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Status of Malaria Eradication Programs

In recent years malaria has shown a rising trend in the Region of the Americas (Table 1). At year-end 1979 the situation could be classified as follows:

Group I. In 12 countries or territories (Chile, Cuba, Dominica, Grenada and Carriacou, Guadeloupe, Jamaica, Martinique, Puerto Rico, Saint Lucia, Trinidad and Tobago, the United States of America, and the Virgin Islands) the disease had been eradicated. This group has a population of 72.8 million inhabitants in originally malarious areas (32.2 per cent of the total inhabitants of the originally malarious area of the Americas). No major problems in the maintenance of eradication occurred during the year, although cases continued to be imported into these countries and territories.

Group II. Eight countries or territories interrupted or almost eliminated malaria transmission (Argentina, Belize, Costa Rica, Dominican Republic, French Guiana, Guyana, Panama, and Paraguay). In this group, which has a population of 14.6 million inhabitants in originally malarious areas (6.4 per cent of the total), 9,044 cases were reported in 1979. In many countries there was an increase relative to the previous year. In some countries, imported cases were more numerous owing to the increased exchange of population with other countries whereas, in others, the lack or delay in the provision of funds for operations and surveillance forced a reduction of the program or the postponement of corrective measures. In Argentina, Belize, Dominican Republic, French Guiana, and Guyana the epidemiological situation deteriorated during the year.

Group III. Five countries (Brazil, Ecuador, Mexico, Suriname, and Venezuela) vigorously pursued the eradication campaign, which received appropriate administrative and financial support. This group has a population of 98.3 million inhabitants in originally malarious areas (43.4 per cent of the total) and reported 182,428 cases of malaria in 1979. During the year, Mexico shifted an area with a population of 5.3 million inhabitants from the consolidation to the maintenance phase, and another, with 2 million inhabitants, from the attack to the consolidation phase. Brazil, Ecuador, and Venezuela continued to make steady progress; in contrast, no significant advance was made in Suriname in 1979.

Group IV. In the eight remaining countries (Bolivia, Colombia, El Salvador, Guatemala, Haiti, Honduras, Nicaragua, and Peru) the total number of residents in the originally malarious areas amounted to 40.6 million (18 per cent of the total). Although the final goal of the program is eradication, the immediate objective is to reduce mortality and morbidity from malaria in areas in which transmission persists, as well as to prevent a resurgence of the disease in areas in which transmission

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Table 1. Reported cases of malaria in the Americas, 1976–1979.

Group	Population in originally malarious areas 1979 (in thousands)	Reported cases			
		1976	1977	1978	1979
Group I					
12 countries or territories in which malaria eradication has been certified	72,843	424	531	718	1,162
Group II					
Argentina	3,276	70	463	325	936
Belize	158	199	894	1,218	1,391
Costa Rica	624	473	217	313	307
Dominican Republic	5,241	586	745	1,531	3,080
French Guiana	58	394	488	266	604
Guyana	899	4,642	1,563	927	2,294
Panama	1,856	734	678	268	316
Paraguay	2,487	140	156	156	116
Subtotal	14,599	7,238	5,204	5,004	9,044
Group III					
Brazil	48,427	89,959	104,436	121,577	147,630
Ecuador	4,712	10,974	11,275	9,815	8,207
Mexico	34,809	18,153	18,851	19,080	20,983
Suriname	287	537	993	876	903
Venezuela	10,076	4,768	5,304	5,065	4,705
Subtotal	98,311	124,391	140,859	156,413	182,428
Group IV					
Bolivia	1,961	6,714	10,106	10,897	14,712
Colombia	16,212	39,022	63,888	53,412	60,957
El Salvador	4,020	83,290	32,243	52,521	77,976
Guatemala	2,644	9,616	34,907	59,755	69,039
Haiti	4,271	15,087	27,679	60,472	41,252
Honduras	3,267	48,804	39,414	34,554	25,297
Nicaragua	2,518	26,228	11,584	10,633	18,418
Peru	5,715	18,462	32,410	20,376	17,127
Subtotal	40,608	247,223	252,231	302,620	324,778
Total	226,361	379,276	398,825	464,755	517,412

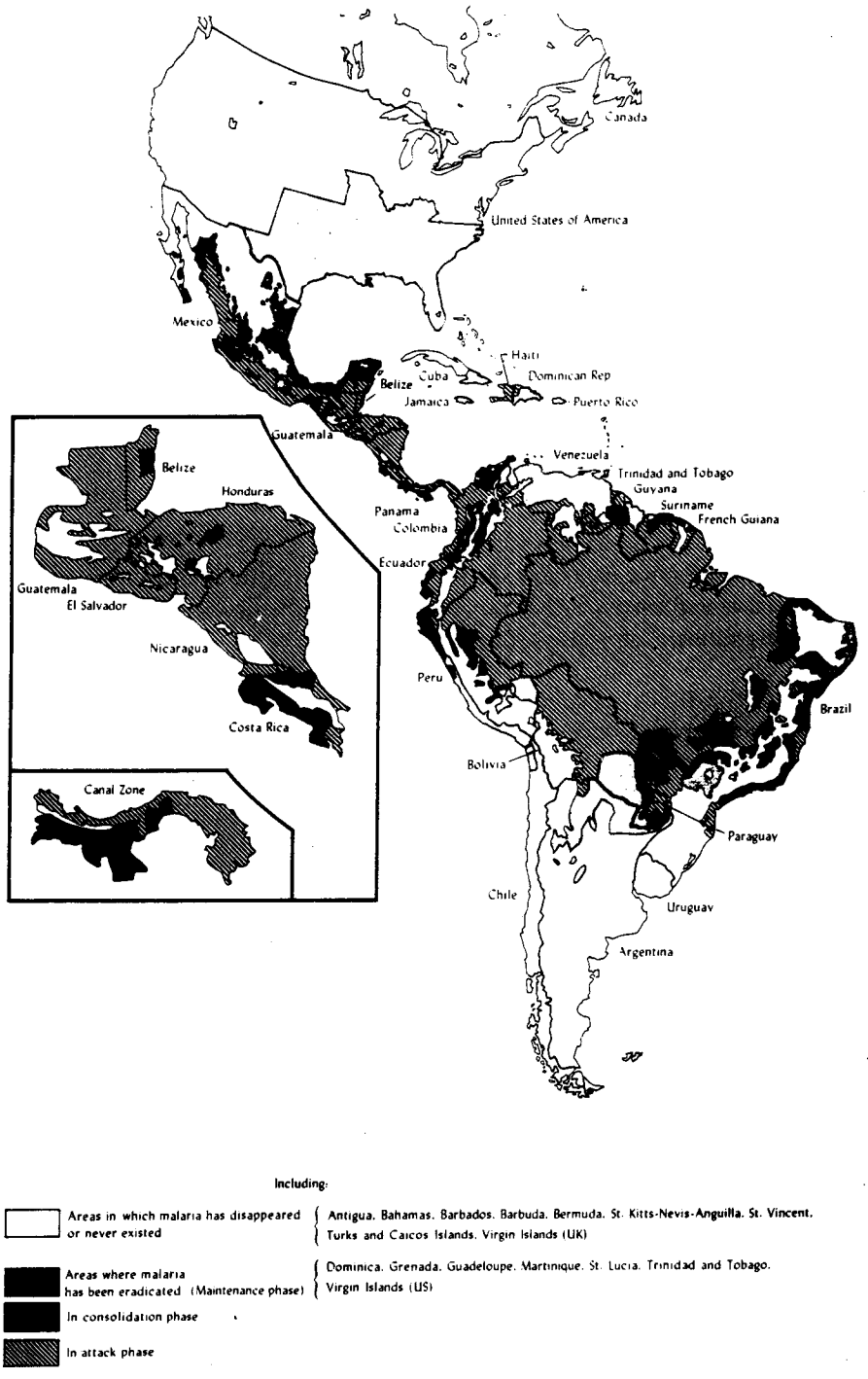
has already been interrupted. In Bolivia, all the areas that were in the consolidation phase were shifted back into the attack phase. PAHO analyzed the programs of Colombia, Haiti, Honduras, and Nicaragua and cooperated with the national authorities in preparing operational plans tailored to local epidemiological conditions. Honduras and Peru decided to incorporate malaria control activities into their general health services while, in other countries, malaria control was the responsibility of autonomous malaria eradication services. In Honduras and Peru, control and case-detection activities were reduced because of administrative problems due to organizational changes; it was therefore very difficult to evaluate the status of malaria in those countries. In 1979 the countries in this group reported 324,778 cases, or 62.7 per cent of the total in the Region.

