JUNGLE TRAINING AND OPERATIONS
# JUNGLE TRAINING AND OPERATIONS

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*This manual supersedes FM 31-30, 5 October 1960.*

TAGO 551A
CHAPTER 1
INTRODUCTION

1. Purpose
This manual is for use as an aid to the individual soldier and the junior leader in learning how to prepare for and conduct jungle combat. Emphasis is placed on techniques which will enable the soldier to fight, live, and move in the varied types of terrain, vegetation, and climatic conditions peculiar to jungle. It will furnish guidance to commanders and staff officers in the preparation of units for combat and will afford a reference on doctrinal concepts applicable to jungle operations.

2. Scope
This manual describes the distinguishing characteristics of jungle environment and the resultant effects of these characteristics on individuals, equipment, and operations. Sufficient material is included to enable commanders to organize, initiate, and establish an effective jungle training program. Emphasis is placed on special techniques for use in jungle operations, employment of supporting arms and services, and communications. Administration and logistics also receive attention commensurate with importance in operations conducted in jungle terrain.

3. Publications
a. This publication supplements and, in some instances, amplifies pertinent portions of manuals in current use. Emphasis has been placed on application of approved doctrine and techniques under conditions imposed by jungle terrain. It is to be expected that units preparing for or conducting jungle operations will find it necessary to consult other appropriate publications. Those references applicable to training and combat in jungle are included in appendix I.

b. To improve this manual, users are encouraged to submit recommended changes or comments. Comments should be keyed to the specific page, paragraph, and line of the text in which changes are recommended. Reasons should be provided for each comment to insure understanding and complete evaluation. Comments should be forwarded direct to Commander, United States Army Forces Southern Command, Fort Amador, Canal Zone.
CHAPTER 2
THE JUNGLE

Section I. GENERAL

4. Prevalent Misconceptions

The soldier who is not familiar with the jungle will suffer from conditioned fears and apprehensions when faced with the prospect of living and fighting in a jungle environment. Popular representation of the jungle as being a veritable green hell of large trees and dense underbrush growing over vast expanses of flat, swampy ground inhabited by thousands of animals, snakes, and insects which are hostile to man, cause this fear. Before such individuals even set foot in the jungle they are appalled at the prospect of doing so. Certainly the foreboding appearance of the jungle, the oppressive humidity and heat, the unfamiliar noises, and the abject feeling of loneliness that one feels when entering the jungle intensify the already existing fear of the unknown. It cannot be denied that the jungle presents some most unpleasant aspects. But the individual must, through systematic and thorough training and acclimation, learn to know the jungle for what it actually is and not for what it is supposed to be or what it might be. Once this knowledge is acquired, the soldier will respect the jungle, not fear it.

5. Definitions

a. Jungle. For the purposes of this manual, the word “jungle” means an area located in the wet tropics and dominated by large trees and varied types of associated vegetation in which an abundance of animal, insect and birdlife exists.

b. Terrain simply refers to any area or tract of ground which is considered with regard to its natural and manmade features and the effects that these features will have on military utilization of the ground.

c. Terrain Features include all of the elements which make up the earth’s surface. These elements comprise:

(1) Topography—The shape or configuration of the land’s surface.

(2) Hydrography refers to the study of oceans, lakes and rivers (to include relief and drainage) as affecting military utilization of terrain.

(3) Vegetation—includes all plant life, both natural and cultivated.

(4) Surface materials—the nature of soils with particular emphasis on area traffic-ability.

(5) Cultural features—includes all the works of man.

d. Climate denotes the prevailing or average weather conditions of a specific place as determined by the recorded temperature and meteorological changes measured over a period of years.

e. Weather is the condition of the atmosphere at a given place at a specified time.

6. The Tropical Zone

The tropical zone lies between the Tropic of Cancer and the Tropic of Capricorn. Within this zone there are such diverse environmental conditions as snow-capped mountains, barren deserts, and steamy forests. This manual is concerned only with part of the tropical zone, the part in which the temperature and relative humidity remain high throughout the year. Areas within this part of the tropical zone are considered to comprise the humid tropics, and it is in the humid tropics that jungle terrain is found. Figure 1 gives a generalized view of the areas of the world included in the humid tropics.

