Cap-Vert: Less risk during
[6] Mogadishu: very low risk

Table 13 (continued)

MALARIA RISK		
Country 1	Where? 2	When? 3
Southern Rhodesia	...	...
Sudan	Whole country.	1-12
Swaziland	Northern border areas – Bordergate, Lomahasha, Mhlume, Tshaneni.	12-3
Togo	Whole country.	1-12
Tunisia	Occasionally rural areas of the north	5-11
Uganda	Whole country below 1800 m excl. Kigezi, Distr. (southern part)[1].	1-12
United Rep. of Cameroon	Whole country.	1-12
United Rep. of Tanzania	Whole country.	1-12
Upper Volta	Whole country.	1-12[2]
Zaire	Whole country.	1-12
Zambia	Whole country.	11-5
AMERICA, NORTH		
Belize	Whole country (below 400 m) excl.: Belize District and urban areas.	1-12
Costa Rica	Below 500 m, excl. urban areas: Alajuela, Guanacaste, Puntarenas, Prov.	1-12
Dominican Rep.	Below 400 m, excl. urban areas: Pedernales Mun. (Pedernales Prov.); Elias Pina, El Llano, Banica, Mun. (Estrelleta Prov.); Dajabon, Partido, Mun. (Dajabon Prov.); Pepillo Salcedo Mun. (Monte Cristi Prov.).	1-12
El Salvador	Whole country below 1000 m, excl. urban areas	1-12
Guatemala	Below 1500 m, excl. urban areas: Dep.: Alta Verapaz[3], Baja Verapaz, Chiquimula, Escuintla, Huehuetenango[3], Izabal[3], Jalapa, Jutiapa[3], El Peten, El Progreso, El Quiche, Retalhuleu[3], Santa Rosa, Suchitpequez, Zacapa; Mun.: San Martin Jilotpeque (Chimaltenango Dep.), Coatepeque (Quetzaltenango Dep.), Malacatan, Ocos (San Macros Dep.).	6-10
Haiti	Whole country below 300 m	1-12
Honduras[4]	Whole country (below 1000 m) excl. urban areas and excl. Ocotepeque Dep.	1-12[5]
Mexico	Below 1000 m, excl. urban areas: Chiapas, Guerrero, Michoacan, Nayarit, Oaxaca, States – Etats; Morelos, Pueblo (part.), States – Etats; Alamos Mun. (Sonora State – Etat); Chihuahua (part.), Durango (part.), Jalisco (part.), Sinaloa, States – Etats.	1-12 6-10 5-10
Nicaragua	Rural areas below 1000 m as well as outskirts of: Chinan, Leon, Granada, Managua, Nandaine, Tipitapa, towns. No risk: Nueva Segovia, Madriz, Dep.	5-12
Panama	Below 800 m, excl. urban areas: Prov.: Darien, Bocas del Toro, Colon (excl. Ciudad Colon); Distr.: Santa Fe (Veraguas Prov.), Chepo, Chiman (Panama Prov.); Comarca de San Blas.	1-12

[1] Entebe, Fort Portal, Jinja, Kampala, Mbale: No risk
[2] Djibo, Oudalan, cercles: 6-12.
[3] Risk also in urban areas.
[4] Based on WHO *Wkly Epidem. Rec.*, No. 24, 1976 – D'apres *Releve epidem. hebd.* de l'OMS. No. 24, 1976.
[5] Conan, Intibuca, La Paz, Lemnira, Olancho, Dep.: 5-12.

Table 13 (continued)