As of 31 December 1979 the estimated population of the Americas was 600,363,000 inhabitants, of which 226,361,000 (37.7 per cent) were living in originally malarious areas. Of the last-mentioned, 113,092,000 (50.5 per cent) live in areas in which the disease has been eradicated (maintenance phase); 57,280,000 (25.3 per cent) in areas in which transmission has been interrupted, although the reservoir of parasites has not been exhausted and focal transmission may exist (consolidation phase); and 55,989,000 (24.7 per cent) in areas in which transmission has not yet been interrupted (attack phase) (Figure 1).

Obstacles to the Progress of the Program

In the period 1956–1959 a coordinated program to eradicate malaria was launched in all the countries of the Americas in which the disease was endemic. The substan-

Figure 1. Status of the malaria program in the Americas, 31 December 1979.



tial progress achieved in the 1960s waned in the 1970s. At the end of 1969 the population in areas in the consolidation and maintenance phases amounted to 67.9 per cent of the total of the originally malarious area. This figure rose to 75.3 per cent at the end of 1979, which is tantamount to an increase of only 7.4 per cent in the last 10 years.

The program faces many problems that are often interrelated and form a complex of interdependent elements that attenuate or cancel out the effect of antimalaria measures. The magnitude and nature of the problems differ from one country to another, although there are several common aspects in the same group of countries (Table 2).

Generally speaking, three principal types of problems are hampering the progress of the malaria program, especially in the Group IV countries, namely:

1. *Technical problems:* Physiological resistance of the vector to insecticides, as in the Central American countries and Haiti; evasive behavior of the vectors (the spraying of houses is not completely effective because of the lack of vector contact with the insecticide), as in western Venezuela and in eastern Colombia with *Anopheles nuñeztovari*; and *Plasmodium falciparum* resistance to chloroquine, as occurs in Brazil, Colombia, Ecuador, French Guiana, Guyana, Panama, Suriname, and Venezuela.

2. *Economics related to development:* All the countries of the Americas are actively promoting economic development projects. Agricultural settlement of new lands and the construction of highways, hydroelectric plants, dams, and the like always bring immigrants and workers to areas in which living conditions are precarious. In the last 20 years the geographic extension of the malarious area has increased as and when new land areas have been opened up to development projects and resettlement.

3. *Budgetary problems:* The funds assigned by the Governments to the malaria program have progressively increased in the past 20 years. However, this increase has been offset by the rising cost of personnel, supplies, equipment, and means of transportation. In addition, in some countries the appearance of technical problems such as vector resistance to DDT and other insecticides and parasite resistance to drugs has made it necessary to apply different or supplementary measures that are much more expensive. Furthermore, the increase in the malarious areas, new population settlements, and frequent outbreaks of the disease among immigrants are problems whose solution calls for a large amount of funds that, as a rule, are not easy to obtain. In many countries the present level of financing is barely sufficient to protect the areas in which malaria has been eradicated and, at the same time, to solve problems in areas in which transmission persists. Because of financial constraints many countries plan their activities by order of priority or use their resources solely to prevent epidemic outbreaks or to deal with emergency situations.

Table 2 summarizes the principal problems by their geographic distribution.

(*Source:* Parasitic Diseases and Vector Control Unit, Division of Disease Prevention and Control, PAHO.)

Table 2. Types of problems and distribution, by country, 1979.[a]

Countries and areas	Population (problem areas)	Areas km²	Insecticides: Types used	Insecticides: Years of coverage	No. of cases in this area	Principal vectors	Causes of the problem
BOLIVIA							
1. Department of Beni (Guayaramerín) Department of Tarija (Bermejo)	88,972	27,639	DDT	21	3,682	*Anopheles darlingi* *A. pseudopunctipennis*	Makeshift housing; land settlement; parasite resistance to chloroquine; population movement
COLOMBIA							
2. Western Caribbean region; central region of Magdalena River Valley; Pacific Coast middle and southern region; Catatumbo; central region of the eastern Piedmont of the eastern Cordillera; Upper Caquetá and Sarare; Meta River (Upper Vaupés)	849,280	125,509	DDT Malathion Propoxur	13-20	22,269	*A. darlingi* *A. punctimacula* *A. nuñeztovari* *A. albimanus* *A. pseudopunctipennis* *A. neivai* *A. albitarsis*	Vector behavior; makeshift housing; land settlement; social problems; parasite resistance to chloroquine; non-cooperation; population movement

Table 2. (Continued).

