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BURMA (UNION OF BURMA)

Walter Reed Army Medical Center
Washington, D. C.

January 1966

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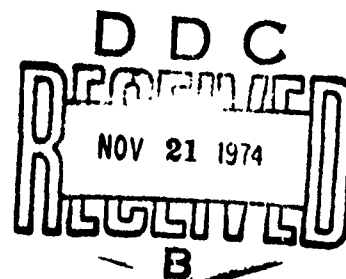
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WALTER REED ARMY MEDICAL CENTER

WASHINGTON D.C. 20012

HEALTH DATA PUBLICATION NO. 30

BURMA
(UNION OF BURMA)

Department of Health Data
Division of Preventive Medicine

January 1966

Notice

This report was prepared by the Department of Health Data primarily for the use of officers of the Army Medical Service and is based on the latest information available

WALTER REED ARMY INSTITUTE OF RESEARCH

Walter Reed Army Medical Center

Washington, D. C. 20012

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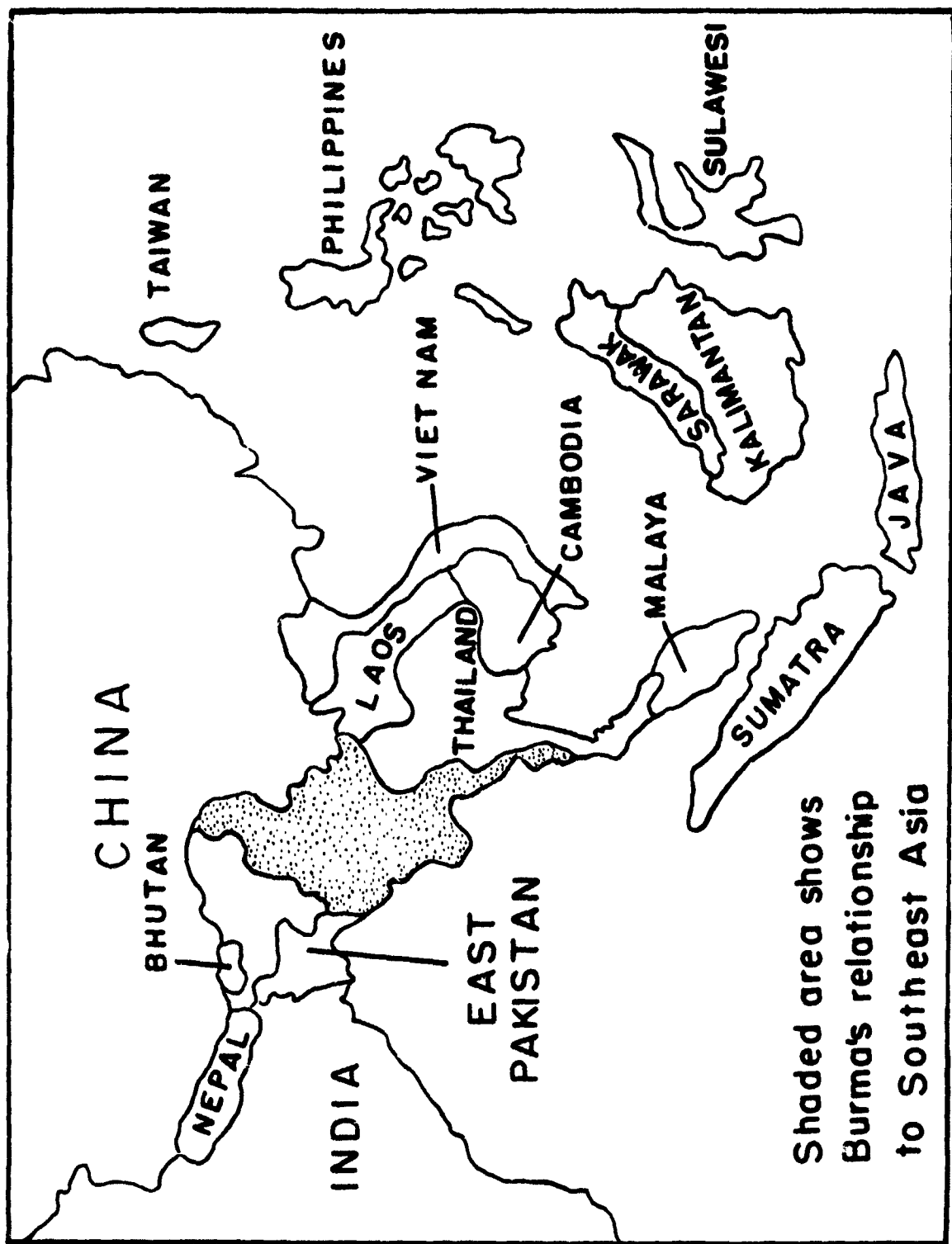
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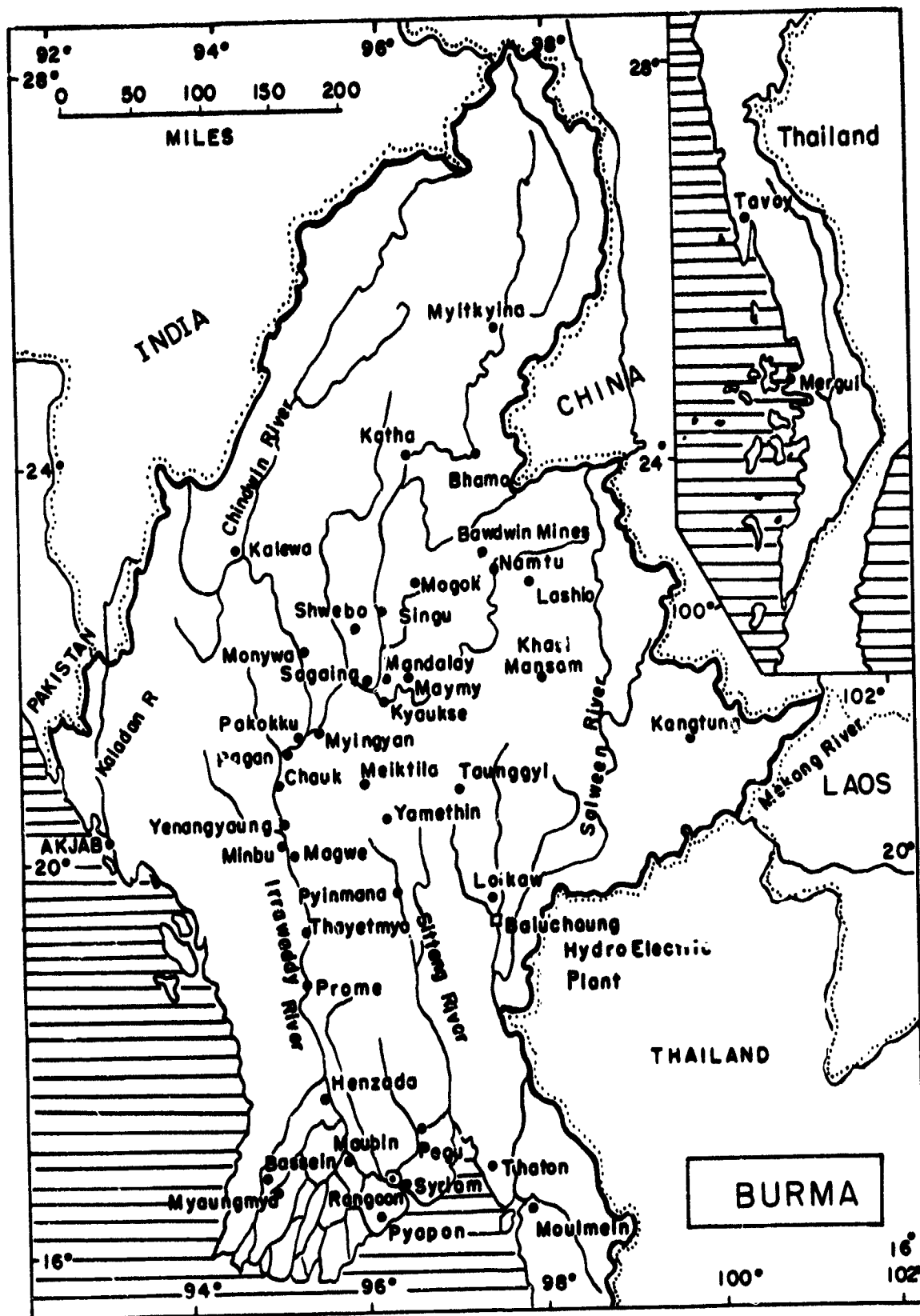
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BURMA

(UNION OF BURMA)

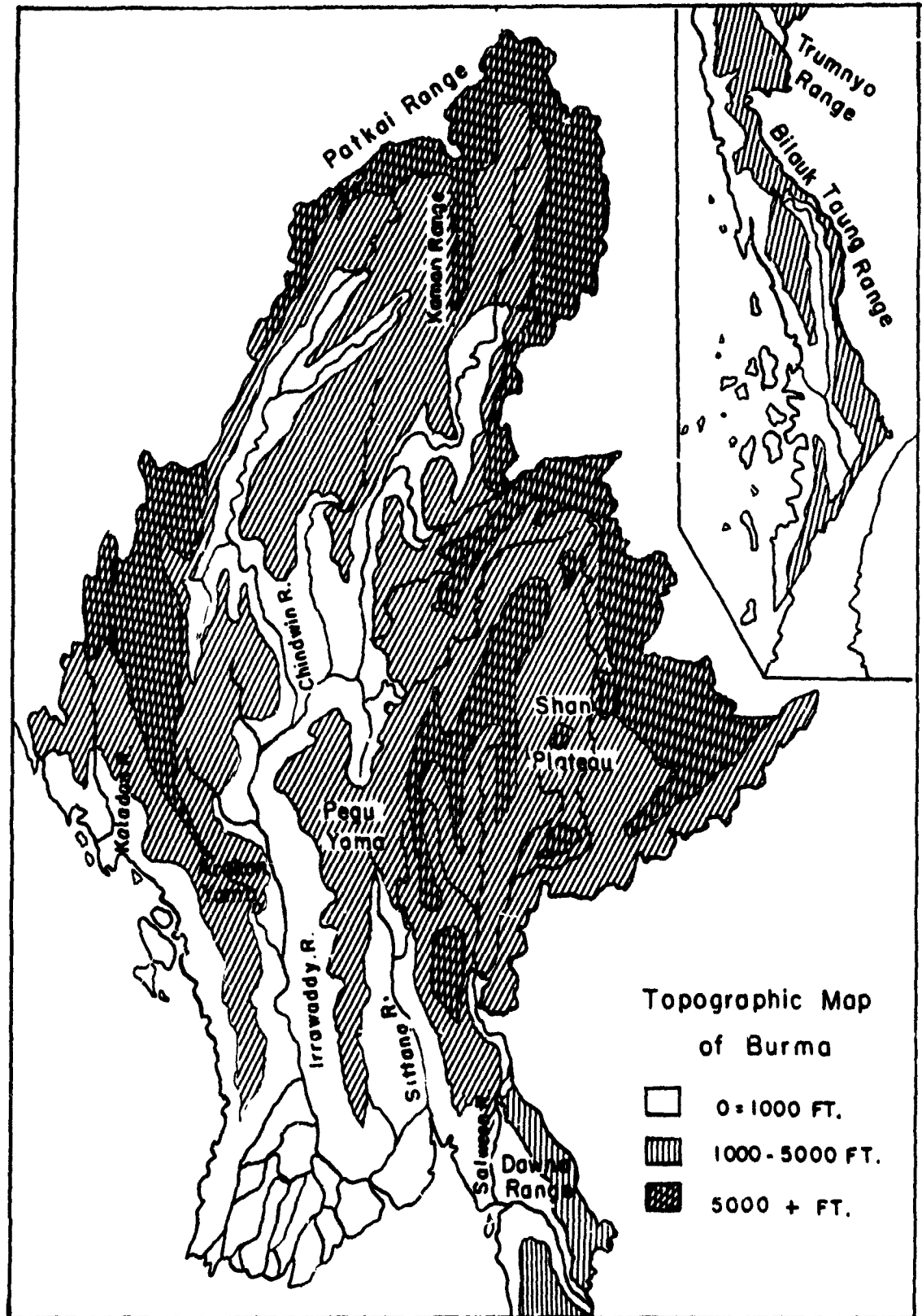
Burma is a land of green fields, high mountains, and rivers - important rivers which for centuries have been the main arteries of her economic and cultural development. Rangoon, with its port on the Andaman Sea, is not only the capital but the dominant city, and the only city most non-official foreigners are allowed to visit (1966). All international trade routes focus on Rangoon and 85 per cent of Burma's foreign trade moves through its port. Practically no other single city in the world dominates a country as Rangoon dominates Burma.