MALARIA RISK		
Country 1	Where? 2	When? 3
AMERICA, SOUTH		
Argentina	Part of (below 1200 m) and excl. urban areas: Iruya, Oran, San Martin, Santa Victoria, Dep. (Salta Prov.).	10-5
Bolivia	Whole country (below 2000 m) excl. urban areas and excl.: La Paz (Highlands), Oruro, Potosi, Prov.	1-12
Brazil	Below 900 m: Acre, State; Amapa, Rondonia, Roraima, Terr,; Part of and excl. urban areas: Amazonas, Bahia, Espirito Santo, Goias, Maranhao, Mato Grosso, Minas Gerais, Para, Parana, Piaul, Santa Catarina, States.	1-12
Colombia	Regions of (below 800 m, excl. urban areas): Urbaa (Antioquia, Choco, Dep.), Bajo Cauca-Nechi (Cauca, Antioquia, Dep.), Magdalena Medio, Caqueta (Caqueta Intendencia), Sarare (Arauca Intendencia), Catatumbo (Norte de Santander, Dep.), Pacifico Central & Sur, Putumayo (Putumayo Intendencia), Ariari (Meta, Dep.), Alto Vaupes (Vaupes, Comisaria).	1-12
Ecuador	Below 1500 m: Esmeraldas, Guayas, Manabi, Prov.; Excl. urban areas: Morona Santiago, Napo, Pastaza, Zamora Chinchipe, Prov.; El Oro, Los Rios, Prov.	 1-12 1-12 3-6
French Guiana	Whole area (excl. Cayenne City).	1-12
Guyana	Below 900 m: North-West, Rupununi, Regions.	1-12
Paraguay	Some rural parts of: Amambay, Kanendiyu, Alto Parana, Dep.	10-5
Peru	Below 1500 m (excl. urban areas): Dep.: Amazonas, Cajamarca (excl. Hualgayoc Prov.), La Libertad (excl. Otuzco, Santiago de Chuco, Prov.), Lambayeque, Loreto, Piura (excl. Talara Prov.), San Martin, Tumbes; Prov.: Santa (Ancash Dep.), part of: La Convencion (Cusco Dep.), Tayacaja (Huancavelica Dep.), Satipo (Junin Dep.).	1-12
Surinam	Below 1300 m (excl. urban areas): Brokopondo (south of 5° lat. N), Commewijne, Marowijne, Nickerie, Saramacca, Districts.	1-12
Venezuela	Below 600 m (excl. urban areas): Terr. Fed. Amazonas: Atabapo, Atures, Casiquiare, Rio Negro, Dep.; Apure, State: Codazzi, Cunaviche, Elorza, Guachara, Guasdualito, San Camilo, Urdaneta, Mun.; Bolivar, State: Caicara, La Paragua, Santa Rosalia, La Urbana, Santa Elena, Mun.; Barinas, State: Andres E. Blanco, Ciudad Bolivia, Santa Barbara, Mun.; Merida, State: Alberto Adriani, Caracciolo Parra Olmedo, Eloy Paredes, Obispo Ramos de Lora, Mun.; Tachira, State: Cardenas, La Concordia, Cordoba, Garcia de Hevia, Jose T. Colmenares, Pregonero, Rivas Berti, San Antonio de Caparo, San Simon, Mun.; Zulia, State: Encontrados, Bartolome de las Casas, Libertad, Jesus Maria Semprum, Santa Cruz, Urribarri, Mun.	1-12

Table 13 (continued)

MALARIA RISK		
Country 1	Where? 2	When? 3
ASIA		
Afghanistan	Whole country below 2000 m.	5-11
Bahrain	Whole country (occasionally)	1-12
Bangladesh	Whole country, excl. Dacca City	1-12
Bhutan	Whole country excl. urban areas and excl.: Chirang, Sanchi.	1-12
Burma	Irrawaddy Div. (part.): Bassein west, Bogale, Ingapu, Kyangin, Labutta, Lemyethna, Myanaung, Ngaputaw, Pyapon, Thabaung, Yekyi, townships;	5-12
	Magwe Div. (part.[1]): Gangaw, Htilin, Kama, Mindon, Myothit, Ngaphe, Pwintbyu, Saw, Setoketaya, Taungdwingyi, Thayet;	6-10
	Mandalay Div. (part.[1]): Kyaukse (ease – est) District, Mandalay (north, east – nord, est) District, Meikhtila (east – est) District, Yemathin, District;	5-12
	Pegu Div. (part.[1]): Kyaukkyi, Minhla, Padaung, Paukkaung, Pegu (west), Shwednung, Shwekyin;	6-12
	Rangoon Div. (part.[1]): Hlegu, Hmawbi, Htantabin, Kawhmu, Kungyangone, Taikkyi, Twante, townships;	6-12
	Sagaing Div (part.) (below 1000 m: Katna, Kelewa, Khamti, Mawlaik, Monywa (west – ouest). Shwebo (north), Districts;	6-10
	Tenasserim Div. (part.[1]): Bokpyin, Launglon, Mergwi, Palaw, Tavoy, Tenasserim, Theyetchaung, Yebyu, townships;	4-12
	States (below 1000 m[1]) of Arakan, Chin, Kachine, Karen, Kayah, Mon, Shan.	6-12
China	...	
Dem. Kampuchea	...	
India	Whole country excl. some urban areas and the following districts of the states listed below: Himachal Pradesh: Chamba, Kinnaur, Kulu, Lahaul Spiti, Mahasu, Mandi, Simla, Sirmur (part.), Districts; Jammu & Kashmir: Anantnag, Ladakh, Punch, Srinagar, Districts; Karnataka: Coorg. North Kanara, South Kanara, District; Kerala: Kottayam, Palghat, Trivandrum (part.), Districts; Sikkim: East Sikkim, North Sikkim, Districts; Tamil Nadu: Batlagundu, Coimbatore (part.), Mandurai, Nilgiris; Districts; Uttar Pradesh: Almora (part.). Almora & Champawat, Chamoli, Dehradun (part.), Garhwal, Nainital (Teh), Pithoragarh, Tehri Garhwal, Uttar Kashi, Districts; West Bengal: Darjeeling (part.), District.	1-12
Indonesia	Whole country (below 1200 m) excl.: Jakarta, Surabaya, Municip.	1-12
Iran	Areas below 1500 m, excl. urban areas and excl. prov. of: East & West Azarbaijan, Gilan, Hamadan (part.),	7-11