ECUADOR							
3. Esmeraldas; Napo	352,601	69,605	DDT Fenitro-thion	12 1	5,174	*A. punctimacula* *A. albimanus*	Land settlement; make-shift housing; parasite resistance to chloroquine
EL SALVADOR							
4. Pacific Coast	...	7,500	DDT	17	...	*A. albimanus*	Vector resistance to DDT and propoxur
GUATEMALA							
5. Pacific Coast	833,052	11,456	Clorfoxim	...	32,732	*A. albimanus*	Vector resistance to insecticides
HAITI							
6. Cité Simone O. Duvalier; Jacmel; Coma Valley; Gross-Morne; southeast of the country; Petit-Goave; Bois Neuf	1,720,150	3,645	DDT	13	20,529	*A. albimanus*	Vector resistance to DDT; population movement
HONDURAS							
7. Southern areas of Jamastrán, Talanga and Cedros Valleys	273,635	5,436	Malathion DDT	9	17,079[b]	*A. albimanus* *A. pseudopuncti-pennis*	Vector resistance to chlorinated, phosphorus, and carbamate insecticides
MEXICO							
8. Basin of the Fuerte, Sinaloa, Humaya, and Tamazula Rivers 9. Huicot 10. Balsas River basin 11. Costa Chica of Guerrero and Oaxaca coast 12. The Isthmus, northeastern slope of Gulf of Mexico and State of Oaxaca 13. Tapachula-Suchiate 14. Center of state of Chiapas	3,554,580	162,547	DDT	22	7,021	*A. pseudopuncti-pennis* *A. albimanus*	Internal migration; make-shift housing, temporary housing; alteration to houses; vector resistance to DDT; damage to sprayed surfaces
NICARAGUA							
15. Pacific region; central region; Atlantic region; Zelaya	...	30,138	DDT Malathion Propoxur	16 5 7	...	*A. albimanus*	Vector resistance to DDT, malathion, and propoxur
PANAMA							
16. Jaqué Calovebora St. Catalina	7,658	4,871	DDT	21	75	*A. albimanus*	Migration; makeshift housing; parasite resistance; population movement
PERU							
17. Col. San Lorenzo; Bigote, Chinchipe, Bagua Santiago, Ene-Satipo Lower Marañón	214,300	142,950	DDT	16–22	5,895	*A. pseudopuncti-pennis* *A. rangeli* *A. albimanus* *A. benarrochi*	High vulnerability; makeshift housing; labor migration; temporary housing; damage to sprayed surfaces
VENEZUELA							
18. Western and southern areas	599,455	139,946	DDT	32	2,666	*A. nuñeztovari* *A. darlingi*	Exophilia of the vector; population movement; anthropological problems
Total	8,493,683	731,242	—	—	117,122	—	—

... Data not available.

[a] There are special regions with problems of all kinds such as that of the Amazon basin which comprises areas in Bolivia, Colombia, Ecuador, Peru, and large tracts of Brazil; in the last-mentioned country, for example, a large-scale plan of socioeconomic development that includes the construction of many road and land settlement projects requires malaria control activities to be carried out as a long-term program.

[b] Up to September.

Diseases Subject to the International Health Regulations

Cholera, yellow fever, and plague cases and deaths reported in the Region of the Americas up to 31 December 1980

Country and administrative subdivision	Cholera Cases	Yellow fever		Plague Cases
		Cases	Deaths	
BOLIVIA	—	*46*	*39*	*23*
Cochabamba	—	12	8	—
La Paz	—	32	30	23
Santa Cruz	—	1	1	—
Tarija	—	1	—	—
BRAZIL	—	*26*	*23*	*91*
Bahía	—	—	—	6
Ceará	—	—	—	78
Goiás	—	21	20	—
Maranhão	—	4	2	—
Pernambuco	—	—	—	7
Rondônia	—	1	1	—
CANADA	*3*	—	—	—
Quebec	1	—	—	—
Saskatchewan	2	—	—	—
COLOMBIA	—	*7*	*7*	—
Cesar	—	1	1	—
Guaviare	—	1	1	—
Meta	—	1	1	—
Norte de Santander	—	1	1	—
Putumayo	—	3	3	—
ECUADOR	—	*2*	...	—
Napo	—	2	...	—
PERU	—	*25*	*20*	—
Ayacucho	—	8	7	—
Junín	—	9	5	—
San Martín	—	7	7	—
...	—	1	1	—
UNITED STATES	*9*	—	—	*18*
California	6	—	—	3
Florida	1	—	—	—
Maryland	1	—	—	—
Nevada	—	—	—	2
New Mexico	—	—	—	13
Pennsylvania	1	—	—	—
VENEZUELA	—	*4*	*4*	—
Mérida	—	3	3	—
Sucre	—	1	1	—

—None.
... Data not available.

Toxic-Shock Syndrome

The United States and Canada have reported a large number of cases of a newly recognized disease known as toxic-shock syndrome (TSS).

Although some cases of this disease were recognized since 1975, between January and October 1980, 408 were reported in the United States; 394 (96.5 per cent) occurred in menstruating women, and the case fatality ratio was 9.8 per cent. As of 27 November, 22 cases had been reported in Canada, of which 17 were confirmed. Only one suspected case died.

The syndrome is characterized by sudden onset of high fever with vomiting and profuse watery diarrhea, some-

times accompanied by sore throat, headache, and myalgia. In severe cases the disease may produce hypotensive shock in 48 hours. During the acute phase the patient develops a diffuse erythematous rash with nonpurulent conjunctivitis; urine output is often decreased and the patient may be disoriented or aggressive. Respiratory or cardiac insufficiency may accompany these symptoms.

Laboratory studies reveal elevated blood urea nitrogen serum creatinine, bilirubin, and creatine phosphokinase levels and white blood cell counts with marked left shifts. Platelet counts are low during the first week of illness but are usually high in the second week.

Patients usually require intensive care and large volumes of fluids to maintain perfusion. Ten days after the onset of fever, there is desquamation of the skin, particularly of the palms and soles, or of the digits and even of other areas of the skin.

TSS is a serious disease of unknown etiology which primarily affects young women of child-bearing age during the menstrual period. Because of the relationship of TSS with the menses a number of United States health agencies and institutions have undertaken studies and investigations to look at practices and products used during the menstrual cycle. The Utah Study did not find any significant association between the development of TSS and the method of contraception used, sexual intercourse during menstruation, history of herpes infection, history of earlier vaginal infections, or use of vaginal douches or sprays during menstruation. In no instance was person-to-person transmission demonstrated.

The United States Center for Disease Control (CDC) carried out a retrospective study in June 1980 of cases and controls and found a significant relationship between the use of tampons and the development of TSS, particularly if tampons were used continuously during the menstrual period. This association was corroborated by studies made by the Wisconsin State Department of Health.

A second retrospective case-control study carried out by the CDC in September 1980 focused on the brands of tampons used. Of 52 patients (no information was obtained on two of them), 50 were interviewed. The characteristics found in the cases during the study were as follows:

1. Fever (temperature >38.9°C).
2. Rash (diffuse macular erythrodermal).
3. Desquamation (1-2 weeks after onset of illness, particularly of palms and soles).
4. Hypotension (systolic blood pressure <90 mm Hg for adults or orthostatic syncope).
5. Involvement of three or more of the following organ systems:

a) Gastrointestinal (vomiting or diarrhea at onset of illness).
b) Muscular (severe myalgia or creatine phosphokinase level twice as high as normal).
c) Mucous membranes (vaginal, oropharyngeal, or conjunctival hyperemia).
d) Renal (blood urea nitrogen or creatinine levels twice as high as normal and five or more white blood cells per high-power field—in the absence of urinary tract infection.
e) Hepatic (total bilirubin, serum glutamic oxaloacetic transaminase or serum glutamic pyruvic transaminase level twice as high as normal).
f) Hematologic (platelets $< 100{,}000/\text{mm}^3$).
g) Central nervous system (disorientation or alterations in consciousness without focal neurologic signs when fever and hypotension are absent).