GEOGRAPHY, AREA, AND POPULATION

Geography and Area

Burma is the largest country of Southeast Asia (See Map on page vii.) Its 262,000 square miles (almost the size of Texas) are tucked between the mountains of the Assam State of India and the rugged plateau of Yunnan Province of Communist China. In the south it shares with Thailand a long mountainous border augmented by a panhandle, the Tenasserim, extending along the west side of the Malay peninsula. It also touches on two other countries for short distances, Pakistan in the west on the Bay of Bengal and Laos in the east along the Mekong River north of Thailand. Although rimmed by mountains which isolate it from neighboring countries, Burma has 1,200 miles of coastline facing the Bay of Bengal and the Andaman Sea. There are several good ports along this coast.

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Topographically, Burma is divided into three regions (See Map on page 2): 1) A series of rugged mountain ranges separates Indian and Burmese slopes down to the coast, and there curves southeastward to form the coastal range, the Arakan Yoma. 2) The Shan highlands in the east consist of a plateau deeply gouged by the Salween River system. A range of mountains rises from the plateau to 20,000 feet in some places along the China border and gradually diminishes to 2,500 feet in the Tenasserim. 3) The river valleys of the Sittang, the Irrawaddy and its main tributary the Chindwin form the central lowland. This lowland broadens as it nears the coast into the fertile delta region, Burma's rice bowl. The lowlands are divided down the middle by the Pegu Yoma, a volcanic ridge of rolling, forested hills. (See Appendix I for lists of important Rivers and Mountains)

Population

Estimates of Burma's population are in large part based on the prewar censuses of 1931 and 1941 and are subject to error. However, it was estimated in 1963 that the population had risen to nearly 23 million inhabitants, mostly rural. This gives an average of 90 people per square mile, but population densities per square mile vary widely from 10 in the north to 200 in the delta. The natural rate of increase is estimated to be 1.5 per cent annually. The populations of the main cities are as follows:

<u>City</u>	<u>Location</u>	<u>Estimated Population (1963)</u>
Rangoon (capital)	Irrawaddy Delta	821,000
Mandalay	Central Burma	200,000
Moulmein	Mouth of Salween	115,000
Bassein	Irrawaddy Delta	92,000
Akyab	Coast near western border	46,000
Taunggyi	Southern Shan States	23,000

CLIMATE

Burma stretches from about 10° to 29° N. latitude. Consequently, the climate is generally tropical although above 3,000 feet temperate climate vegetation appears and frosts occur. Its location on the northeastern shore of the Bay of Bengal exposes it to the full effects of the Indian monsoon. From May to October, southwest winds off the ocean release 100 inches of rainfall at Rangoon on the flat delta and about 200 inches at Akyab and Tavoy on the windward side of the coastal mountains. The northern part of the lowlands lies in the lee of the coastal mountains and annually receives only 25-45 inches of rainfall. Mandalay receives 30 inches a year. Farther north in the mountains and on the plateau, rainfall again increases, averaging some 80 inches at Myitkyina and 60 inches at Lashio. The weather during the rainy season is characterized by low overcast skies, daily intermittent light rain, and occasional rain squalls. From October until May, the prevailing winds change to the north-northeast bringing clear skies and dry, cool air off the continent.

The succession of seasons is: monsoon or rainy season from mid-May to mid-October, a short hot season through November, the cool season from December to March, and the hot season through April and May. The temperature ranges from 55 F. in January to 109 F. in May in Rangoon, and from 44 to 114 F. in the central dry zone. At Lashio on the plateau the range is from 30 F. in December to 108 F. in March.

SOCIO-ECONOMIC

Ethnic Groups

The people of the dominant ethnic group are Burmans. They comprise more than half of the total population and are chiefly concentrated in the lower valleys of the Irrawaddy, Sittang and Chindwin Rivers.

The Karens, numbering about 3 million, are found mostly in the southern and eastern regions along the Sittang River. The Shans,

about 1 million in number, occupy the eastern plateau; and the Chins, of which there are about 1/2 million, inhabit the northwest. There are less than 1/2 million Kachins in the north. Many other minor ethnic groups scattered throughout the country make up the remaining indigenous population.

About 500,000 overseas Chinese and an equal number of Indians and Pakistanis also reside in the country.

Language

Burmese, the official language, is spoken by more than 80 per cent of the people. The remainder speak over 126 dialects. Burmese is a monosyllabic and tonal language belonging to the Sino-Tibetan family. However, its alphabet of 11 vowels and 32 consonants was derived from the Pahlavi script of South India and a considerable number of words are of Indian origin. English is the second language and the Constitution was written both in English and Burmese.

Religion

Theravada Buddhism is the religion accepted by 85 per cent of the people. Although for a time it was declared the state religion, the Revolutionary Council has announced that it recognizes "the right of everyone to profess and practice his religion." Burmese Buddhism is a mingling of elements of Buddhism, received from India, with residual beliefs and practices antedating Indianization. Monasteries and pagodas are seen in virtually every village, and nearly all Burmese males serve as religious novices sometime during their lives. The Buddhist monks abstain from secular activities but have important influence in the village through their religious functions; i.e., giving instruction in the Buddhist texts, guiding boy novices, acting as intermediaries with the supernatural, and participating in family rituals.

This religion influences the peoples' diet in that it forbids the taking of life even for food. Thus, hunting is of little importance and

cattle are raised for draft purposes rather than food. Although raising of pigs and poultry is commonly practiced by the household and fishing is an even more common pursuit, there is some reluctance to kill the animals, and butchering and fishing are looked down upon. On the other hand, there seems to be no reluctance to eat meat or fish killed by someone else.

Residual elements from their indigenous religion include belief in a heterogeneous class of spirits called "nats." These include ancestral ghosts, monsters, natural forces, and tutelary spirits attached to places or things. Associated with these beliefs there are certain practitioners, astrologers, witches and spirit dancers.

Only 2 per cent of the population is Christian. Although Christian missionaries have had some success among the Karens, Chins and Kachins, conversions among the Burmese and Shans are almost unknown. The Indians, Pakistanis and Chinese practice the religions they brought from their homelands.

Indigenous Medicine

Although western medicine was introduced into Burma over a century ago, the majority of Burmese still rely upon indigenous practitioners or sesayas for their medical care. This is partly due to the fact that much of the population does not have access to western-trained physicians and the sesaya is always available. In addition, the sesaya is not particularly a charlatan and the government is attempting to revive indigenous medicine. The Sesaya Act of 1952 requires these practitioners to register and there were 21,000 so registered in 1961. In 1957 there were 18 free sesaya dispensaries treating a half million people.

Traditional concepts of the sesaya attribute illness to various naturalistic causes, as an imbalance of the elements in the human constitution, malign influence, or a supernatural possession. There are two types of sesaya; the dietists who seek to obtain a proper balance of the elements by regulating the diet, and the herbalists who dispense a variety of medicinal preparations. Little or no

surgery is practiced but the indigenous practitioner may call upon an expert in magical methods to deal with maleficent spirits. Many Burmese laymen have their own repertoire of household remedies. Besides the sesayas there are in Burma many practitioners of Indian medicine, as well as practitioners of Chinese ancestral medicine.

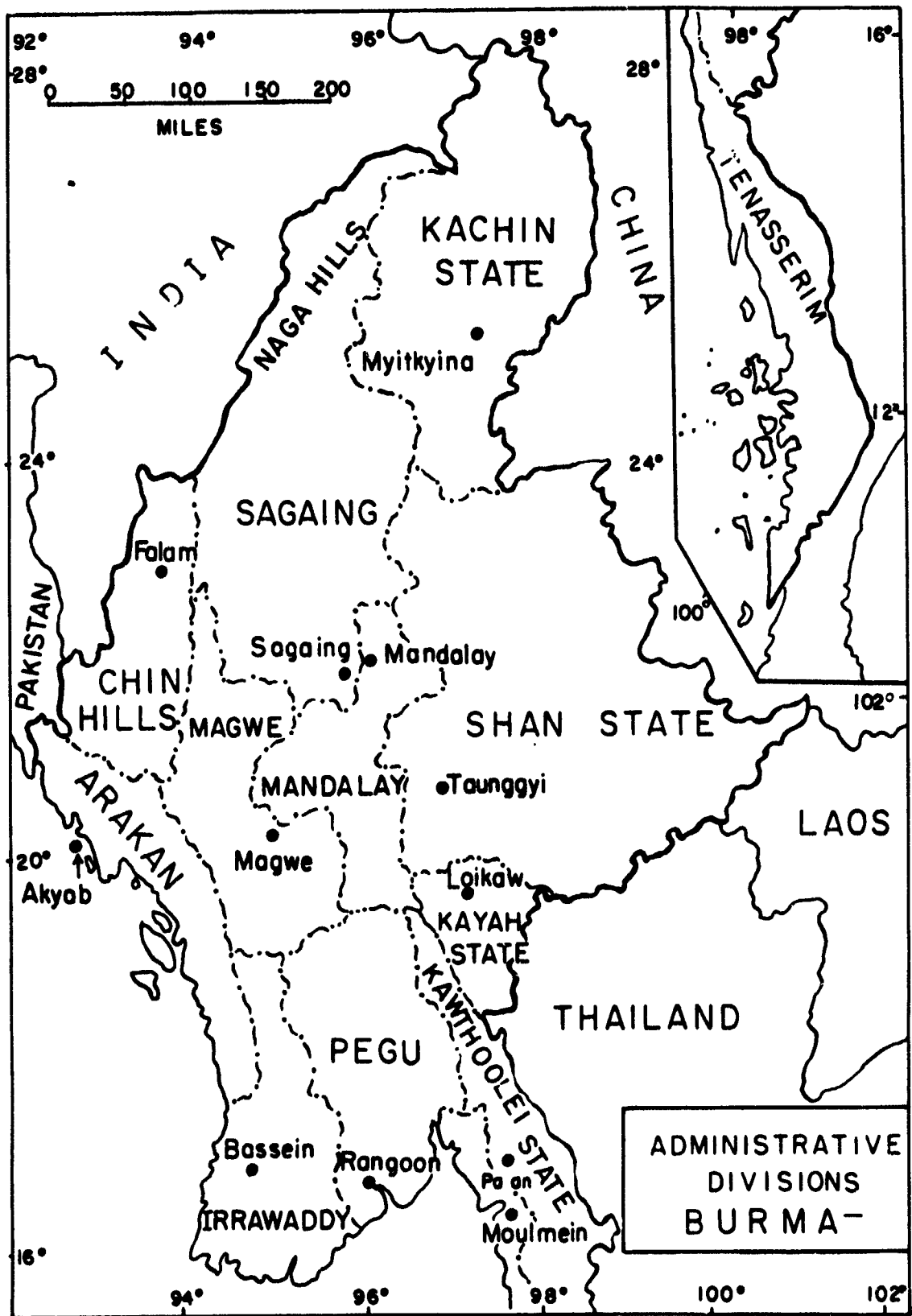
GOVERNMENT

Burma was first united politically in 1044 as the Kingdom of Pagan. After defeat by the Kublai Khan in the Thirteenth Century, the country was divided until the founding of the last dynasty in 1754. The British gained control of the territory in a series of wars beginning in 1824, and administered it as a province of the British Indian Empire until 1937, when it became a separate colony.

As a major battleground of World War II, Burma suffered more than the usual amount of devastation. Since the war, reconstruction and national development have been retarded by insurgent and bandit activities.

After gaining independence from Great Britain in 1948, the former colony became the Union of Burma as a parliamentary democracy. In October 1958, the temporary transfer of the political power to the military was approved by Parliament, and a military "caretaker" government was formed for the purpose of restoring internal order. Parliament was dissolved in March 1962, the Constitution was suspended, and a Revolutionary Council of 18 men took over the government. In the new government the Revolutionary Council is the law-making body. Executive powers are administered through a Council of Ministers, usually called the Revolutionary Government. Judicial powers have been delegated to the courts, but the system of courts was reorganized under a single Court of Final Appeals with one Chief Judge and five other members.

The Union of Burma consists of Burma proper, four associated states, and Chin Hills Special Division (See Map on page 8.) Burma proper is divided into seven administrative divisions which are subdivided into a total of 33 districts. Towns and villages are organized into townships whose councils send representatives to the district councils. The district councils report directly to the Minister of



Home Affairs in the central government. The four associated states have a certain degree of autonomy in that some powers are reserved within their State Supreme Councils. These states are: Shan, Kachin, Kayah, Kawthoolei (previously called Karen.) Although the five members of each council are chosen by the Revolutionary Council, supposedly they are drawn from the major ethnic groups within the state. Chin Hills Special Division is administered as a territory by the central government. Autonomy is limited to certain administrative personnel, schools, and cultural affairs.

Burma aspires toward a welfare state. Shortly after taking control of the government the Revolutionary Council in a statement of its goals, in "The Burmese Way of Socialism," indicated that parliamentary democracy had failed to achieve Burma's socialist aims. It defined a socialist economy as participation of all for the general well-being in works of common ownership, and planned toward sufficiency and contentment of all. For these ends all means of production will be nationalized or owned by cooperative societies.