[1] and excl. urban areas.

Table 13 (continued)

MALARIA RISK		
Country 1	Where? 2	When? 3
	Isfahan, Kerman (part.), Khorasan, Kordestan (part.), Mazandaran, Semnan, Teheran (Central), Yazd, Zanjan.	
Iraq	Northern region (below 1500 m): Duhok, Erbil, Kirkuk, Ninawa, Sulaimaniya, Prov.	5-11
Jordan	Only some rural areas of Jordan Valley and Kerak Lowlands.	4-11
Korea, Rep. of	Rural areas of: Chung-chong Pukdo, Kyongsang Pukdo, Prov.	5-10
Lao People's Dem. Rep.	Whole country excl.: Vientiane.	1-12
Malaysia	Whole country (below 1700 m. excl. urban areas).	1-12
Maldives	Whole country, excl. the capital	1-12
Nepal	Excl. urban areas:	
	All hill districts (below 1200 m);	6-9
	All Terai districts;	5-9
	All foothills, inner and forested Terai districts;	1-12
Oman	Whole country	1-12
Pakistan	Whole country (below 2000 m)	3-10
Philippines	Whole country (below 600 m) excl. urban areas and excl.:	1-12
	Bohol (part.), Catanduanes, Cebu, Leyte. Misamis occidental, Prov.; plain areas of:	
Qatar	Whole country	1-12
Saudi Arabia	Whole country excl.: Alhasa, Arar, Jauf, Quraiya (Gurayyat), Riyad. Tabuk, Taif. and the urban areas of: Jeddah, Mecca, Medina, Qatif.	1-12
Singapore	Particularly on the islands, not in urban areas.	1-12
Sri Lanka	Amparai, Anuradhapura, Badulla (part.), Batticaloa, Hambantota, Jaffna, Kandy, Kegalle, Kurungala, Mannar, Matale, Matara, Moneragala, Nuwara Eliya (part.), Polonnaruwa, Puttalam, Ratnapura, Trincomalee, Vavuniya, Districts.	1-12
Syrian Arab Rep.	Occasional risk in the whole country (below 600 m), excl. urban areas and excl.: Damascus, Deir-esZor, Hama, al Hasakeh, Homs, Latakia, Sweida, Tartus, Districts.	5-10
Thailand	Rural, especially forested and hilly areas in the whole country. –	1-12
Turkey	Potential risk in the whole country; local health authorities to be consulted.	7-10[1]
United Arab Emirates	Whole country.	1-12
Viet Nam	...	1-12
Yemen	Whole country (below 1400 m) excl.: Hajja, Sada, Prov.	9-2
Yemen, Democratic	Whole country excl. First Governorate (Aden and airport perimeter).	1-12
OCEANIA		
New Hebrides	Whole area excl.: Futuna Is., Luganville Town, Port Vila.	1-12
Papua New Guinea	Whole country.	1-12
Solomon Is.	Whole country (below 400 m) excl. some eastern and southern outlying islets.	1-12

[1] Hakkari Prov.: 8-10; Siirt Prov.: 7-9.