6. Negative results on the following tests, if obtained:

a) Blood, throat, and cerebrospinal fluid cultures.
b) Serologic tests for Rocky Mountain spotted fever, leptospirosis, or measles.

None of the patients interviewed had been included in the earlier studies. They were asked about tampon, napkin, or minipad use, brand of tampon used, and pattern of use for the menstrual cycle in which they became ill. They were asked to provide the names of three female friends or acquaintances of the same age, who lived in the same geographic area. Relatives and members of the same household were not accepted as controls. The controls were asked the same questions as the patients. If knowledge of the patient's illness had caused a change in the control's tampon use, the control was asked about the menstrual period in the previous month. Both patients and controls were asked to read the labels on their tampon boxes to substantiate the brand and the absorbency of the tampons used. All cases used tampons during the menstrual period associated with their illness, compared with 124 of the 150 controls (83 per cent) ($P = 0.006$ by chi-square for studies with matched cases and controls). In the cases and controls that used tampons, the brands used were examined. Table 1 shows the proportion of cases and controls that used only one tampon brand during their menstrual period.

The risk associated with specific brands of tampons was evaluated, taking into account the number of days of menstrual flow; a matched linear logistic regression model was used. The odds ratio (estimate of relative risk) associated with the use of Rely tampons was statistically significant ($P < .0001$, relative risk = 7.9; 95 per cent confidence limits = 2.8 to 22.2). An increased risk was observed for both product lines of Rely—Super and Regular. Similar differences in the frequency of products used by patients and controls were seen when brands were examined for: (1) predominant use during the menstrual period or (2) use at least once during the period.

Although no previous study had demonstrated a statistically significant difference in brand use, no other study had been designed to look at brands used by cases and controls over a comparable time period. However, the Minnesota State Department of Health has reported the preliminary results of a study of cases of TSS that have occurred since early 1979. In this study, 10 (35 per cent) of 29 cases and 9 (18 per cent) of the 50 matched controls had used Rely tampons. These trends are similar

Table 1. Percentage distribution of cases of TSS and controls that used only one tampon brand.

Brand	Cases[a]	Controls[b]
Rely	71	26
Playtex	19	25
Tampax	5	25
Kotex	2	12
Other	2	11

[a]42 cases.
[b]114 controls.

to the results of the CDC study. There is a significant association between the use of tampons and the cases of TSS in menstruating women. Of the menstrually associated cases, all occurred in women using tampons.

The available data show that the risk of developing TSS is related to the brand of tampons used. While TSS cases have occurred with tampons produced by all five of the major United States manufacturers, a substantially higher proportion of cases than of controls used the Rely brand. On 22 September 1980, the manufacturers of Rely tampons (Proctor and Gamble) voluntarily withdrew the product from the market.

In a recent CDC study, *S. aureus* was isolated from the vaginas of four (7 per cent) of 55 unmatched controls during their menstrual period. In contrast, *S. aureus* was isolated in 43 out of 44 cultures of TSS patients included in the CDC study made in September 1980.

So far, all isolates of *S. aureus* from TSS patients examined in the CDC laboratories have been penicillin resistant. *S. aureus* has not been recovered from unused tampons, including those from the boxes of tampons used by TSS patients.

From the early studies, the incidence of TSS was estimated to be 3/100,000 women of menstrual age per year, based on surveillance data from the State of Wisconsin. Information from the State of Utah indicates that, in that state, the incidence could be as high as 10-15/100,000 women of menstrual age per year. However, it now appears that the true incidence rate of the disease in menstruating women has been underestimated for the following reasons among others: (1) incomplete reporting of cases; (2) the case definition limited the reporting of the more serious cases.

Although the use of tampons is undoubtedly an important factor in the development of TSS in menstruating women, the pathogenesis of TSS is not yet fully understood. The isolation rates of *S. aureus* in cases and controls document an association between *S. aureus* and TSS. This association is consistent with the etiologic role for *S. aureus* in this disease.

Whatever roles *S. aureus* and tampons play in the development of TSS, some preventive measures can be identified. For example, women that use tampons can reduce their risk by using them intermittently during each menstrual period (that is to say, not to use them all day and all night throughout the period). If a woman who is using tampons develops a high fever, vomiting, or diarrhea, she should discontinue using them and consult a physician immediately.

Proper management of suspected cases of TSS includes a careful vaginal examination with removal of any retained tampon; cervical and vaginal cultures, in particular to detect *S. aureus*, and aggressive fluid replacement. Physicians should probably use beta-lactamase resistant antistaphylococcal antibiotics after appropriate cultures have been obtained. These antibiotics are indicated in view of the evidence supporting their efficiency in preventing recurrences. In addition, because of the recurrence rate of 30 per cent, the CDC recommends that tampons not be used by women that have had TSS until *S. aureus* has been eradicated from their vaginas.

(*Sources: Morbidity and Mortality Weekly Report*, Vol. 29, 229-230, 297-299, 441-445, 470, 1980; *Canadian Disease Weekly Report*, Vol. 6, 42, 49, 1980.)

Editorial Comment

The United States Food and Drug Administration (FDA) has proposed that all tampon manufacturers place the following warning on the packages:

> WARNING: Tampons have been associated with toxic shock syndrome, a rare disease that can be fatal.
>
> You can almost entirely avoid the risk of getting this disease by not using tampons. You can reduce the risk by using tampons on and off during your period.
>
> If you have a fever of 102° or more, and vomit or get diarrhea during your period, remove the tampon at once and see a doctor right away.

The studies that are being made in the United States include investigations designed to differentiate penicillin-resistant *S. aureus* from other strains capable of producing TSS; research on the role played in TSS by previously identified toxins and of the possible existence of new toxins; microbiological studies of tampons and their components; experiments on animal models.

Industry market data estimate that in the United States 70 per cent of menstruating women use tampons. Data on the tampon market in Latin America are not available and so far no cases of TSS in that region have been reported to PAHO.

Because of the association between tampon use and TSS, recommendations are made to the health authorities in the countries to consider the advisability of alerting their respective epidemiological and clinical services to TSS.

Outbreak of Bartonellosis in Ecuador

On 7 and 11 March 1970 two patients from the Chinchipe Canton were admitted to the Regional Hospital of Loja, Ecuador, with a suspected diagnosis of yellow fever; however, blood examination confirmed that they were two cases of bartonellosis. The first recovered, but the second died 10 hours after admission to hospital.

A total of more than 200 clinical cases were reported in March and April; of these, only five were confirmed by the laboratory. Mortality was low (only three deaths). The cases were treated with chloramphenicol.