Burma chose not to join the British Commonwealth. However, as a member of the Colombo Plan Council, Burma has received technical and economic assistance from several of the Commonwealth countries and the United States. Burma was admitted to the United Nations in 1948 and most aid has been channeled through the United Nations and its specialized agencies, particularly the Food and Agriculture Organization (FAO), International Labor Organization (ILO), and to a lesser extent the World Health Organization (WHO) and the United Nations Educational Scientific and Cultural Organization (UNESCO). Burma has been receptive to aid from Russia, Red China and the United States. Moreover, considerable financial assistance has come from Japan in the form of war reparations. Burma hosts a WHO Filariasis Research Unit which is supported by funds from WHO and a United States Public Health Service Research Grant.

Burma is a participant in the Afro-Asian Solidarity Conference and maintains a neutral status with regard to the Cold War. However, the Government of Burma has greatly curtailed the amount of travel permitted foreigners within Burma and as a result exchange of information has become scant.

EDUCATION

About 45 per cent of the population is literate, with literacy predominating in the male population by a ratio of over three to one. The Government after independence adopted a centralized system of graded schools: primary, junior secondary or middle, and senior secondary or high.

Attendance at school is not compulsory. Primary and middle schools as well as vocational schools are free, but fees are charged in high schools and universities. English is taught as a compulsory second language in secondary schools and above. There was a marked improvement in the level of education during the last decade when school attendance rose from 7 to 20 per cent in the 5 to 19 age group. During the same period, the number of teachers increased seven-fold with the result that the average number of children per teacher dropped from 74 to 42. Only a fraction of the students continue beyond primary school. In the period 1949-1959 only 5 per cent of the enrollees in secondary schools went on to the universities. Although the state schools account for almost all education at the primary level, almost 20 per cent of the students enrolled in secondary schools attend private institutions.

The University of Rangoon with about 14,000 students has faculties of arts, sciences, engineering, law, education, medicine, veterinary medicine, agriculture, forestry and social science. The University of Mandalay has 3,000 students. The intermediate colleges at Moulmein and Bassein have been raised to university status. Intermediate colleges are presently found at Taunggyi, Magwe and Myitkyina. In addition to these there are several institutions in Rangoon and Mandalay offering technical training.

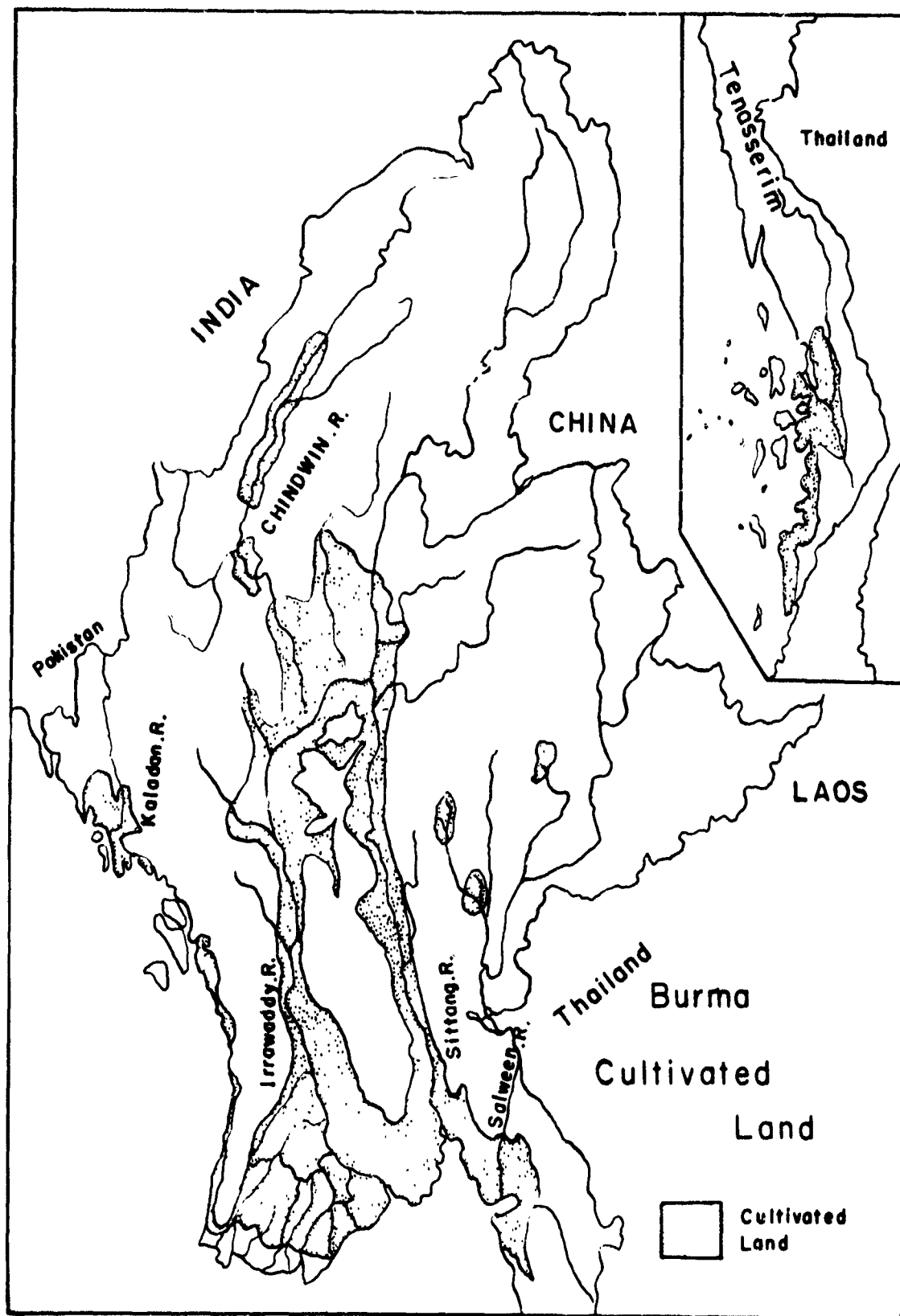
RESOURCES AND COMMERCE

Agriculture

Burma's economy is based on agriculture. Together with forestry and rice processing, agriculture employs 70 per cent of the labor force and accounts for one-half of the gross domestic product. Burma is self-sufficient in food and is the world's leading exporter of rice. Only 8 per cent of her import expenditures go for food products, primarily vegetable oils, dairy products and grains other than rice.

Burma has an enormous potential for agricultural expansion. Cultivable unused land could double the area presently under cultivation; and utilization of fertilizer and double cropping where the climate permits could further increase production. Recognizing this potential, the government is nationalizing agriculture. The goal is to finance the country's development through increased rice production and to reduce imports and the foreign currency shortage through crop diversification. Government activities in this sector have been on a broad front. Prices are fixed through purchasing and marketing the major agricultural products; 1.5 million acres have been distributed to peasants through the Land Nationalization Scheme; tractors, water pumps and other equipment are provided to expand mechanization; and several irrigation and water storage projects are underway, including Thitsan Dam in Yamethin district and Thetsaw Dam in Meiktila district.

The estimated total sown area in 1962 (See Map on page 12) was 17.76 million acres, slightly more than the previous year but still only 93 per cent of the prewar level. Although production of some crops has increased, total agricultural production has been fairly stable since 1959. About 1.4 million acres, almost all sown in paddy, are irrigated. In 1962 the 10.8 million acres under paddy produced 6.49 million tons of rice. This crop is often damaged by floods, as was the case in 1962 when 212,000 acres were destroyed. Other important crops are grown mainly in central Burma. These include millet, wheat, sesame, pulses, peanuts, sugar cane,



cotton and tobacco. An average of 15,000 tons of rubber is produced annually in the delta and the Tenasserim.

In mountainous areas shifting agriculture "taungya" is practiced. This involves burning off the forest cover, cultivating the land for one or two years, and then moving on to a new field. One of the drawbacks of taungya is that it fosters erosion and the loss of valuable topsoil.

Animal Husbandry

Although the Buddhist Burmese have not engaged extensively in raising livestock as a food source, 5.7 million cattle, mostly of the zebu variety, and over 1 million water buffaloes are maintained for draft purposes. Most farming households keep poultry and many keep pigs. About 4,000 captive elephants are used by the logging industry.

Draft cattle are undernourished due to poor quality of grasses in native pastures and the annual depletion of good pastureland during the dry season. Moreover, the presence of wild predators necessitates coralling the herd at night. This forces the cattle to graze in the heat of the day which impairs their food intake. These nutritional factors, combined with the prevalence of disease and parasitic infestation, result in slow growth rates, low reproduction rates and little milk production. The government usually permits slaughtering of aged or decrepit cattle or those no longer useful for draft purposes.

Although there are a few commercial establishments producing pigs and poultry in the Rangoon area, most of these are produced by householders throughout the country. The swine and chickens are usually penned in areas under residences where disease and parasites become concentrated. Their diet consists of table scraps, rice by-products and whatever roots and grubs they can scavenge for themselves. Such a diet for pigs supports only slow growth and depresses reproduction rates. Pig carcasses tend to excessive fatness at market age.

The two most economically important animal diseases of Burma are hog cholera in swine and hemorrhagic septicemia in cattle and buffaloes. Neither disease is transmissible to man.

Forestry

Forests cover 57 per cent of the country and one-fourth of this area is in teak. Teak is located on both flanks of the Pegu Yoma, on the escarpment of the Shan Upland, on the lee slopes of the Arakan Yoma and on the lower slopes of the northern mountains. The teak output in 1961 was 312,000 round log cubic tons, one-third of which was exported, supplying 75 per cent of the world teak market.

Production of wood other than teak amounted to 619,000 round log cubic tons, almost all of which was consumed domestically.

Forest concessions have been nationalized.

Fishing

In spite of their 1,200 miles of coastline, the Burmese have not developed a salt-water fish industry and fishing is done chiefly in fresh water. According to official records, 20,000 tons of fish were harvested from inland waters in 1962, but it is estimated that many times that amount was actually harvested. Fishing is the most significant non-agricultural pursuit of Burma and is the most important source of animal protein. The fish may be dried or salted for market, consumed fresh, or processed into a paste to be eaten with rice.

The government expects to develop salt-water fishing in a joint venture with Thai and Japanese companies. A cold-storage plant, a fish cannery, and an oil and fish meal factory have been erected by the government.

Mining

All mining is nationalized under the control of the Mineral Resource Development Corporation (MRDC.)

The minerals of Burma include lead, silver, and zinc from the Bawdwin Mine near Namtu, where copper and nickel are also found. Tin and tungsten are mined in Kayah State at the Mawchi Mines and near Tavoy in the Tenasserim. Jade is found near Myitkyina; rubies

and sapphires, as well as garnets near Mogok. And gold is found along the banks of the Chindwin and Irrawaddy Rivers.

Resources in iron, antimony, and brown coal are known to exist.

Petroleum was an important mineral resource, but recovery from the destruction of the industry during World War II has been slow. Existing fields located at Yenangyaung, Chauk and Singu are declining in yield, and the future of Burma's oil industry depends upon the successful exploitation of new wells. A number of deep wells were drilled between 1960 and 1962, of which only a few in the Chauk area were productive. Refineries are located in Chauk and Syriam. Their output must be supplemented by imports.

Power

In 1962, Burma's total state-operated generator capacity was 330 million k.w.h. Energy consumption was 290.7 million k.w.h. The largest hydroelectric power station is Baluchaung on Lawpita River in Kayah State. It supplies 180.5 million k.w.h., most of which is consumed in Rangoon.

Industry

Burmese industry provides only 10 per cent of the gross national product and is largely confined to processing of agricultural products. Although rice is the primary agricultural product other crops provide: cotton for spinning and weaving, jute for bag production, sugar for milling, tobacco for cigarette manufacturing and fruits and vegetables for canning. The government announced in March 1963 that industrial production would be nationalized but has promised to encourage light industries and provide managerial, technical and material aid to this phase of industry.

TRANSPORTATION AND COMMUNICATIONS

(See Map on Page 17)

Rivers

Rivers provide the primary routes of inland transportation. The Irrawaddy is navigable to Bahmo over 800 miles from the ocean and the Chindwin, its principal tributary, is navigable for 400 miles. The Kaladan is navigable for 100 miles, and the Salween for 55 miles. Moreover, the Irrawaddy Delta provides 1,700 miles of creeks and canals navigable to small craft.

Ports

Ocean shipping is controlled by the government, which operates all coastal and high-seas lines. Rangoon located 21 miles inland on the Rangoon River handles 90 per cent of all imports and 70 per cent of all exports. Other ports include Akyab, Bassein, Moulmein, Tavoy, and Mergui.