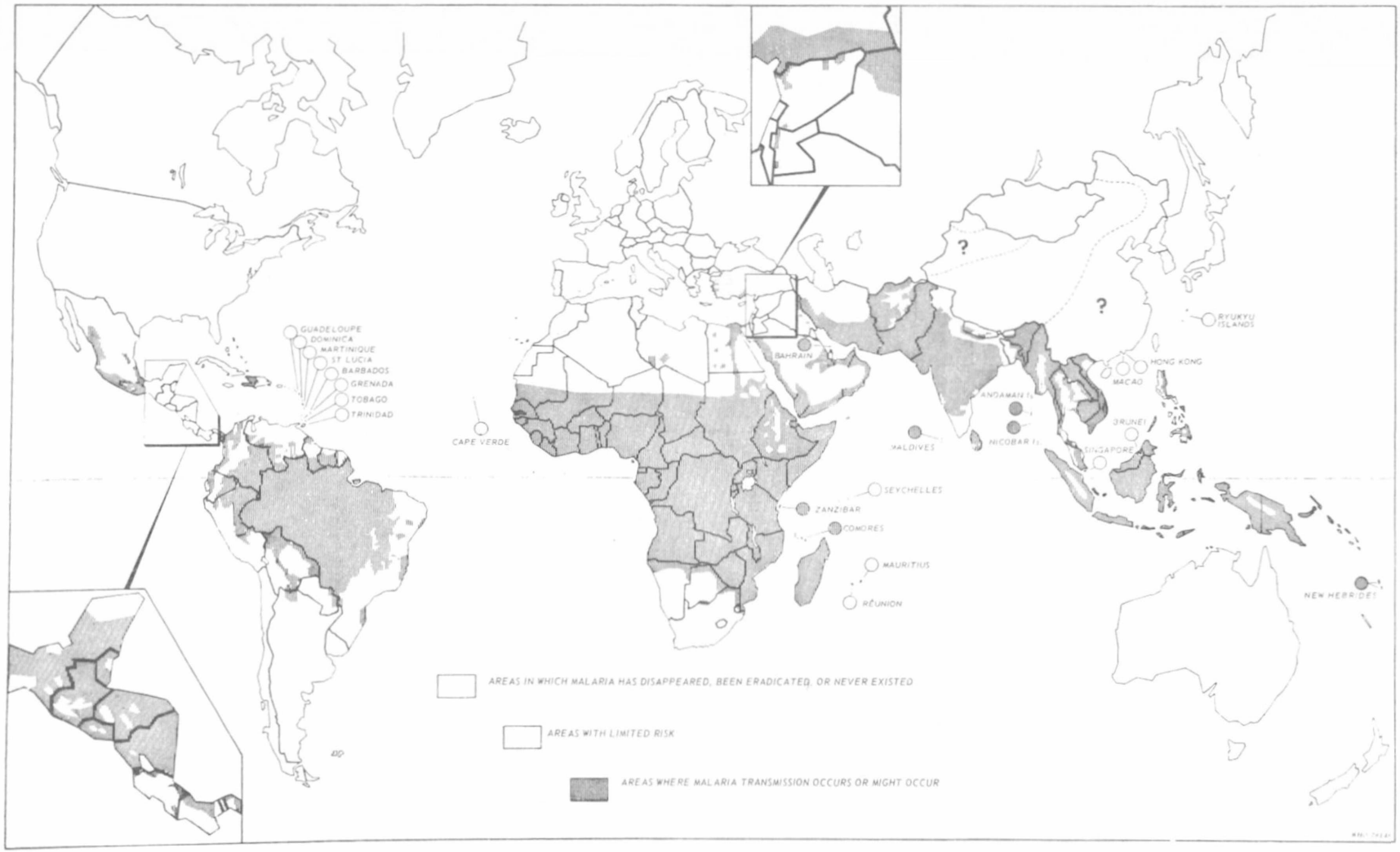
Table 13 (continued)

MALARIA RISK		
Country 1	Where? 2	When? 3
UNION OF SOVIET SOCIALIST REPUBLIC Union of Soviet Socialist Rep.	...	