From Guayaquil, National Malaria Eradication Program personnel and equipment were flown to the area so that ULV sprayings of fenitrothion to control mosquitoes in the area affected, and DDT intradomiciliary sprayings of houses in the Canton, could be carried out.

The Chinchipe Canton is considered an endemic area of bartonellosis (verruca peruana). It is located in the southern part of the eastern province of Zamora-Chinchipe between the eastern Cordillera of the Andes and the Condor Cordillera, which separates it from the ravine of the Cenepa River toward the east. Its climate is humid tropical, with abundant rainfall during most of the year; the land is very rugged, and ecological conditions are very favorable to the spread of anopheline, *Haemagogus*, *Culex*, and phlebotomus insects.

The Canton has a population of 11,771 inhabitants, distributed in more than 52 localities. The chief town of the Canton is Zumba, which is located at an altitude of 1,200 meters; the other localities are located at altitudes ranging between 800 meters (Isimanchi) and 1,750 meters (San Gabriel). The region is isolated from the rest of the country by a lack of roads, and travelers must use mules or light planes, whose service is very irregular.

By 1966, the presence of *Bartonella* in blood samples and blood cultures of patients coming from the region had been confirmed. Since then no further cases of bartonellosis have been reported, possibly as a collateral result of antimalaria activities.

In October 1978, an epidemic outbreak of verruca peruana was reported in Namballe and San Ignacio, Peruvian communities near the frontier; this led the Peruvian authorities to take urgent control measures, in particular intradomiciliary sprayings of houses in the affected area.

(*Source:* National Malaria Eradication Service, Guayaquil, Ecuador.)

Editorial Comment

Bartonellosis is an endemic disease limited to areas of Colombia, Ecuador, and Peru. It is transmitted through the bite of sandflies of the genus *Phlebotomus*. These vectors only feed by night but are found at altitudes of 750 to 3,000 meters above sea level. The reservoir of the disease is man. The disease, which is produced by *Bartonella bacilliformis* is characterized by an initial febrile period with irregular fever, anemia, pains in the bones and joints and lymphadenopathy. Weeks later an eruptive period occurs, with outbreaks of papules or nodules resembling hemangiomas, sometimes with many small lesions, sometimes with a few tumor-like subepithelial nodules. Fatality of untreated cases ranges from 10 to 40 per cent.

Diagnosis is by demonstration of the infectious agent within red blood cells during the acute phase; in sections of skin lesions during the eruptive stage; or by blood culture during either stage.[1]

As preventive measures it is suggested that known endemic areas be avoided after sundown; otherwise, apply insect repellent to exposed parts of the body.

According to information provided by the Institute of Tropical Medicine of the Cayetano Heredia University of Peru, there has been an increase in cases and outbreaks of bartonellosis in the endemic area of Peru in recent years.

[1] See Hunter, G. W. *et al. Tropical Medicine.* Philadelphia, W. B. Saunders, 1973, and *Control of Communicable Diseases in Man*, 12th edition, Washington, D.C., American Public Health Association, 1975.

Health Examination of Food Handlers

In November 1979, a WHO Working Group met in Copenhagen, Denmark, to discuss the health examination of food handlers. The purpose of the meeting was to clearly establish the various kinds of examination required for the control of foodborne diseases caused by food handlers and to formulate a new strategy for achieving an acceptable level of control of food hygiene.

As a rule, the problem revolves around the validity of

the legal requirements in many countries for food handlers to be medically examined before being employed and at regular intervals thereafter. However: (1) there is little evidence that outbreaks of foodborne diseases are connected with food handlers; (2) medical examinations and laboratory analyses are very expensive and only make it possible to identify a small proportion of the carriers of pathogenic organisms; and (3) from the administrative point of view, it is difficult to ensure comprehensive examination coverage because of the rapid turnover of workers in the food industry.

In most of the European countries a medical examination prior to employment in the food industry is required by law. The requirements for the subsequent regular examinations vary from country to country. Food handlers (excluding housewives) account for 6-10 per cent of the population.

A number of participants in the Working Group expressed doubts about the effectiveness of the national policies of their countries on the medical examination of food handlers. They were of the opinion that insufficient resources were available for examining all the workers and that the cost of these examinations made routinely and on a general basis represented an inefficient use of available resources. Therefore, attention should be concentrated on workers that are most likely to be carriers of pathogenic organisms and on persons that work with foods that are especially sensitive—like those that permit the rapid growth of pathogenic organisms or are for consumption by especially vulnerable groups such as children and the elderly.

While required in many European countries, the medical examination of workers is of limited value in detecting carriers although it reveals some sources of staphylococcal infection (for example, infected skin lesions) and may provide guidance for more elaborate investigations.

It was noted that there is no specific evidence of the value of routine microbiological examinations of the stools of food handlers as a means of identifying healthy carriers of enteropathogenic organisms.

Most of the participants were of the opinion that, although the human carrier could be a source of intestinal pathogens that caused food contamination, other sources such as raw foods and the environment were much more important.

The Group concluded that practice demonstrated that routine examinations of all food handlers should not be a priority; that these examinations should be aimed at specific problems; and that the governments should consider appropriate education of workers and strict supervision and control of food hygiene as a much more effective alternative.

Among the recommendations of the Working Group were the following:

1. Since no medical examination (even if it includes a detailed microbiological examination) can ever be relied on to exclude all carriers of enteropathogens, all food handlers must appreciate their responsibility and continually practice the highest levels of hygiene. To that end, they must be instructed in hygiene practices, and this instruction should be the responsibility not only of the official health authorities but also of their employers.
2. Occupational health nurses and other appropriately trained health personnel have an important role in the food industry, since they can assist in investigating certain conditions such as staphylococcal skin infections; encourage workers to report episodes of illness; and assist in the health and hygiene control of food handlers.
3. *Ad hoc* examination of food handlers, including microbiological examinations, should be performed promptly and thoroughly when epidemiological or clinical evidence indicate a need; for example, when food handlers have been ill or when an outbreak of foodborne disease has occurred in the community.
4. No persons should be allowed to work where they could contaminate food if they have symptoms of gastrointestinal infection or manifest infection of the skin or upper respiratory tract. This is essential even in the absence of positive microbiological findings.
5. Since thorough washing of the hands is very effective in removing enteropathogens, all persons engaged in the preparation of food commercially and in the home should give it particular attention.
6. Research should be carried out into the efficiency and effectiveness of medical examinations of food handlers in the prevention of foodborne diseases.

(*Source: Health Examination of Food Handling Personnel. Report of a Working Group.* World Health Organization, Regional Office for Europe, Copenhagen, 1980.)

Editorial Comment

Many countries of the Region of the Americas are at present reviewing their regulations on the health examination of food handlers, and are evaluating their effectiveness and studying more appropriate methods for the control of food hygiene. The Directing Council of PAHO selected this topic for the Technical Discussions to be held in 1981.