Surface

Surface transportation in Burma is difficult. Railroads and highways generally parallel the rivers and provide few east-west routes. The rail network extends 1,860 route miles on one-meter-wide single tracks and is managed by the government-owned Burma Railway System. The Ava Bridge near Mandalay is the only bridge crossing the Irrawaddy River.

Railroad and highway ferries at Henzada connect Rangoon with Bassein and western portions of the delta. Ferry service across the Salween River is necessary in order to reach Moulmein.

Roads

There are 12,422 miles of roads of which 6,811 are surfaced. About 4,000 miles are passable in all weather. There are 8,319

miles of mule tracks, 4,704 miles of car tracks, and 47,000 miles of village tracks. The 1957 registration indicated there were 17,500 motor vehicles plus an equal number of commercial motor vehicles.

The Burma Road connecting Lashio with Kunming, China is probably the only remaining all-weather route between Burma and any of its neighbors. Recent maps indicate that Stillwell Road connecting Bhamo and Myitkyina with Ledo in Assam State in India is not now an all-weather route.

Air

Air transportation is an important link with the outside world. Nine foreign airlines land at the principal airport, Mingaladon, located 9 miles from Rangoon. Domestic air transportation is maintained by the government through the United Burma Airlines (UBA). There are 3 other international airports in Burma and 36 landing fields.

Telephones/Radio/Telegraph

There are 18,800 telephones of which about 16,300 are in Rangoon. Radio receivers number 15,000 half of which are in Rangoon, where the government established two 50 kw. radio transmitters in 1957.

There are 193 telegraph offices. Direct wireless telegraph or radio telephone service links Rangoon to most Asian countries, the United States, the USSR, the United Kingdom, and Switzerland.

Post Offices

There are 532 post offices

DIET, NUTRITION, AND FOOD SANITATION

Diet and Nutrition

Although Burma produces a surplus of agricultural products, many Burmese do not have a satisfactory diet. This results from several factors: dietary customs which exclude several valuable foods; cooking habits that often waste valuable nutrients; problems of transport and storage which hinder distribution of produce from areas of surplus to areas of need; and the high cost of food in the market.

Burmese generally eat two meals a day. The menu is the same for both meals and cooking is usually done at one time in the morning. Meals consist of polished rice eaten with a curry and a variety of condiments, particularly "ngapi," a paste made from shrimp or fish. Ordinarily, curries consist of vegetables since few can afford meat regularly. Information currently available indicates the average diet furnishes a little over 2,000 calories a day. Protein intake is low since meat is expensive and scarce due to religious and legal restrictions on slaughter. Peas and beans are considered Indian food and are not readily acceptable to Burmese. However, fish caught by non-Buddhists are commonly used. Only foreigners drink significant amounts of milk. Fresh milk is unsafe. Powdered and canned milk which must be imported is expensive and is used by the Burmese in small amounts only.

Dietary fats are high in unsaturated fatty acids but provide only 17 per cent of the calories. The main caloric source is rice which is washed 3 to 4 times and then cooked in an excess of water. This excess water is discarded wasting much of the vitamin content. Vegetables include many species of leaves eaten by the Burmese, but these too are cooked in excess water. Vitamins most likely to be deficient in the diet are thiamine, riboflavin and possibly B₆. The intakes of iron, iodine and probably calcium are also inadequate. Often the fishpastes contain the bones and serve as the principle source of calcium.

The incidence of dental caries is low although the fluoride

content of the water supplies is not sufficient in itself to account for this. Dental problems and periodontal disease, however, are common due to neglect of caries and poor hygiene.

Food Sanitation

Food sanitation as practiced in western nations is practically nonexistent in Burma. The Food and Drug Act (1928) places a penalty on the sale of articles that are not of proper nature, substance, or quality. However, neither an enforcement agency nor specific standards has been established. Milk should be boiled and all food sold in public places should be considered unsafe without thorough cooking.

HOUSING

Typical Burmese houses stand on stilts about 1 to 6 feet above the ground and have gabled, thatched roofs and wooden or bamboo floors. The interior is quite dark and usually consists of a single room but may be divided by partitions that reach only to the eaves. A veranda in front serves for greeting guests and as a living room. A second veranda in the rear is used for storage and food preparation.

Particularly in cities, lack of suitable housing presents major health problems. Of approximately 3 million houses existing in Burma before the war, about 240,000 or 8 per cent were destroyed. Rangoon lost 33 per cent of its 79,000 houses and the destruction in Mandalay was even greater. Insurgent and bandit activities have hampered reconstruction. Shortages of building materials exist and items that have to be imported are expensive. Thus, reliance is placed on bamboo and jungle lumber for construction material and on thatch for roofing. As a result the fire hazard is great.

A National Town and Country Housing Development Board has been created and has recently constructed a number of suburbs for

Rangoon and other cities to replace some of the squatters' shacks that sprang up after the war.

WATER SUPPLIES

None of the water supplies in Burma meets American standards for safety and as a precautionary measure all water should be boiled or treated before use. A survey made in 1956 of 65 major towns showed that 60 per cent had no water supply system. Less than 10 per cent had an adequate supply system and these served only a small portion of the population.

Rangoon

Rangoon has a water supply of 29 million gallons a day obtained from Hlawga Lake and from Gyobu Reservoir 55 miles north of the city. The water from both sources is chlorinated part of the time, the Hlawga Lake supply with calcium hypochlorite and the Gyobu with liquid chlorine.

Shortages of disinfectant occur from time-to-time and treatment is intermittent. Pressure in the distribution system is maintained for only 16 hours a day. As a result, water is stored in open containers even in well-to-do homes and office buildings. Most of the residents must carry water into their homes from street faucets, frequently more than 100 yards away. Great quantities of water are wasted because taps are left open. The uncemented areas around these faucets are used for bathing and laundry purposes. Numerous private wells, mostly driven, are also in use in Rangoon, but from a bacteriological standpoint the quality of this water is no better than that of the municipal supply.

Mandalay

Mandalay's public water supply is the large open moat surrounding the palace grounds in the city. The water is brought untreated to the city from nearby hills. Only a small portion of the population

uses this supply and most of the residents use wells, either driven or dug. The dug wells are unprotected against surface drainage and are frequently in poor repair. Hand pumps are rare and in most places water is drawn in open buckets with a soiled rope. Those who live along the Irrawaddy River use it as a source even though it receives human excreta and other wastes.

Moulmein

Moulmein derives its water from a reservoir on a nearby hill. The water is not treated. The capacity of the reservoir is inadequate and much of the stored water is lost through a long-standing leak. As a result there is a serious shortage and the municipal supply is intermittent. Consumers store water in open containers and wastefully dump it when piped water becomes available again. The population not served by the municipal supply obtains water from insanitary water carts whose sources are unprotected dug wells.

Bassein

Bassein does not have a piped water supply. The municipal supply is obtained from two driven wells located in a congested section of the city. It is then peddled from wooden barrels, drawn through the streets on bullock carts. Many residents not served in this way obtain their drinking water from the polluted river that runs through the city. A number of unprotected dug wells are found near houses, and there are a few privately owned driven wells.

Akyab

Akyab has a small municipal water supply of doubtful quality. This supply is not connected with any of the houses but only to a small number of street faucets. Private, unprotected wells of doubtful safety are in use.

Taunggyi

Taunggyi has an unpolluted mountain water source that flows into two small reservoirs that contain considerable vegetation. Although

an extensive town supply could be developed, very few houses are presently supplied by this source. The water is reported to be of good quality, but is not treated. Most of the residents obtain water from privately-owned, unprotected dug wells.

Remaining Towns and Villages

The remaining towns and villages have no municipal supply of water. Water is generally obtained from shallow wells or nearby surface supplies.

Rural Areas

In the rural areas the Sanitation and Water Supply Board, operating under the Ministry of Social Welfare, has the specified function of providing the rural population with clean drinking water. The primary effort of the Board is directed toward drilling and renovating driven wells. Between 1952 and 1957, 2,031 such wells serving about 600,000 people had been constructed in 18 rural districts mostly around Pangoon. Elsewhere water is derived from unprotected, shallow wells, cisterns, and nearby ponds or streams. The same ponds and streams may be used for bathing and laundering and often receive outflow from privies.

SEWAGE, WASTE, GARBAGE DISPOSAL

Sewage

The disposal of human excreta is at a primitive level throughout Burma and is a major public health problem. Rangoon has the single sewerage system which serves only 25 per cent of its population. The system is antiquated and in many locations conduits overflow due to poor maintenance and faulty pumps. The sewage is ultimately discharged into the river without treatment. Open trenches serve as storm sewers and help remove surface run-off during the monsoon. In the dry season they become badly fouled with feces and refuse. These trenches were originally provided with stone covers but they have long since been removed. The contents of the trenches are discharged into any nearby stream or open field. In other cities and

towns people use either insanitary surface privies or pail privies if they are available. However, the scavenger service for the latter is usually unsatisfactory. It is not uncommon for adults as well as children to urinate or defecate in the streets.

In rural areas excreta are usually disposed of on the ground. There are relatively small numbers of pit privies, bored hole latrines, and septic tanks in use. The high ground-water table that prevails during the monsoon season complicates the problem of sewage disposal and all rivers, lakes and ponds invariably receive sewage and excreta.

Waste/Garbage Disposal

Waste and garbage are picked up by truck at irregular intervals from a few designated areas in the major cities. Most of these cities have one or two central locations for dumping and periodically the residue is covered with earth.

PLANTS OF MEDICAL IMPORTANCE

Rather common beliefs among the Burmese ascribe medical and toxic uses, or alleged therapeutic and toxic properties to a number of plants. The Appendix on page 59 indicates the scientific and common Burmese name as well as the alleged properties of some of these plants.

ANIMALS OF MEDICAL IMPORTANCE

Large animals include tigers, leopards, bears, deer, and wild dogs. Elephants, wild buffaloes and boars, living mostly in herds, may cause serious damage to crops of sugar cane and paddy rice, but do not commonly pose threats to humans. Twelve species of monkeys and two of gibbons are present. Rhinoceros, although quite rare, have been reported.

Snakes

Poisonous snakes are numerous and even urban dwellers may encounter them (See Appendix IV.) Burma reports the highest snakebite mortality rate in the world, 15.4 per 100,000. Within Burma the rates are highest along rivers in the dry zone and only slightly lower in the delta. Peak mortality is generally recorded in December.

The venoms of cobras, coral snakes, kraits and sea snakes are primarily neurotoxic. The symptoms are manifested initially by disturbances of locomotion, sensation and mental processes, with little tissue reaction around the bite. The venom of the vipers produces painful swelling and bleeding at the site of the bite followed by bleeding from mucous membranes.

Burma Pharmaceutical Industries produces 5 ml. ampules of polyvalent antivenom which is supposed to be effective against both cobra and viper venoms. No data are available on its potency against other venoms. (See Appendix IV.)

Rodents

A survey of rats in Rangoon showed the most common species to be the Little Burmese rat, Rattus exulans concolor. Since Rangoon is a port city, this may not apply to the country as a whole. However, it is an important species as it could be a host for fleas harboring rickettsiae.

Also present in Burma are: Bamboo rats, RHIZOMYS; the black rat Rattus rattus; the brown rat, Rattus norvegicus; bandicoot rats, Bandicota bengalensis.

The bandicoot rats, Bandicota bengalensis, are quite common and known to transmit rat bite fever. This rat should be distinguished from the Australian bandicoot which is a marsupial. The bamboo rats, RHIZOMYS, are a serious economic pest. When the roots of the bamboo die, they are likely to invade and destroy the rice in the paddies.

Arthropods

Mosquitoes

Anopheles. More than 35 species of anophelines have been recorded in Burma. Breeding can be expected at least to elevations of 8,000 feet and possibly higher. The most important malaria vector is A. minimus which breeds in foothill streams and terraced paddies and prefers to feed on man. It is the dominant vector in the foothills of the Arakan Yoma and Pegu Yoma mountain ranges, foothills of the northern mountains and on the eastern plateau.

A. culicifacies is the dominant malaria vector on the plains of the delta and central dry zone. It has demonstrated increased tolerance to DDT.

A. sundaicus and A. annularis are prevalent along the Arakan coast and are thought to be vectors of malaria in that area. As early as 1954 it was recognized that A. sundaicus was resistant to DDT, and Dieldrin must be employed for mosquito control at least along the coast.

A. balabacensis, which is primarily a jungle breeder, is a malaria vector of importance in certain thickly wooded areas of northern Burma, the Maddy Township near Mandalay, and the Chand zone near Moulmein. Other malaria vectors of importance in some areas include A. maculatus maculatus, A. nigerrimus, A. fluviatilis, A. jeyportiensis, A. philippinensis, and A. stephensi. A. stephensi breeds in artificial containers and transmits in some urban areas.

Aedes. Aedes aegypti, vector of yellow fever and dengue, is found throughout Burma except at elevations that do not permit year around breeding. The primary breeding places are in artificial containers in and around houses.