Abbreviations – Abreviations

... No official information available. The reader may refer to the map outlining broadly the areas with risk of malaria.
Arch. Achipelago
Distr. District.
Dem. Democratic
Dep. Department
excl. Excluding
incl. Including
Is. Island(s) (Isles)
Mun. Municipio (Department).
Pop. Populaire.
part. Partially.
Prov. Province.
Reg. Region.
Rep. Republic.
St. Saint.
Terr. Territory.
v. vide

Fig. 5 EPIDEMIOLOGICAL ASSESSMENT OF STATUS OF MALARIA, DECEMBER 1977



Chemoprophylaxis of Malaria:

All tourists who travel in a malarious area should use a prophylactic drug no matter how brief their visit. The drug of choice for most areas is chloroquine phosphate 500 mg (300 mg base) once a week beginning 1-2 weeks before entering the malarious area and continuing for 6 weeks after departure from the malarious area. The pediatric dose of chloroquine phosphate is 5 mg per kg (base) once a week. Alternatives to chloroquine phosphate, which are given at the same intervals as chloroquine, are hydroxychloroquine sulfate 400 mg (310 mg base) and amodiaquine hydrochloride 520 mg (400 mg base). These drugs will suppress a clinical attack of malaria. Primaquine phosphate can be used for terminal chemoprophylaxis, but it should not be given routinely. Its use depends on the intensity of exposure to malaria and on whether the patient is glucose-6-phosphate dehydrogenase (G-6-P-D) deficient. The dose is 26.3 mg (15 mg base) a day for 14 days after the patient's last exposure. Subsidiary measures to reduce contact with night-biting mosquitoes include the use of insecticides, mosquito nets and screens, and long sleeves and trousers.

There are areas of the world in which malaria due to P. falciparum is resistant to chloroquine. These areas include parts of Asia and South America and are summarized in Table 14, abstracted from the World Health Organization's Weekly Epidemiological Record 52:366-370, 1977. The reader is encouraged to consult the above reference for more detailed information on these areas. A combination of pyrimethamine and sulfadoxine, a long-acting sulfonamide, has proven to be effective in the prevention of chloroquine-resistant P. falciparum malaria. This drug is not presently available in the United States, but it is marketed in other countries in a single tablet form, under the trade names Fansidar, Falcidar, or Methipox*. Administration of 2 tablets on alternate weeks during and for 6 weeks after exposure to malaria has been found to be effective in the prevention of chloroquine-resistant malaria. More information on the chemoprophylaxis of malaria may be found in the Morbidity and Mortality Weekly Report (CDC) vol 27 (Supplement): 81-90, 1978.

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*Use of trade names is for identification only and does not constitute endorsement by the Public Health Service or the U.S. Department of Health, Education, and Welfare.

Table 14 Areas in which chloroquine-resistant strains of *P. falciparum* have been reported

Country	Name of Area	Years(s)of Study
AMERICAS		
Brazil	States in interior of country; Espirito Santo State (coastal area north of Rio de Janeiro)	1961-69
Colombia	All malarious areas except west coast	1961-73
Ecuador	Provinces in interior of country bordering Colombia	1975-76
French Guiana	Isolated reports	1975
Guyana	Brazil-Guyana border area	1969, 71
Panama	All areas east of Canal Zone including San Blas	1969-75
Surinam	All malarious areas	1973-75
Venezuela	All malarious areas	1964-74
ASIA		
Bangladesh	Border areas with Assam State, India, and Burma	1970-75
Burma	All malarious areas	1969-75
Dem. Kampuchea	All malarious areas	1962
India	Assam State	1973
Indonesia	East Kalimantan (Island of Borneo) Irian Jaya (Island of New Guinea)	1974 1974
Laos	Vientiane Province	1976
Malaysia		
West	All malarious areas	1963
Sabah	All malarious areas	1971-75
Papua New Guinea	Border area with Irian Jaya, Indonesia	1976
Philippines	Luzon Island Brasilian Island and Sulu Archipelago Mindoro Island Palawan Island	1969-76 1975 1974 1969
Thailand	All malarious areas	1961-71
Vietnam	Widespread	1962

X. MICROSCOPIC DIAGNOSIS OF MALARIA

Early diagnosis of malaria requires a high level of clinical suspicion and, in particular, the careful taking of a travel history from every patient with a fever of unknown origin. Once the diagnosis is suspected, a Giemsa-stained smear of peripheral blood should be examined for the presence of parasites. Since the accuracy of diagnosis is dependent on the quality of the blood film, the following guide is offered for the proper preparation of thick and thin blood smears.