Jungle Yellow Fever in Goiás, Brazil

Because of the occurrence of cases of jungle yellow fever in the central region of the State of Goiás, Brazil, in late 1979 and early 1980, the Evandro Chagas Institute, with the support of the Public Health Campaign Authority (SUCAM), carried out studies in a number of municipalities of the region affected in order to obtain ecological and epidemiological information about the problem.

The studies were made between 19 February and 5 March 1980. During that period new cases of yellow fever were reported.

Ecological Studies

Initially an area in the municipality of São João da Aliança, where the occurrence of human cases of yellow fever and deaths of monkeys had been confirmed, was selected for the ecological studies. However, since it was not possible to reach that area because of floods, two other areas in which some of the cases of yellow fever had probably contracted the infection, were selected. One of these is situated on the border of the municipalities of Uruaçú and Niquelândia and the other, in the municipality of Barro Alto, near Goianésia. In each of them, mosquitoes and jungle vertebrates were captured. The arthropods were captured during the day by means of human bait, and the vertebrates, through the use of wire traps, nets, or fire arms. Of the 8,678 mosquitoes captured, 512 belonged to the genus *Haemagogus* and included species known to be important vectors of the jungle yellow fever virus in South America. Of the 512 insects, 461 were *Haemagogus* sp. and 51, *Haemagogus leucocelaenus*. The number of *Haemagogus* captured per man/hour was 3.2 and a total of 60.6 mosquitoes were captured per man/hour. No *Haemagogus* was trapped in five hours of peridomiciliary capture.

The insects from Uruaçú and Niquelândia were inoculated, in the form of 354 pools, into the brain of suckling mice. Four isolations, all of yellow fever (YF) virus, were obtained from *Haemagogus* sp. (28 pools); this means that at least one of every 115 *Haemagogus* was infected.

Of the 4,529 arthropods captured on the ranches of Barro Alto, 1,031 belonged to the genus *Haemagogus*: the man/hour mosquito capture rate was 4.7 for *Haemagogus* and 28 for all mosquitoes. Only five *Haemagogus* were trapped in four hours of peridomiciliary capture. No isolation of the virus was obtained with the inoculation of the arthropods, in the form of 220 pools, into suckling mice brain.

In Uruaçú and Barro Alto 119 vertebrates were captured: 100 bats, seven primates, seven marsupials, and five rodents. The blood and visceral suspensions of these animals were inoculated into mice with negative results. The hemagglutination inhibition tests (HI) made with the sera of 62 animals gave positive results: three bats for Group B, one rodent (also positive for St. Louis encephalitis), one marsupial, and one primate, both positive for Group A.

Epidemiological Studies

Concurrently with the ecological studies, a serological study was made of the population of three municipalities in order to determine the prevalence of HI antibodies for YF virus and other flavovirus existing in Brazil, as well as the incidence of infections caused by the yellow fever virus. The survey included 662 persons from the municipalities of Uruaçú, Barro Alto, and Goianésia, most of whom were resident in rural areas. The specimens were obtained from persons who had been previously vaccinated or who had come to be vaccinated against yellow fever. The results, presented in Table 1, did not show any differences as regards sex, and positive reactors were found in all age groups; however, the highest rates occurred among older people. In Goianésia the prevalence

Table 1. Flavovirus[a] hemagglutination inhibition (HI) antibodies in residents of three municipalities of Goiás, February–March 1980.

Municipality	No. of persons surveyed	Persons with Ab			
		HI P/Flavovirus		HI ≥ 1:160 P/Yellow fever	
		No.	%	No.	%
Uruaçú	246	72	29.3	4 (1)[b]	1.6 (0.4)[c]
Barro Alto	270	72	26.7	1 (1)	0.4 (0.4)
Goianésia	106	36	34.0	0	0
Total	622	180	28.9	5	0.8

[a]Yellow fever (YF), Ilhéus, St. Louis encephalitis, Bussuquara, and Rocio.
[b]Individuals with CF antibodies ≥ 1:64.
[c]Estimated incidence of recent infections.

was slightly higher than in the other municipalities. Five (0.8 per cent) of the persons examined showed HI antibody titers equal to or higher than 1:160; four of them lived in Uruaçú and one in Barro Alto. Four were males and, with the exception of one aged 13 years, the others were 30 years of age or more. Two individuals (one from Uruaçú and the other from Barro Alto) had YF antibodies with titers of 1:64, which indicates that they had probably been recently infected and had developed a benign clinical form of the disease. Consequently, it is estimated that the incidence of the infection was 0.4 per cent in each one of the municipalities.

The results observed in the 622 sera examined by means of HI tests against antigens of various arboviruses in the region are summarized in Table 2.

No positive reactions were observed for eastern or western equine encephalitis, Bussuquara, Be An 327600 (Group B), Caraparu (Group C), Guama (Group Guama), Icoaracy (sandfly fever group), Araguari and Be An 280577 (not grouped).

The results of the investigation indicate that the sole vector infected with yellow fever virus belonged to the genus *Haemagogus*. The species could not be determined. Examination of females made identification possible only at the level of the genus. Attempts to obtain males—essential for determining the species—failed, since the females died before ovulating. It should be pointed out that other species involved in the transmission of YF virus in the Americas (*Haemagogus leucocelaenus* and *Sabethes chloropterus*) were not found infected despite the fact that a large number of them were examined.

It should be emphasized that the infected *Haemagogus* sp. were those captured in the forests of Uruaçú-Niquelândia, even though in Barro Alto twice as many *Haemagogus* were captured. In some areas the *Haemagogus* capture rate was slightly higher in the canopy of the trees than at the soil level whereas, in others, the captures in trees were four times more productive. The fact that *Haemagogus* was found in a peridomiciliary environment, about 100 meters from the forest of Belmonte, in Barro Alto, confirms the possible transmission of YF outside the forest. This fact had already been observed in other areas of Goiás (Pinheiro, F. P. et al., 1980).

The absence of immunity to YF virus in primates was somewhat surprising; this phenomenon may be explained by the fact that only seven animals were examined (three from Uruaçú and four from Barro Alto).

Table 2. Results obtained in 622 sera examined by means of HI tests.

Group	Virus	Sera	%
A	Mayaro	60	9.6
	Mucambo	1	0.1
	Cross-reactions	6	0.9
California	Guaroa	2	0.3
Simbú	Oropouche	12	1.9
	Utinga	1	0.1
Anopheles A	Tacaiuma	1	0.1

The presence of flavovirus HI antibodies in about 30 per cent of the 622 persons examined is largely explained by yellow fever vaccination. Indeed, almost two thirds of the persons reported having been vaccinated with 17D vaccine a few weeks earlier.

If we accept the estimated incidence—0.4 per cent—of recent infections by YF virus in groups of persons examined in the rural areas of Uruaçú and Barro Alto and apply it to the entire rural population of the two municipalities (27,853 and 8,379 inhabitants, respectively), the probable number of recent cases would be 145 for the two municipalities.