A. albopictus, also a vector of dengue, is another domestic mosquito found throughout the country. Unlike A. aegypti, it breeds in tree boles near villages and in the jungle and scrub.

Culex. Culicini are extremely common and more than 18 species have been reported in Burma. C. pipiens quinquefasciatus (C. fatigans) is the most important, due to its role as a vector of filariasis. It carries Wuchereria bancrofti. In one survey, 14.8 per cent of specimens collected were infected with this parasite. C. tritaeniorhynchus, a vector of Japanese encephalitis in Japan and other Asian areas, is also present. Whether it is a vector in Burma is not known.

Flies

Houseflies are common, especially during the rainy season. Musca domestica, M. sorbens, and others infest markets, open restaurants, vending carts, and households. They are potentially dangerous as mechanical transmitters of filth-borne disease. Horseflies and deer flies, Stomoxys and Chrysomya, are found in the jungle, especially during the rainy season. Although they are not known to be vectors of human disease in Burma their bites are painful. They can be mechanical vectors of Trypanosoma evansi, causing "surra" in horses and other animals.

Among the sandflies Phlebotomus argentipes, a vector of kala-azar and cutaneous leishmaniasis, is common and widespread. Other species of sandflies present in Burma include P. sylvestris and P. barraudi, potential vectors of these diseases. P. papatasi has not been reported as being present in Burma.

Lice

The head louse, Pediculus capitis, is found throughout Burma. The body louse, P. corporis, is found in the mountains and cities where more clothing is worn. The pubic louse, Phthirus pubis, is also common. The rat louse, Polyplax spinulosa, contributes to the maintenance in rats of murine typhus.

Fleas

The rat fleas Xenopsylla cheopis and X. astia are ubiquitous in Burma. X. cheopis is the most common vector of plague but X. astia also has been incriminated. Other fleas include Ctenocephalus canis and C. felis.

Ticks

Rhipicephalus sanguineus, the universal brown dog tick, is present in Burma. It is a vector of Rickettsia conorii, the causative agent of tick typhus. Other species are present also but identifications have not been made.

Mites

Leptotrombidium akamushi and Leptotrombidium deliense, both vectors of scrub typhus, are common. Gahrliepia (Schongastia) ligula, which may possibly transmit scrub typhus, seems to be more common in Burma than Laurentella (Euschongastia) indica which is commonly found in India. The latter is not a vector of scrub typhus.

Sarcoptes scabiei, the itch mite, is also very common.

Other Arthropods

Other arthropods of importance because they cause discomfort or more or less dangerous painful bites include: scorpions, centipedes, bedbugs, and ants.

VITAL STATISTICS

Vital statistics figures for Burma are extremely variable and should be viewed with caution. Death rates, birth rates, infant mortality and natural population increases are all based on extrapolation of a 1953-54 census that was constructed from sample surveys representing less than 10 per cent of the population. (See Appendix V) The estimated 23 million population of 1963 may be inaccurate and the other vital statistics are based on an assumed annual increase varying from 1.5 to 2.0 per cent in the intervening years.

Recording of vital statistics and morbidity figures has been attempted in only 78 towns representing a population of two million. However, there is a project supported in part by WHO to extend registration to the whole country. In 1960 estimated vital statistics based on 60 of the 78 registration areas surveyed in 1953-54 were as follows:

Crude Birth Rate	50/1,000
Crude Death Rate	35/1,000
Infant Mortality	156/1,000 live births
Maternal Mortality	58/1,000
Life Expectancy at Birth	
Males	40.8 years
Females	43.9 years

Appendix V, Leading Causes of Death in Burma, gives some information on the relative importance of several general categories of causes of death.

DISEASES OF BURMA

General

The medical problems of only a fraction of the population come to the attention of western-educated physicians and since there is no well established notification system little official information is available.

The following diseases are listed as notifiable in the Rangoon municipal area: plague, cholera, smallpox, yellow fever, chickenpox, measles, diphtheria, scarlet fever, enteric fevers, cerebro-spinal meningitis, pulmonary tuberculosis, puerperal septicemia, beriberi, relapsing fever, leptospirosis, typhus, influenza, malaria, leprosy, rabies, dysenteries, anthrax, food poisoning, and whooping cough.

In a country that is primarily rural, the figures given for specified diseases are considerably below actual occurrences and reflect

information on the urban more than on the rural population. The information is only slightly better for diseases that have been the object of special programs; as on malaria, leprosy, venereal disease, tuberculosis and malnutrition.

Malaria

Malaria remains one of the most serious medical problems in Burma. Most of the general information on malaria transmission dates from the mid-1950's, when the situation was reviewed at the outset of a malaria eradication program. The initial eradication efforts resulted in considerable reduction in the rate of malaria transmission within some areas where spraying was begun. However, hopes for eradication of the disease have been frustrated in Burma, just as they have been in the other Southeast Asian countries. Eradication efforts in many instances actually amounted to only intensive control measures. In some areas the transmission rate has been reduced since 1956, but high rates recur when control efforts lag.

Malaria occurrence has been very common in the hilly regions, including Chin Hills, Naga Hills, Kachin State, Shan Plateau, hills of the Tenasserim, and foothills of Arakan Yoma and Pegu Yoma. In areas over 4,000 feet elevation malaria incidence is probably low each year during the cool season, when vectors are inactive.

In coastal areas, infection rates are generally lower except in some foci along the Arakan coast. In the central plains, disease rates are generally low except in regions bordering foothills or irrigated areas.

Plasmodium falciparum is the agent found most commonly, followed by P. vivax, and then P. malariae. Drug resistant strains have not been reported, but this does not exclude the possibility of their presence.

Anopheline mosquitoes which have been shown by dissection to be infected in Burma are A. minimus, A. culicifacies, A. balabacensis, A. annularis, A. jeyporiensis, and A. philippinensis. A. minimus is the predominant vector in the hills and, thus, the most important vector in Burma. A. balabacensis, present in extreme northwest Burma and in northern Tenasserim, is a particular problem to control since it does not rest indoors. A. annularis is a vector along the Arakan coast where A. sundaicus, a suspected vector of malaria, is also present.

During the rainy season, May to October, transmission of malaria occurs commonly in coastal areas, the dry zone and in the hills. In some coastal areas transmission continues through the cool season, October to January. In the hills transmission continues throughout the year, but peaks after the early monsoonal rains in May and again during the main monsoonal rains from June to October.

Five hundred and sixty-one deaths from malaria were reported in 1960, and 487 in 1961. After several years devoted to malaria control measures, an eradication program was drawn up in 1954 with the assistance of the World Health Organization (WHO) and United Nations Children's Emergency Fund (UNICEF). However, at the end of 1962, the Government of Burma did not renew the contract for this assistance but continued the program on its own under the Burma Malaria Institute. This decision probably resulted from the opinions of experts that due to lack of personal safety (especially in Karen State and in the Arakan Division), poor organization, poor staff, and financial problems, there was little hope for complete eradication within the foreseeable future.

Tuberculosis

Pulmonary tuberculosis is a major problem in Burma. The specific death rate is probably in excess of 200 per 100,000 population. Although the official specific death rate is under 100, it was estimated in 1956 that there were 3 million active cases. In a recent WHO survey to determine the incidence of tuberculosis in children of Rangoon, positive results to the tuberculin test were: under 6 years

28 per cent; under 10 years 53 per cent; under 15 years 81 per cent.

A BCG antituberculosis campaign was started in 1952 following an agreement with WHO and UNICEF. By the end of 1963, 11,534,245 tuberculin tests and 3,941,189 BCG vaccinations had been administered. Five teams were engaged in campaign work while 5 other teams were engaged in training health center staffs. Four hundred and fifteen out of 705 existing centers had received this training by the end of 1963.

WHO is sponsoring a new vaccination program, begun in 1964 and scheduled to last until 1968. There is a tuberculosis clinic in Rangoon equipped with mass X-ray facilities; and another in Mandalay where free treatment, home visits, and health education are given to patients and their families. These also serve as census-taking, teaching and training units for medical students and other medical personnel.

Hospital facilities for the isolation of tuberculosis patients are severely limited. Rangoon General Hospital has a 200-bed tuberculosis ward, and Mandalay General Hospital has a 30-bed ward. The Russian-built hospital in Taunggyi is said to have a separate building for tuberculosis patients. The remaining hospitals indicate that a separate ward is reserved for tuberculosis patients but the number of beds used for this purpose is unknown.

Smallpox

In 1960, 392 cases of smallpox were reported. The disease is said to be more common in the hills and mountains, but an outbreak occurred in Insein District near Rangoon in 1960. In the same year government vaccinators performed 848,194 primary vaccinations and 2,106,158 revaccinations. In 1964 a country-wide control program was launched and freeze-dried vaccine was produced by the Burma Pharmaceutical Institute.

Venereal Diseases

Venereal diseases are highly prevalent. Syphilis and gonorrhea are the most common, but chancroid, lymphogranuloma venereum and granuloma inguinale occur in considerable numbers. Twenty-five government anti-VD teams operate in Burma. According to one report 25 per cent of the people examined need treatment. Another report indicated that 11 per cent of over 100,000 blood samples from Rangoon and 11 districts were sero-positive for syphilis.

Leprosy

Leprosy is a serious problem in Burma. By the end of October 1963, the leprosy control projects in Burma had registered 115,362 patients and treated over 100,000. It was estimated in 1965 that more than 200,000 cases existed. However, this program covered only one-half the population. The overall rate is estimated to be 10 per 1,000, but the disease is somewhat more prevalent in the dry zone than in the rest of the country. School surveys have shown a high rate among children. The lepromatous or "open" cases account for an unusually high percentage - 35 per cent. Fifty eight deaths were reported in 1960.

Control efforts which were organized in 1957 receive continuing assistance from WHO and UNICEF. A WHO leprosy consultant is permanently established in Mandalay. Fourteen project areas have begun operations. These are in Kyaukse, Magwe, Mandalay, Meiktila, Minbu, Monywa, Myingyan, Pakokku, Pegu, Sagaing, Shwebo, Taunggyi, Thayetmyo, and Yamethin. Further project areas are planned. Most case finding is done through school surveys, but contacts are not followed up and there is no central registry. The survey work is done by teams composed of a doctor, two leprosy inspectors, one junior leprosy worker, one clerk and one field assistant. Treatment facilities are found in several leprosy clinics.

There are 21 establishments with a total of 3,675 beds for the care of lepers. The bulk of these facilities is provided by missionary groups who receive subsidies from the government. The larger leprosaria are:

<u>City</u>	<u>Facility</u>	<u>Number of Beds</u>
Rangoon	Rangoon Leper Asylum	360
Mandalay	Home for Lepers	320
	St. John Leper Asylum	584
Moulmein	Susan Haswell Colony	200
Kengtung	Leprosy Village	1,000

Some antileprosy work is also done by the Burma Leprosy Relief Association. The effectiveness of BCG vaccination for the prevention of leprosy is being explored under a WHO grant.

Cholera

Burma is subject to frequent epidemics of cholera because of its proximity to the great focus of world cholera in the Ganges Delta, and is said to rank third after India and Pakistan in the number of cases. The disease occurs at intervals in epidemic form and usually appears first in the delta of the Irrawaddy at the end of the dry season during April, May and June. From there it spreads up the rivers, which are used not only as a source of water supply but also for bathing and sewage disposal. By August, September and October the disease reaches upper Burma where conditions favor a continuing spread. The most recent serious epidemic occurred in 1963, beginning as usual in the delta and spreading up river. The total number of persons affected is not known but 922 cases were reported in 1964.

Endemic foci are said to exist in the delta region of the Irrawaddy and at the mouth of the Salween River.

Each year several hundred thousand vaccinations against cholera are given in an attempt to control this disease.

Typhoid Fever

Typhoid fever is common. During 1961 there were reported to be 496 deaths from typhoid and 3171 cases. Since the case fatality of untreated typhoid is approximately 10 per cent, the number of cases probably was well over 4,000. The disease has been reported in all months of the year.

Typhoid fever vaccine is imported but the only known vaccinations are administered to Army personnel in conjunction with cholera vaccine.

Paratyphoid also occurs although it is apparently less frequently encountered.

Diarrheas and Dysenteries

Amebic dysentery, bacillary dysentery, and undifferentiated diarrheas are common, particularly in the rainy season. As a rule they occur as localized epidemics. Amebic dysentery has a particularly high incidence in Upper Burma. Bacillary dysentery is generally not specifically diagnosed and is probably frequently included among the undifferentiated diarrheas. There were 611 deaths reported from dysenteries or diarrheas in 1960, but the actual numbers of cases are unknown.