1. Manufacturers' "pre-cleaned" slides are not considered clean enough for use in malaria diagnosis. Prior to use, such slides should be washed in mild detergent, rinsed thoroughly in warm running water, then in distilled water, and dipped in ethyl alcohol (90% to 95%). Slides may then be wiped dry with a lintless cloth or tissue for immediate use or stored in 95% alcohol until needed.
2. The patient's finger should be cleaned with alcohol and wiped dry with a clean cloth or gauze.
3. After puncturing the finger with the blood lancet, allow a large globule of blood to form.
4. Place cleaned surface of slide against drop of blood and with a quick circular motion, make a film the size of a dime in the middle third of 1 end of the slide. Ordinary newsprint should be barely legible through such a wet drop (Fig. 6). (Excessive mixing or stirring with a second slide leads to distortion of blood cells and parasites.)
5. The finger should then be wiped dry and a small drop of blood gently squeezed from the puncture and placed at the edge of the middle third of the same slide (Fig. 7).
6. Apply a clean "spreader" slide to the edge of the small drop at a 45° angle and allow the blood to extend about two-thirds of the slide width; then keeping even contact, push the spreader forward along the slide. This will produce an even layer of red blood cells with a "feathering" at the lower edge (Fig. 8).
7. The blood film should be kept horizontal and protected from dust and insects while the thick film dries (minimum of 6 hours at room temperature).*
8. Label the slide in the upper part of the thin film with the date and the name or initials of the patient as illustrated (Fig. 8).

*If a rapid diagnosis is desired, the thin and thick films may be made on separate slides. The thin film can be air dried, fixed with methyl alcohol, and stained immediately. If no parasites are found on the thin film, the thick film should be examined subsequently for rare organisms not detected on the thin preparation.

Fig. 6

in all their phases. The importance of the examination of blood films for the presence of malaria parasites will be fully understood

Fig. 7

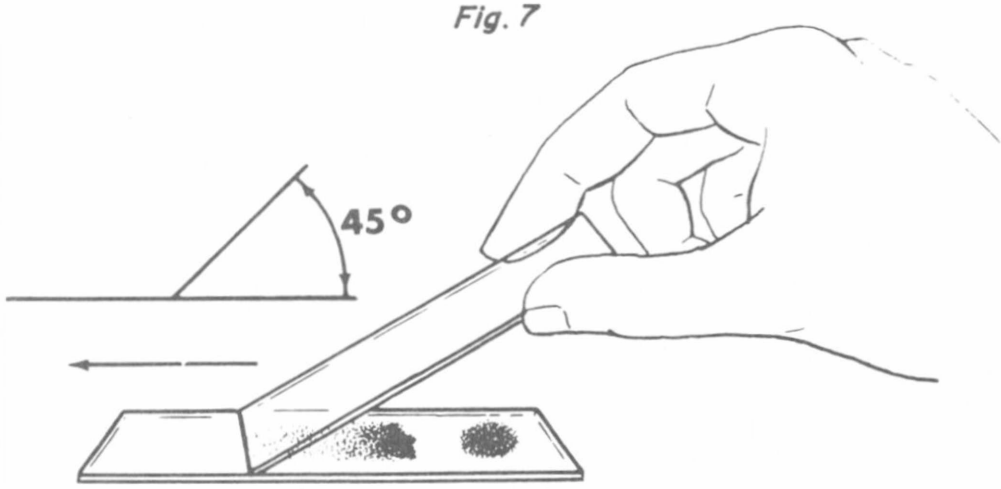
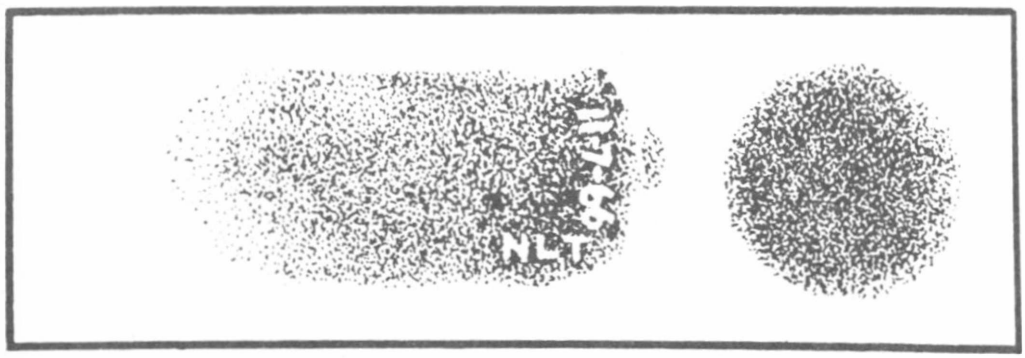


Fig. 8



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