The current outbreak of yellow fever in Goiás (20 cases as of 1 December 1980) confirms the cyclical character of the disease observed in the State for almost 40 years. But, unlike what happened in 1972-73, when the disease spread to the south of Goiás, Mato Grosso, and Paraguay (Pinheiro, F. P. et al., 1978), or in earlier periods, when other states of Brazil and Argentina were affected (Taylor, R. M., 1951), the current outbreak appears to be limited to the central region of Goiás. The wave may possibly have stopped spontaneously, but it is more likely to have been arrested by the energetic vaccination campaign immediately undertaken in the area as soon as the outbreak was discovered. The cyclical occurrence of yellow fever in certain areas of Goiás has been attributed to periodic incursions of the virus from the Amazon region (Kerr, J. A., 1951, and Aitken, T. et al.). However, this hypothesis should be reevaluated and the possibility of the persistence of the virus at a low enzootic level, and even the transovaric transmission of the virus in *Haemagogus*, should be investigated.

(*Source: Boletim Epidemiológico*, XII (10), 1980. Ministry of Health of Brazil.)

Isolation of β-lactamase-producing *Neisseria gonorrhoeae* in Panama

Gonococcal infections produced by strains of *Neisseria gonorrhoeae* producing β-lactamase (penicillinase) were reported for the first time in the United States and England in early 1976.[1] Since then these strains have been isolated in a number of countries, but their presence was unknown in Latin America. The World Health Organization recommends that epidemiological surveillance of sexually-transmitted diseases be intensified in all countries in order to discover the existence of these strains. In Panama this surveillance is carried out by the Epidemiological Division of the Ministry of Health, the Department of Bacteriology of the Gorgas Memorial Laboratory, and the Metropolitan Health Region, through its Health Centers (Drs. M. A. Vásquez, M. Kourany, and E. Quiroz). Since Panama is at the cross-roads of innumerable international flights and sea routes and has a substantial inflow of tourists and seafarers, it was deemed advisable to begin the surveillance with prostitutes, which is the group most exposed to infections due to β-lactamase producing gonococci.

A total of 991 cases of prostitutes coming from different countries in the Americas were studied. Every Friday 50 patients attending the social hygiene clinic of one of the seven health centers in Panama City were randomly selected, and each week the cases were studied in a different center. Epidemiological data were obtained from each patient and an endocervical specimen was collected with a sterile cotton swab. Each specimen was inoculated in Thayer-Martin medium, and a Z mark traced; these plates were placed in a flask with 10 per cent CO_2 and transported to a laboratory where they were streaked with a platinum loop. They were incubated for 48 hours, after which a smear was made on the suspected colonies and stained by the Gram method; the oxidase test was also carried out. When the two tests proved positive, degradation of the sugars (dextrose, maltose, and sucrose) was determined to confirm the diagnosis.[2] To determine whether the *N. gonorrhoeae* strains isolated were producers of β-lactamase, their sensitivity or resistance to penicillin was tested by placing a disk of 10 units of penicillin G on a plate of chocolate agar inoculated with the strain. The absence of an inhibition area or the presence of an area less than 22 mm in diameter demonstrated that the strain was resistant to that antibiotic. The chromogenic cephalosporin substrate test was used to determine the production of β-lactamase in the penicillin resistant strain.[3]

By October 1979 a total of 1,730 patients had been examined and 137 isolations of *N. gonorrhoeae* had been obtained. The specimens were from 991 different women, 127 of whom were found positive for *N. gonorrhoeae*. Only one of all the strains isolated proved to be resistant to penicillin and a producer of β-lactamase. This strain was isolated on 10 October 1979 from a patient aged 21 years, white, who had been engaged in prostitution for only nine months. The patient said that she did not use any contraceptive method and that in the two weeks prior to the examination no antibiotic of any kind had been administered. In addition, she stated that she did not suffer from lower abdominal pain or dysuria although she presented a thick crystalline secretion from the *cervix uteri* and slight erosion of it. No visible lesion was observed in the genital region. Two cultures had been made previously on this patient on 27 July and 31 August 1979, and on both occasions no *N. gonorrhoeae* was isolated. Once the isolation of the penicillinase-producing strain was confirmed, the patient was located at her work place and stated that, since the previous week and subsequent to the examination, she had had around 52 sexual contacts, none of whom could be located. She also stated that on 15 October she had received 4,800,000 units of procaine penicillin IM and 2 grams of oral probenecid. On 17 October a further culture was made and again β-lactamase-producing *N. gonorrhoeae* was isolated; on 19 October she was given 4 grams of spectinomycin IM and on 23 October, another culture was made with negative results for *N. gonorrhoeae*.

Epidemiological surveillance of gonorrhea and the search for gonococcal strains producing β-lactamase was continued, but as of July 1980 no other case of β-lactamase-producing *N. gonorrhoeae* had been detected.

(*Source:* Gorgas Memorial Laboratory, Panama, Panama.)

Editorial Comment

So far four countries in the Americas (Argentina, Canada, Panama, and the United States) have confirmed the

[1] World Health Organization. *Neisseria gonorrhoeae* producing β-lactamase (penicillinase). *Weekly Epidemiological Record* 11, November 1977.

[2] World Health Organization. Neisseria gonorrhoeae *and Gonococcal Infections.* Technical Report Series 616, Geneva, 1978.

[3] O'Callaghan, C. H., A. Morris, S. Kirby, and A. H. Shingler. Novel method for detection of β-lactamase by using a chromogenic cephalosporin substrate. *Antimicrobial Agents and Chemotherapy* 1:283-288, 1972.

presence of penicillinase (β-lactamase) producing *N. gonorrhoeae* in their population.

Since the strain was discovered in 1976, 1,372 isolations have been reported in the United States, 66 in Canada, 1 in Argentina, and 1 in Panama. Despite the fact that its incidence is low in this Region (less than 1 per cent in the Panama study), its capacity to spread in some high-risk groups of the population is well documented.

The Center for Disease Control (CDC) recommends[4] that, whenever possible, all patients treated for gonococcal infections be given a cure test (examination and culture) three or five days after treatment. Those patients whose examinations or cultures are positive should be considered *N. gonorrhoeae* suspects and their isolations should be examined for the production of β-lactamase. If the prevalence of the infection is higher than 5 per cent of all the isolations, all the isolations should be investigated before treatment in order to reduce the time required for identifying infected patients and their sexual contacts. Prompt treatment with streptomycin of patients and their contacts whose cure test (examination or culture) is positive can prevent the spread of β-lactamase producing *N. gonorrhoeae* in the community. If it is not possible to conduct routine studies of isolations before treatment or cure tests, consideration should be given to the periodic selective study of high-risk groups in order to determine the prevalence of the infection and the need for possible changes in the national treatment strategy.