Plague

Plague is an endemic disease in Burma. The usual vector is Xenopsylla cheopsis, the rat flea. The disease is probably under-reported but in 1965 there were 36 reported cases. Most cases occur in the dry season from October to February, with occasional cases recorded in July and August. No cases were reported in 1964 but the disease was again reported in January 1965 in Mandalay and this focus apparently had a continuing activity. The main foci are along the China border, in the Kengtung area and along the Irrawaddy from Mandalay south. There are other foci at Meiktila, Mahlaing and Pyawbwe. In 1963 there was an epidemic in a rural part of Magwe

District following an epizootic in rats. At that time there was an increased exposure to rat fleas since the inhabitants of the area trapped rats and collected dead rats for food. A central epidemiological unit was organized in 1965, to conduct a pilot study in this disease.

Acute Respiratory Diseases

Even in the warm climate of Burma acute respiratory disease is common and has a seasonal occurrence, the upswing coinciding with the beginning of the cool season. According to the statistics of the Directorate of Health Services, influenza and pneumonia are among the leading causes of death (See Appendix V). Reported cases of influenza in 1961 number 3171. Epidemics of acute respiratory illness usually follow Buddhist festivals. This presumably results from the increased exposure due to crowding of participants, many of whom come from more or less isolated rural environments.

Rickettsial Diseases

In 1960, 15 deaths were reported due to unspecified typhus fevers. This is obvious underreporting.

Scrub typhus, caused by Rickettsia tsutsugamushi and transmitted by the mites Leptotrombidium akamushi, L. deliensis and possibly L. Gahrlepiea ligula, is widely distributed and is the most commonly occurring form of typhus fever in Burma. Most cases occur from June to November in the south and from May to December in the north. Areas of known infection include suburban wastelands around Rangoon, the Chindwin Valley, Arakan, and the Burmese-Pakistani border. Scrub typhus occurs focally within unoccupied land where it is not recognized until these lands are settled or occupied by military personnel.

Epidemic or louse-borne typhus has been reported from Bhamo and from the mountains along the upper Salween and Sittang Rivers in Shan State as well as from the Tenasserim Coast. Murine or flea-borne

typhus has appeared focally in the delta. A few cases of tick-typhus have been reported from lower Burma.

Arbovirus Diseases

Yellow Fever

Yellow fever has never been reported from Burma or the other countries of Southeast Asia, despite the prevalence of the vector Aedes aegypti.

Dengue

Dengue fever is endemic in Burma and occurs every year. It is less prevalent in the hills but is a hazard throughout most of the country.

Hemorrhagic Fevers

Hemorrhagic fever associated with strains of dengue virus, such as the strains occurring in the Philippines, Malaya and Thailand, has not been reported from Burma. However, a febrile dengue-like illness associated with mild hemorrhagic manifestations was reported from Rangoon in 1963. At the same time, hemorrhagic fever due to both dengue virus strains and chickungunya virus was occurring in Bangkok and for the first time in Calcutta.

Epidemic hemorrhagic fever (hemorrhagic nephro-nephritis; Far East hemorrhagic fever) which is transmitted by mites has been reported in Burma. Kyasanur Forest disease, a viral hemorrhagic fever occurring in India, has never been recognized in Burma.

Japanese Encephalitis

Japanese encephalitis virus has been isolated from animals in Burma but human cases have not been reported.

Tetanus

The situation with respect to tetanus is not clear. In 1960, only 212 deaths were reported but this is probably only a small fraction of the actual number. Many of the deaths reported were in newborn infants and post-operative patients. The disease occurs in all parts of Burma and it is believed only a small number of the cases are treated by western-trained physicians.

Yaws

Yaws is distributed primarily in four areas: 1) the Tenasserim, including the hills up to 500 meters elevation; 2) the Chittagong Hill Tracts along the East Pakistan and Assam border; 3) the whole of North Burma including upper and lower Chindwin Districts, Katha and Bahmo Districts; and 4) the central dry zone in the vicinity of Mandalay. A few cases have been seen farther south in the dry zone, as well as in Rangoon. At present there is no large-scale control program.

Trachoma

Trachoma is quite prevalent in Burma, particularly in the cities of the delta area. It is primarily a virus infection of the conjunctiva transmitted by direct contact with the secretions from the eyes of infected persons. Severe cases may become blind as a result of corneal scarring and impaired vision is common. Twenty per cent of patients treated in the Ophthalmic Clinic of the Rangoon General Hospital have trachoma. Obviously, this percentage does not apply to the population at large but it does indicate the importance of the disease as an eye infection. Other towns along the Irrawaddy and Chindwin Rivers as well as parts of Shan State have a high incidence.

The prevention of trachoma is dependent upon strict personal hygiene.

Communicable Diseases of Childhood

The Burmese experience these diseases in a manner similar to many other parts of the world. However, Burmese reporting, including mortality reporting, is unreliable. Two scarlet fever deaths and 542 deaths due to rheumatic fever were reported in 1960. In the same year measles was reported as the cause of 233 deaths; meningococcal meningitis 20; infectious hepatitis 25; and whooping cough 21. Poliomyelitis occurs primarily from January to July, but is an uncommon cause of death; only 5 cases were reported in 1960. Diphtheria occurs throughout the year and was the reported cause of 60 deaths.

Leptospirosis

Leptospirosis is undoubtedly present. Leptospira icterohaemorrhagica has been identified in Burma, but no information is available regarding its incidence and distribution.

Leishmaniasis

Each year isolated cases of visceral leishmaniasis (kala-azar) caused by Leishmania donovani have been reported from the vicinity of Rangoon and sometimes Akyab. Its occurrence has been chiefly among people of Indian stock, but in view of the prevalence of the vector Phlebotomus argentipes the disease could easily spread. It is likely that cutaneous leishmaniasis (Oriental sore), caused by Leishmania tropica and transmitted by species of the genus Phlebotomus, also occurs but is not diagnosed or reported.

Sandfly Fever

Sandfly fever carried by unidentified vectors is found at least in the vicinity of Rangoon and Mandalay, along the Salween River and in the upper Chindwin Valley. No information is available concerning incidence and it has been reported solely on the basis of clinical evidence.

Relapsing Fever

Cases of louse-borne spirochetal relapsing fever were reported in 1962, with most reports coming from the areas of Mandalay, Prome, and northern Shan State.

Toxoplasmosis

Toxoplasmosis which occurs in animals and birds in most areas of the world has not been reported from Burma.

Mycotic Infections

Cutaneous mycoses are troublesome and potentially disabling in Burma, just as they are elsewhere in hot and humid climates. Systemic mycoses do not present any unusual problems. Those with world-wide distribution presumably also occur in Burma.

Helminthiasis

Intestinal parasites are extremely common in Burma. The roundworm Ascaris lumbricoides is the most commonly found. Also present are the whipworm Trichuris trichiura, the pinworm Enterobius vermicularis, and Strongyloides stercoralis.

Hookworm infections with both Necatur americanus and Ancylostoma duodenale occur and are often contributing factors in anemia.

The beef tapeworm (Taenia saginata) is frequently found. The pork tapeworm (T. solium) is only occasionally seen. The dwarf tapeworm (Hymenolepis nana) also occurs.

Filariasis

Filariasis has been known to be present in Burma since before World War II but was not thought to be a serious problem. Since 1957 an increase in the number of patients appearing at clinics with manifestations of infection led to investigations of the problem in Rangoon and elsewhere. About 6 per cent of 100,000 blood films examined in Rangoon and other urban centers between 1959 and 1961 revealed microfilaria of Wuchereria bancrofti. It is believed that there has been a recent upsurge of filarial infection, particularly in urban centers. Taunggyi in Shan State appears to be an exception. Other areas where filariasis has been known to be important are the Tenasserim adjoining the Thai border, along the Arakan coast, and around Mandalay.

So far, W. bancrofti has been the agent found and there has been no evidence of infection with Brugia malayi.

Although over 30 species of mosquitoes included in the genera Anopheles, Culex, Aedes and Mansonia are potential vectors of bancroftian filariasis, Culex pipiens quinquefasciatus (C. fatigans) has been most strongly implicated as the vector in Burma. A WHO Filariasis Research unit is studying the ecology and bionomics of Culex spp in the Rangoon area.

Dracontiasis, the guinea worm type of filariasis, is found in areas where step wells are used. This infection is acquired by drinking water containing infected Cyclops, a genus of minute fresh water crustaceans. The incubation period is 8-14 months.

Bilharziasis (Schistosomiasis)

Schistosoma japonicum is present in the adjoining Yunnan Province of China and occasional cases have been reported in Shan State. However, these cases may not indicate the transmission of the disease in Burma because there have been many Nationalist Chinese troops in this part of the country as well as others from the Asian mainland. It is probable that cases among these were acquired elsewhere. There is no proof that schistosomiasis is acquired in Burma.

Fascioliasis

Infection with the trematode Fasciola hepatica has been found in Burma and is of importance in at least some parts of the country. It has been observed in the swine herds and is a moderate hazard to the human population. Also, Faciolopsis buski infections probably occur.

Paragonimiasis

Paragonimiasis has not been reported.

Nutritional Diseases

Clinically overt nutritional deficiency affects only a small percentage of the population. Dietary and biochemical studies, however, indicate that a much larger segment of the population has a food intake that is only marginally adequate in several essential nutrients.

Burma is familiar enough with kwashiorkor to have a name for it, "noe mget," which means the disease a child gets when its mother gets pregnant. Slightly depressed serum albumin levels have been noted in both children and adults, but whether this finding reflects a protein deficiency remains to be proven. Beriberi, or thiamine deficiency, is very common. Angular lesions and scars of the mouth

are prevalent, but biochemical studies indicate that it is only infrequently a manifestation of riboflavin deficiency.

Anemia

Anemia is a common problem throughout Burma. Surveys show a prevalence of 25 to 33 per cent in the general population but rates are higher still among children and pregnant women. Although dietary analysis indicates that the level of iron intake is within a range that has been considered adequate, it is insufficient to meet the requirements of Burmese during growth and pregnancy.

Goiter

Goiter is common and increases in frequency with increasing altitudes. As would be expected, cretinism may be seen.

Tropical Sprue

Tropical sprue is not reported as prevalent among Burmese, but the disease was prevalent among British soldiers in the country during World War II. It is presumably nutritional in origin although a viral etiology has been suggested. People of European extraction seem to be more susceptible than others, yet tropical sprue did occur among Indian troops in Burma. Onset may be within weeks or after a latency of years. Symptoms are painful lesions of the mouth and tongue, flatulence and diarrhea. Treatment is directed toward a diet and regimen characterized by low fat and high protein intake, vitamin supplement, and rest.

ZOONOSES

Rabies

Rabies is commonly encountered in the canine population, and the frequent occurrence of human cases is largely attributable to the numerous stray dogs roaming the streets of the cities. Peak occurrence is in September to November. In 1961, 2,500 people received antirabic treatment. For the five-year period ending in 1959, 164 human deaths were reported and there were 20 deaths during 1961 and 1962. A campaign to eliminate stray dogs was initiated in Rangoon but its fate is not known. Vaccination of pets is voluntary.

Anthrax

There were 254 foci of anthrax infection in animals in 1962. Vaccination has probably reduced animal losses from this disease in recent years. Ninety-five human deaths were reported in the period 1954-1959.

Brucellosis

Brucellosis was the reported cause of 181 human deaths in the five-year period 1954-59. Indications are that the disease is widespread among domestic animals but no comprehensive survey has been made. It has been demonstrated in cattle herds in both upper and lower Burma, and there is strong suspicion that it exists in swine.

Bovine Tuberculosis

Bovine tuberculosis is a problem in lower Burma where cattle are usually confined at night in closed sheds. Indications are that up to 5 per cent are infected, whereas the disease is rare in the dry

zone where housing is more open.

Melioidosis

Melioidosis recently has been reported in a sow at Insein, and prior to World War II cases in man were reported from Rangoon. The causative organism Pseudomonas pseudomallei infects man presumably through skin contact with contaminated water.

This disease affects rats and domestic animals but the link between these and human cases has not been determined.

Animal Diseases Other Than Zoonoses

Foot-and-Mouth Disease

Foot-and-mouth disease is one of the most serious causes of economic loss of cattle and swine. Types O and Asia 1 are widespread. The morbidity is high but the mortality is low, rarely exceeding 3 per cent.

Hemorrhagic Septicemia

Hemorrhagic septicemia, a specific pasteurellosis, is the most economically significant disease of cattle and buffalo in Burma. Losses each year are heavy despite a rather widespread vaccination program.

Hog Cholera

Hog cholera is the most important swine disease producing heavy mortality each year.

Newcastle Disease

Newcastle disease causes serious economic losses in the poultry industry.

COMMUNITY HEALTH SERVICES

Health Services

The public health services of Burma are centralized under the Minister of Health. The Director of Health Services, who is responsible to the Minister for carrying out policies and managing the health services, is assisted by four Deputy Directors in charge of: hospitals and dispensaries, public health, maternal and child health, and laboratories. A National Health Council advises the government on health matters.

Within Burma proper the organization of health services parallels the organization of the administrative divisions. A Commissioner oversees health work at the division level. In the districts, work is usually in the hands of the Civil Surgeon who doubles as the District Health Officer (or Deputy Commissioner.) A fulltime health officer in addition to the Civil Surgeon is assigned in each of the four districts.

Under the Deputy Commissioner are the Subdivision Officers, and under them the Township Medical Officers. The Township Medical Officer is assisted by: a Public Health Nurse, an Assistant Health Educator, and the Headmen who are responsible for the individual village tracts and hamlets. Public health activity is based at urban and rural health centers, operated by Public Health Assistants under the supervision of the Township Medical Officer.

The World Health Organization has provided substantial assistance to health services in Burma. In 1964-65 this organization supported 10 major projects (See Appendix VI.)

Health Education

A Health Education Bureau exists in the Directorate of Health Services. The Bureau directs the training of all categories of health

workers, including teachers and medical students, in the principles of health education.

School Health

A school health program, first started at Rangoon, consists of a physical examination and a record of physical defects. As of 1962 there were 12 such school health centers in operation as services of the urban health centers of Rangoon, Mandalay, Moulmein, and Bassein. A similar service is provided by the Aung San Demonstration Health Unit in the outskirts of Rangoon.

Maternal and Child Health

This program represents an effort that was previously operated by the Child Welfare and Maternity Care Association. The program is now being greatly expanded by the government. One hundred ninety four Maternal Child Health Centers were in operation at the end of 1961 and UNICEF provided equipment for 50 more scheduled to be opened in 1962. Five hundred are planned for the whole of Burma. However, shortages of staff and limited utilization of facilities by the populace remain important problems. For example, in 1960 only 3 per cent of all births were attended by certified midwives or doctors. Other services include home visits to expectant mothers and newborn infants. This program is ultimately to be integrated into the urban and rural health centers.

Quarantine

A quarantine station is maintained in downtown Rangoon where immigrants and freight entering Burma by ship are checked. A quarantine station is also maintained at the airport. However, there are no facilities for quarantine of large numbers of animals and there have been instances of diseased animals entering the country without inspection.

MEDICAL PERSONNEL AND FACILITIES

Physicians

In 1963 there were 1,778 registered physicians in Burma. Most of these hold a Bachelor of Medicine or Bachelor of Surgery degree acceptable to the United Kingdom's Medical Register (foreign lists). Among this number there were 552 licensed medical practitioners (LMP) with 10 years general education and 4 years vocational study. These represent the group of students who could not qualify fully for admission to the universities. Whether this type of medical education should be continued is still debated in Burma. The ratio of physicians to inhabitants is one to 9,400 or 12,300, depending upon what practitioners are considered physicians. Eight hundred and twenty physicians are practicing in Rangoon and 113 in Mandalay. Medical attention in the rural areas is left almost entirely to practitioners of indigenous medicine (sesayas).

Between 1952 and 1962, 207 doctors were borrowed from India to fill positions in the National Health Service. In 1963 the situation had not changed and there were 242 vacancies out of 632 positions in the hospital service. Newly graduated physicians are allegedly not attracted by government service partly because of personal dangers in rural areas due to brigands. To alleviate this situation the (Doctors') National Service rules were promulgated by the Chairman of the Revolutionary Council, authorizing the formation of conscription boards for enrollment of doctors to undertake a minimum of 2 years national service either with the military or civil departments. In April 1963 the first 50 doctors were called for service.

Dentists

There were 5 qualified dentists plus more than 1,000 self-educated dental practitioners in 1963. The exact number in the latter category is not known, since in most cases they have become dental specialists through the apprenticeship system, in which they work with old-school dentists.

Pharmacists

There are no pharmacists qualified by European standards.

Nurses

There are 2,668 nurses or 1 for 9,600 people. Only 372 nurses have completed schooling in modern schools. Most of these are in large hospitals, thus rural nursing services are wanting. Figures for 1956 show 553 nurses and 26 public health nurses in government service.

Midwives

There are 4,402 midwives, a ratio of 1 per 5,000 inhabitants. Only 816 of these are qualified by modern standards. They too are distributed unevenly between cities and villages. Six hundred and fifty four were in government service in 1956.

Veterinarians

Burma had only 26 qualified veterinarians in 1963. In addition, the government veterinary services employ over 200 veterinary assistants who have had short-term training as vaccinators, animal health assistants, or laboratory workers. The total veterinary services staff is far too small to cope with the animal health programs.

Hospitals

At the beginning of 1963 there were 411 hospitals with 31,218 beds. This averages approximately 3.1 beds per 1,000 inhabitants. Most hospitals are in poor condition, and some are housed in rented space built for other purposes.

Two hundred and sixty of the 411 are general hospitals with 12,587 beds. The remainder are various specialized hospitals, the largest group being 21 leprosaria with 3,685 beds. Others of note, most of which are in Rangoon, are: In Rangoon.- the Dufferin Hospital with 200-300 beds for obstetrical and gynecological patients; the Contagious Disease Hospital with 300-400 beds; a small ophthalmological hospital; four institutions for the blind; one institution for deafmutes; and a terminal disease hospital. A psychiatric hospital in Tagadale has 300-900 beds.

Rangoon General Hospital with more than 800 beds is the most complete facility in Burma. In addition to medical and surgical units there is a 200-bed tuberculosis ward, a 100-bed pediatric ward, and special units for ophthalmology, ENT, orthopedics, dermatology and venereal diseases. The hospital is equipped with a cobalt radiation unit as well as diagnostic X-ray equipment.

Mandalay General Hospital has 350 beds with a 30-bed tuberculosis ward and an orthopedic unit. Operating facilities, diagnostic X-ray equipment and the necessary electrical power supply are available.

Bassein Civil Hospital built a new 200-bed unit in 1963. This has diagnostic X-ray equipment. A driven well on the premises provides water. It is uncertain as to whether the original facilities were abandoned.

The American Medical Center (Seagrave's Hospital), a 250-bed hospital at Manhkam, is one of the largest in the rural areas.

Moulmein has two general hospitals; a 150-bed Civil Hospital, and the 175-bed Ellen Mitchell Memorial Hospital operated by the American Baptist Convention. These hospitals have antiquated X-ray facilities and an erratic electrical supply.

Taunggyi has a 150-200-bed Civil Hospital, plus the 200-bed Sao San Htun Hospital, a gift from the USSR. Sao San Htun Hospital was completed in 1961 and is equipped with diagnostic X-rays, a physiotherapy unit, air-conditioned operating rooms, and two ambulances.

Rangoon and Mandalay General Hospitals, Bassein Civil Hospital, and Sao San Htun Hospital all have food services, but often food sanitation is inadequate. In most hospitals the families of the patients provide food for the patient.

Urban Health Centers

There are at least 12 urban health centers in operation, five of which are in Rangoon. The remainder are distributed in Mandalay, Moulmein and Bassein. Each of those in Rangoon is intended to be staffed by two physicians, two nurses, and a small group of attendants and clerks. Daily attendance is about 160. A dispensary and health van are provided for each clinic and they share a central laboratory and X-ray facility. The services of one ophthalmologist and one dentist are available.

Rural Health Centers

To meet the needs of the 85 per cent of the population living in rural areas, a program to establish 800 rural health centers was begun in 1954. About 700 of these units had been initiated in 1963. Each center is scheduled to be staffed by one public health assistant, one vaccinator, one lady health visitor, and five midwives; and to cover an area comprising 15 village tracts with populations between 15,000 and 40,000. The proportion of these health centers that actually have a complete staff is not known (see pp. 48 and 49 for numbers of technical personnel in Burma).

As many as 200 of these centers have not received complete equipment. Although some are located in buildings of their own, most are established in rented quarters. The public health assistant receives quasi-medical training and is supplied with a kit containing 24 drugs selected to be the most commonly useful. He is expected to: live in his district, diagnose and treat simple diseases, perform simple surgical operations when necessary, teach hygiene and sanitation, and generally supervise the health of his community.

He also serves as official registrar of vital statistics for his area.

In addition, the health center provides preventive medicine measures, such as prenatal care and vaccinations. In the past 10 years, a number of public health demonstration centers, some under American auspices, were established in Shan State, Akyab and Bassein. These were directed to emphasize groundwork for malaria eradication.

Two additional programs were initiated in Bassein; i.e., a Venereal Disease control campaign and a maternal and child health program.

The Aung San Myo Demonstration Health Unit, which encompasses four rural health centers and the Payagyi Rural Community Development Project, has been established as testing grounds for methods in rural health programs.

Laboratory Services

A plan for reorganization of laboratory services was developed by the Ministry of Health in 1964. The former Pasteur Institute became the National Health Laboratory and the proposed center for public health services for the entire country. The former Harcourt Butler Institute has been designated the Burma Medical Research Institute and will be responsible for coordinating medical research programs in addition to carrying out its previous responsibilities.

The Burma Pharmaceutical Institute at Rangoon is responsible for the production of all kinds of vaccines and biologicals in Burma. It has recently received WHO (UNICEF) assistance in obtaining new equipment to produce freeze-dried smallpox vaccine.

In the past four years, hospitals in Rangoon, Mandalay and other cities, as well as the Tuberculosis Center in Rangoon, have received technical and financial assistance from WHO. And laboratory services have been strengthened through WHO assistance for

Medical Faculties in Rangoon and Mandalay.

The Insein Veterinary Institute serves as the only veterinary diagnostic laboratory and has prepared vaccines against some of the diseases causing losses among livestock. Veterinary services, however, are not widely developed.

MEDICAL EDUCATION AND RESEARCH

Physicians

There are two medical schools in Burma, one at the University of Rangoon, founded in 1924; and a second one at the University of Mandalay, founded in 1954. A new medical school at Mingaladon, a suburb of Rangoon, is being started with the help of a WHO grant. All these schools are government institutions. (See Appendix VI)

The course in the above schools includes two years premedical and five years medical studies, plus one year compulsory internship. At graduation the students receive a degree of Bachelor of Medicine or Bachelor of Surgery which is recognized by the General Medical Council of the United Kingdom.

The Rangoon Medical School has a staff of 58 full-time and 31 part-time professors. Enrollments here in 1963 were 862 male students and 354 females. Each year a class of about 138 is graduated.

At Mandalay the teaching staff comprises 18 full-time plus 23 part-time personnel. Enrollment includes 108 males and 25 females. Each year 33 graduates are expected, but in 1963 only two males and one female had completed their studies. The degrees from this school, the same as those from Rangoon Medical School, qualify the student for medical practice without a licensing examination.

In order to accelerate the training of physicians, a plan was adopted in 1954 whereby students who pass biology and chemistry in

a secondary school can qualify for admission to the medical college after spending only one year at the university. Not all secondary schools, however, are equipped or staffed to teach biology and chemistry. Compared to Western standards, the requirements for admission to medical colleges are low.

Internships are an acute problem because the government can not provide the necessary positions in training programs. The number of recognized hospitals in 1962 was two, one in Rangoon and one in Mandalay. There are, however, plans to upgrade the Bassein and Moulmein hospitals, and to create another one in Mandalay and new ones in Maymo and Taunggyi.

Dentists

There is no school of dentistry in Burma and Burmese dentists usually train in Calcutta. An oral surgeon at Rangoon General Hospital has initiated a 6-month training program for apprentice dentists to bolster their preparation.

Veterinary College and Research Station

The Veterinary College is attached to the University of Rangoon, but is located at the Research Station at Insein. The course of instruction was initiated in 1957 with assistance from the FAO, the Colombo Plan, and the United States Technical Cooperation Administration (AID). By 1963 the faculty had grown to 8 full-time and 5 part-time teachers. The instruction course consists of 2 years preveterinary education, 2 years preclinical courses, and 2 years paraclinical and clinical training. The school was set up to take up to 15 students in each class but the number of applications for admission per year has been as low as 2 and rarely approaches the maximum that the school is able to accomodate.

Nurses

Training for nurses is conducted at schools attached to six government hospitals in Rangoon, Mandalay, Moulmein, Bassein, Akyab, and Maymyo; also, at one state training school and two non-government hospitals. One hundred fifty eight nurses were graduated in 1961.

Midwives

Training in midwifery is done in an 18-month course at Rangoon and Mandalay General Hospitals and at 33 district hospitals.

Laboratory Technicians

Rangoon General Hospital trains about 6 laboratory assistants every 6 months. The Pasteur Institute occasionally undertakes the training of laboratory technicians.

Pharmacy

There is no school of pharmacy, but compounders are trained at 26 district hospitals.

Public Health

A school for public health assistants, public health nurses and lady home visitors was created in 1951 at Harcourt-Butler Institute, to procure a sufficient number of quasi-medical personnel to staff rural health centers. This program was encouraged by the United States Technical Mission and assisted by a number of American professors, but it is now having difficulty finding applicants.

Training programs for specialized maternal and child health nurses have been organized in Rangoon, Mandalay, Moulmein, Maymyo, Bassein, Pegu, and Akyab. Additional training programs are planned for Myitkyina, Taunggyi, Yenangyaung, Loikaw, Myingyan, Lashio, and Henzada with the objective of graduating 200 annually. Each trainee receives a government subsidy, in return for which she agrees to remain in the government service for at least 3 years after graduation, either at a maternal or child health center, a Government hospital, or in some other official capacity.