The Bacteriology Division of CDC is equipped to confirm the production of β-lactamase, to conduct antibiotic sensitivity tests, and to collaborate in the analysis of the plasmids of specific strains for epidemiological purposes. Laboratories or programs wishing to submit questions or to send samples for analysis should get in touch with Dr. Clyde Thornsberry, Building 4, Room 239, Center for Disease Control, Atlanta, Georgia 30333, U.S.A.

[4] See *Morbidity and Mortality Weekly Report* 29:541, 1980.

Reports on Meetings and Seminars

Second Meeting of the Working Group on Immunological Differences between Street Virus Strains and Production of Rabies Vaccines

The Second Meeting of this Working Group was held on 18 and 19 November at the Pan American Zoonoses Center (CEPANZO), Argentina, and was attended by 10 scientists from several American countries.

These efforts made it possible to study more than 50 rabies virus strains in only four months of work. The research is aimed at finding differences between the antigenic determinants of the street virus strains prevalent in the Region and those of the viruses used in the production of rabies vaccines.

The results obtained in studies made with monoclonal antibodies against rabies virus antigens using strains isolated from various species in different countries, as well as with the cross protection test, were presented.

In Venezuela six strains were used, including four from human cases. Although two strains of human origin overcame the immunity of the vaccinated mice, the controls were not protected against the strains of the seed virus.

In Brazil, of the 24 strains used, at least two, one from a human case and the other from a bovine case, satisfied the conditions established for strains considered atypical.

In Argentina, studies with strains of human origin demonstrated that one of the strains overcame the immunity of the vaccinated mice, both with suckling mice brain vaccine and human diploid cell vaccine.

CEPANZO studies with strains of animal origin found that the vampire bats strains could be considered atypical, although protection lower than 80 per cent in the controls with seed virus strains could annul the results.

In Chile a strain of canine origin from Arica that could be considered atypical was found.

In the United States, of the three strains studied, that isolated from a bat met the requirements established for atypical strains.

To sum up, it was concluded that the data presented pointed to the existence of atypical strains of rabies virus in the countries of the Region.

The recommendations of the Working Group include: repetition of the test with the same protocol, using a more concentrated vaccine and using the seed virus strains in all the cross-protection tests with the street virus; preparation of suckling mice brain vaccines; determination of immune response in mice four weeks after beginning the vaccinations; and study of typical and atypical strains against most of the types of vaccine for animals used in the Americas.

Workshop on the Management and Production of Primates

The Workshop, sponsored by the Government of Peru, the Pan American Health Organization, and the U.S. National Institutes of Health, was held in Iquitos, Peru, from 10 to 14 November and was attended by 56 technical personnel from 18 countries in Africa, America, Asia, and Europe.

The participants observed the progress made by the Peruvian Primatology Program, through the establishment of a primate production station in Iquitos, and the activities being carried out in other areas of the country. Despite the short time that had elapsed since the beginning of the program, considerable progress had been made and the adaptation and reproduction in captivity of five primate species had been achieved.

Primate studies are essential for a large number of biological investigations, such as those on certain diseases, vaccine production, and testing of therapeutic substances.

Special importance was given to the fact that the tropical forests that are the natural habitat of the primates are in danger of being destroyed because of poor agricultural planning, oil exploration and production, logging, and the urbanization process, all of which are a threat to the existence of forest populations.

The Workshop made the following recommendations:

1. That countries with natural primate populations explore the possibility of initiating primate management programs, using, if possible, the results of the experiences obtained in the Peruvian Primatology Program.
2. That countries with areas inhabited by natural primate populations sign the existing multinational agreements on the conservation and preservation of forest flora and fauna and prevent illegal traffic in these products, and that the countries define their policy on the illegal movement through their territory of forest animals captured in other countries.
3. That international agencies, both public and private, provide funds for the continuation of the primate conservation programs.
4. That an international mechanism be established with the assistance of competent agencies such as the Pan American Health Organization, World Health Organization, and International Union for the Conservation of Nature and Natural Resources, so as to provide the member countries with technical advice in determining priorities for primate production.
5. That programs relating to the management of forest primates take into account the active participation of the population that should be educated and interested in the technical cultivation of plants, the rearing of domestic animals, fish farming, etc., and encouraged to participate in primatology programs.
6. That the countries with natural primate populations endeavor to educate and train the personnel that will participate at the different levels of the program.
7. That countries and institutions that use primates for their biomedical research and that do not have natural primate populations coordinate their needs with those that have primate conservation programs.
8. That an essential policy of the programs be collaboration in the establishment and maintenance of protected areas such as national parks and wildlife reserves. An appropriate program for the conservation and management of primates should include efforts to ensure the survival of representative species of primates and not be concentrated solely on species of immediate interest.
9. That programs for the management of forest primate populations be carried out in conjunction with long-term ecological studies on undisturbed habitats.
10. That programs for the management of forest populations intensify studies for developing better methods of capturing primates.
11. That the many forms of managing the ecosystem of the forest in populated areas be extended experimentally to other areas and that every effort be made to establish and support an institution of renown to conduct natural history studies in the region of Iquitos because of the extraordinary biological diversity of this area in which there are many species that are little known and others that are unknown.

Courses

Principles of Epidemiology for Disease Control

As was announced in the PAHO *Epidemiological Bulletin* (Vol. 1, No. 5), educational material on principles of epidemiology for disease control was presented in the form of a workshop to a group of health professionals in Montevideo, Uruguay, in August 1980.

A corrected version of the material discussed in Montevideo was tested in Cuba and Mexico. In Cuba the workshop was held in Havana and was attended by 27 epidemiologists from the provinces and institutes participating in the First Training Course in Epidemiology, organized by the Ministry of Public Health. In Mexico the workshop was held in León, Guanajuato, with 23 nurses and physicians from the health services and teaching institutions of five states, during the Regional Epidemiology Course for Nurses, held under the auspices of the School of Nursing and Obstetrics of the University of Guanajuato.

Valuable contributions were made by the participants of the two workshops which are being incorporated in the definitive material for the course.

International Postgraduate Course in Public Health

The Ministry of Public Health of Cuba is offering a postgraduate course in public health for university-trained professionals in the health area who work in such services as medical care, education, or research (physicians, dentists, nurses, psychologists, sociologists, social workers, anthropologists, and others) from the countries of Africa, America, Asia, and Europe.

The course lasts for 46 weeks (from 1 September to the third week of July). Persons interested should write to the

Instituto de Desarrollo de la Salud, Apartado de Correo 9082, Zona 9, La Habana, Cuba.

Residencies in Epidemiology, Public Health, and Health Administration

The Department of Epidemiology and Community Medicine of the University of Ottawa, Canada, announced that it has vacancies for residents in community medicine. Three areas of specialization are offered: epidemiology, public health, and health administration. Persons interested should write to Dr. L. C. Niri, Programme Director, Department of Epidemiology and Community Medicine, 1461 Heron Road, Ottawa, Ontario DIV 6A6, Canada.

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