Sanitary Engineering

Training in sanitary engineering has been a United States Government project since 1952, when it started under the Technical Cooperation Administration (TCA). The training was continued later by the creation of a Department of Sanitary Engineering at the University of Rangoon, with visiting American professors lecturing from time-to-time.

APPENDIX I

RIVERS AND MOUNTAINS

Rivers

Sittang
Salween
Irrawaddy
Chindwin
Kaladan

Mountains

Pegu Yoma
Arakan Yoma
Dawna Range
Taungmyo Range
Bilauktaung Range
Patkai Range or Hills
Kuman Range

Shan Plateau

APPENDIX II
AGRICULTURAL PRODUCTION
1959-1962

Crops*

	<u>In Thousand Tons</u>			
	<u>Pre-War Average</u>	<u>1959-60</u>	<u>1960-61</u>	<u>1961-62</u>
paddy	7,426	6,916	6,682	6,485
peanuts	181	275	351	361
sesame	45	66	64	77
cotton	21	12	12	20
pulses	250	275	263	270
sugar cane	1,000	1,005	1,026	1,022
tobacco	44	39	35	35
millet and wheat	78	68	65	65
rubber				15**

Livestock***

	<u>Estimated for 1961-62 - In Numbers</u>
cattle	5,696,000
buffalo	1,061,000
swine	744,000
goats	448,000
sheep	112,000
elephants	4,000
equines	24,000

*Far Eastern Economic Review - 1963 Yearbook, p. 62

** Average annual production

***FAO Production Yearbook - 1964

APPENDIX III

MEDICINAL OR TOXIC PLANTS OF BURMA

<u>Scientific and Common Name</u>	<u>Burmese Name</u>	<u>Alleged Properties</u>	<u>Active Principle</u>
<u>Nigella sativa</u> (black caraway)	samonne	carminative, emmenagogic	melanthin
<u>Annona reticulata</u> (nettled custard)	awza	fish and insect poison	anonaine (alk)
<u>Annona squamosa</u>	awza	seed and leaves and unripe fruit said to be insecticidal	alkaloid (?)
<u>Anamirta cocculus</u> (poison berry)	hong	stimulant, antidote in barbiturate poisoning	picrotoxin
<u>Argemone mexicana</u> (yellow poppy or prickly)	khyaa	emetic and carthetic with anodyne and narcotic properties	berberine (alk) protopine (alk)
<u>Papaver somniferum</u> (opium poppy)	bhain	narcotic	25 alk. including morphine, heroin, etc.
<u>Hydnocarpus kurzii</u>	kalanzo	oil of chaulmoogra used in leprosy; fish poison febrifuge	chaulmoogric and hydnocarpic acids
<u>Garcinia morella</u> (Gamboge tree)	thamen-gut	drastic cathartic, can cause death	camboge
<u>Camellia sinensis</u> (tea plant)	letpet	(the tea plant) stimulant	caffeine, theophylline, etc.

<u>Scientific and Common Name</u>	<u>Burmese Name</u>	<u>Alleged Properties</u>	<u>Active Principle</u>
<u>Tribulus terrestris</u> (caltrop)	charatte	diuretic and aphro- disiac, toxic in high doses	alkaloid
<u>Azadirachta indica</u> also <u>Melia azedarach</u> (margosa tree)	thamaka (and other names)	tonic, antipyretic anthelmintic, purgative, fish narcotic	saponin
<u>Cardiospermum</u> <u>halicacabum</u> (black liquorice)	ma-la-mai	emetic, laxative	saponin
<u>Sapindus trifolia-</u> <u>tus</u> (soap berry tree)	meavme-sue-khati	emetic and purgative	saponin
<u>Anacardium</u> <u>occidentale</u> (cashew nut)	sihosayesi thayet, etc.	the tar is irritant and vesicant	anacardic acid, cardol, gum substance
<u>Semecarpus</u> <u>anacardium</u> (marking nut tree)	che, chyai-beng	highly vesicant	non-volatile irritating oil
<u>Moringa oleifera</u> (horse-radish tree)	daintha	cardiac stimulant (root bark) parts of the plants are used as a poison	undetermined ephedrine-like substance
<u>Abrus precatorius</u> (crab's stone)	gyin-gwe	tonic, purgative, emetic, anticonceptional, also used to poison arrows (seeds very poisonous)	abrin, a very poisonous alk.
<u>Acacia pennata</u>	suyit	fruits and stem extracts used for poisoning fish	saponin
<u>Albizzia chinensis</u>	bnumeza	fish poison	saponin

<u>Scientific and Common Name</u>	<u>Burmese Name</u>	<u>Alleged Properties</u>	<u>Active Principle</u>
<u>Butea monosperma</u> (bastard teak)	pav, pauk	wax and dye producer; leaves astringent; seeds diuretic and aphrodisiac; anthel- minthic	moodooga oil, proteolytic enzymes
<u>Clitoria ternatea</u> (butterfly pea)	bukiya	cathartic, roots used against snake bite	alkaloid
<u>Entada pursaetha</u> (lady nut)	gan-nyin	emetic, narcotic fish poisoning	2 toxic saponins
<u>Phaseolus lunatus</u> (the Rangoon bean)	?	commonly eaten; occasionally very poisonous	hydro- cyanic acid
<u>Pongamia pinnata</u> (Indian beech)	simizu	expectorant, toxic to fishes and insects	fatty oils
<u>Sophora tomentosa</u>	thinbawmagyi	arrests choleraic, vomiting	?
<u>Prunus amygdala</u> (almond tree)	badan	stimulant	amygdalin, a glucoside; yields hydrocyanic acid under enzyme emulsion
<u>Prunus puddum</u> (wild cherry)	panni	used to make local brandy	may yield hydro- cyanic acid
<u>Terminalia bellirica</u> (bahera nut)	bankha	purgative, emetic narcotic in overdoses	tannin
<u>Barringtonia acutangula</u> (Indian oak)	kyaiha	emetic, fish poisoning	saponin

<u>Scientific and Common Name</u>	<u>Burmese Name</u>	<u>Alleged Properties</u>	<u>Active Principle</u>
<u>Barringtonia asiatica</u>	kyaigyee	narcotic, fish stupefying	glucosidic saponin
<u>Punica granatum</u> (the pomegranate)	sale-bin	astringent, anthelminthic	pelletierine (alk.)
<u>Carica papaya</u>	pimbosi	anthelminthic, hydrolyses proteins	carpaine (alk)
<u>Citrullus colocynthis</u> (colocynth)	khiasi	purgative, emmena- gogue, toxic in high doses	purgative resin
<u>Citrullus vulgaris</u>	paye	sweet or bitter, the latter is wild purgative and toxic	cucurbitol (sterol)
<u>Lagenaria vulgaris</u> (calabash, gourd)	businswai	wild species emetic and purgative	saponin
<u>Luffa cylindrica</u> (vegetable sponge)	tha-bwot	wild species purgative and toxic	saponin & mucin
<u>Cinchona spp.</u> (Bolivian bark)	?	febrifuge, antimalarial	quinine, (alk) quinidine (and others)
<u>Coffea arabica</u> (coffee)	kaphi-si	stimulant	caffeine (and others)
<u>Caephaelis (Psychotria)</u> ? <u>ipecacuanha</u> (ipecac)		emetic	emetine, cephaeline (alk) (and others)
<u>Randia dumetorum</u>	hsaythan-paya	emetic also insecticide	?

<u>Scientific and Common Name</u>	<u>Burmese Name</u>	<u>Alleged Properties</u>	<u>Active Principle</u>
<u>Xanthium strumarium</u> (burweed)	cho-sa	sudorific, sedative, said to be toxic to animals	a glucoside
<u>Plumbago indica</u> (fire plant)	chuvondakoduvalli	causes abortion in local application, highly toxic	plumbagin
<u>Diospyros montana</u> (ebony)	chok	said to be poisonous	?
<u>Cerbera manghas</u>	ka-lwah	emetic, purgative, toxic	cerberine (alk)
<u>Rauwolfia serpentina</u>	bong-maiza	lowers blood pressure, tranquillizer	serpentine, etc. (alk)
<u>Calotropis gigantea</u>	maioh	emetic in small doses, poisonous in large doses; stops heart in systole in experi- mental animals	calotropin (glyc)
<u>Strychnos nux-vomica</u> (strychnine tree)	khaboung	tonic, stimulant, poison; febrifuge in combination with quinine	strychnine (alk) brucine, etc.

APPENDIX IV

POISONOUS SNAKES OF BURMA

Type	Name	Common Name	Comment
cobras	<u>Naja naja</u>	spectacled or Indian cobra	Very common in delta but also found in highlands; dangerous but slow-moving
	<u>Ophiophagus (Naja) hannah</u>	king cobra	Range coincides with Pegu Yoma; aggressive and very dangerous
coral snakes	<u>Callophis maclellandi</u>	Oriental coral snake	Distributed widely in Burma; usually cause no harm and are disinclined to bite; most are less than 3 feet in length
64	<u>C. maculiceps</u>	small spotted coral)
	<u>Maticora bivirgata</u>	blue coral)
	<u>M. intestinalis</u>	banded coral)
true viper	<u>Vipera russelli</u>	Russell's viper	Lives primarily in rice fields; because of number of workers exposed in this habitat, it is most common cause of snake bite death
	<u>Azemiops feae</u>	Fea's viper	Upper Burma; not dangerously poisonous

Type	Name	Common Name	Comment
pit vipers	<u>Agkistrodon rhodostoma</u>	Malayan pit viper	Ill tempered; very poisonous but bite seldom fatal
	<u>Trimeresurus gramineus</u>	green tree viper	Found in tree and bamboo thickets; with usual treatment bite is not fatal
	<u>T. purpureomaculatus</u>	shore pit viper	Found in mangrove or other coastal vegetation of Burma and nearby islands
	Three more species of <u>Trimeresurus</u> are common at high altitudes in northern Burma		
65 kraits	<u>Bungarus candidus</u>	common krait) Represented in both jungle terrain and open country.
	<u>B. fasciatus</u>	banded krait) All kraits are very poisonous, but bite only on extreme provocation; fatalities mainly result from accidents such as stepping on these snakes with bare feet at night
	<u>B. flaviceps</u>	yellow headed krait)
	<u>B. lividus</u>	black krait)
	<u>B. multicinctus</u>	many banded krait)

Type	Name	Common Name	Comment
sea snakes	<u>Aepysurus eydouxii</u>	sea snake	
	<u>Astrotia tokesi</u>	sea snake	Very large
	<u>Disteira cyanocincta</u>	sea snake	
	<u>D. ornata</u>	sea snake	
	<u>Enhydrina schistosa</u>	hook nosed sea snake	Very common
	<u>Kerilia jerdoni</u>	sea snake	At least 15 species of poisonous sea snakes are found in the coastal waters, particularly shallow areas near river mouths. They probably do not deliberately attack a man in the water and seldom bite unless handled
	<u>Laticauda laticaudata</u>	sea snake	
	<u>Praescutata viperina</u>	sea snake	

APPENDIX V

LEADING CAUSES OF DEATH - 1961

(Vital and Health Statistics Division of the
Directorate of Health Services, Burma)

<u>Cause of Death</u>	<u>Rate per 100,000 Population</u>
Ill-defined and unknown causes of morbidity and mortality	282.3
Diseases peculiar to infancy	255.2
Influenza and pneumonia (except newborns)	248.6
Anemias	129.5
Heart disease	115.1
Senility without mention of psychosis	99.4
Tuberculosis (all forms)	95.7
Avitaminosis and other deficiency states	72.6
Accidents	47.7
Dysentery (all forms)	24.9
Malaria	20.6

APPENDIX VI

WORLD HEALTH ORGANIZATION PROJECTS IN BURMA * 1964-1965

<u>Project</u>	<u>Objective</u>
Malaria	One fellowship and advisory services through original Bureau; assistance to field eradication program has been discontinued
Tuberculosis	Assist Government in developing antituberculosis programs in all Burma
Leprosy	Control of leprosy in Burma
Public Health Administration	Assist Government in establishing a Division of Epidemiology at Directory of Public Health in Rangoon; reorganize public health laboratory in Rangoon
Statistics	Assist in organizing vital statistics; extending to all hospital systems in Rangoon
Nursing Education	Assist in promoting nursing education
Nursing Care	Establish 8 modern midwifery schools to replace the present 20
Mother and Child Care	Teach pediatrics
Mental Health	Help provide psychiatric nurses
Teaching and Professional Education	Assist Rangoon, Mandalay, and Mingaladon** Medical Schools; and teach laboratory technicians

*Budgetary Projects WHO, Doc. No. 130, Jan 1, 1964-Dec 31, 1965

**Mingaladon Med. School in formative stage