7. Basis of Jungle Warfare Doctrine

The concept of warfare in the jungle is related to the conditions existing in the combat area which result from the combined effects of—
a. **Climate.** This is the dominant factor in jungle areas. It is characterized by heavy rainfall, oppressive humidity and high temperatures. Besides having a definite effect on man, climate also affects the form of the land and contributes to the thick plant growth found in the jungle.

b. **Status of Terrain Features.**

1. **Topography.** Most jungle areas on the shores of large bodies of water, lakes and rivers consist of alluvial plains and swamps. The presence of numerous ridges establishes a many-branched drainage system and causes a rugged and complex terrain structure (fig 2).

2. **Hydrography.** Jungle is characterized by many streams which drain the ridges and by large rivers which are deep, swift and difficult to cross. Streams and rivers usually become raging torrents during the rainy season.

3. **Vegetation.** The element most often associated with the jungle. Many types of plant growth exist in great abundance. This vegetation is characterized by rapid growth, dense concentration and a natural ability to resist enemies.

4. **Surface materials.** Vary from the highlands to the lowlands. The uplands soil is usually composed of fine-grained materials having a clay-like composition. The lowlands are generally of silty composition. Trafficability afforded by either type soil is generally very poor, especially during rainy periods.

5. **Cultural features.** Are so scarce in most jungle areas that any works of man, regardless of how primitive, are liable to assume critical significance in combat.

### Section II. THE JUNGLE ENVIRONMENT

#### 8. Primary Characteristics of the Jungle

Trees interconnected by a network of thick vines are the principle identifying features of a jungle. Primarily responsible for the lushness of the vegetation is a combination of high temperature and relative humidity throughout the year and a heavy annual rainfall. Much of this rainfall is in the form of torrential showers, the runoff from which causes flash floods and scours the stream courses. As a result, most jungle areas are cut by many steep-sided gullies (fig 3). Another important consideration in the jungle is the absence of moving air, a factor which makes conditions extremely uncomfortable. These are the characteristics that prevail in all jungles, but not all jungles provide the same operational environment. (For climatic details, see TM 1-300.)

#### 9. Types of Jungle and Associated Terrain Features

a. **Primary Evergreen Rainforest.**

1. **Lowland Forests.** In these forests a continuous "canopy" of tree branches 100 to 200 feet above the ground blots out the sun from the forest floor which, as a consequence, supports the growth of relatively few, shade-tolerant, shrubs (fig 4). In the semidarkness that prevails in this type of jungle, only the leaves on the many thick, woody vines that hang from the trees and grow along the ground aid the trunks in obscuring horizontal visibility. Heavy rainfall throughout the year supports this forest and the ground is nearly always wet and slippery. The humidity remains extremely high even during the hottest part of the day because the canopy retards the drying effect of the sun. For the most part, this jungle is extensive only in areas remote from civilization.

2. **Highland Forests.** As an illustration of the extreme variations of climatic and vegetative conditions that are found in jungle areas, it is worthy to note and consider a variant of the evergreen rainforests which is called a "cloud forest" or "moss forest" (fig 5). In mountainous terrain located near the equator at elevations from 3,000 to 12,000 feet above sea level this type forest may be found. Large trees dominate but extensive growths of ferns and mosses are also found. All vegetation, the ground and prominent rock formations are covered with a heavy slime or moss covering (fig 6). The tempera-
Figure 1. Shaded areas delimit the humid tropics.
Figure 1. Shaded areas delimit the humid tropics.

Figure 2. Typical topography of jungle areas. The slopes of such hills are very steep, extremely slick when wet and are usually shot through with numerous gullies and ravines.
Figure 3. Erosion hole in large gully which drains a high ridge. These holes are often very deep and are a serious hazard to troops especially when moving at night.
Figure 4. The jungle canopy. The interconnected system of tree limbs forms a veritable roof over the jungle floor. A canopy of this type in primary rainforest may be well over a hundred feet above the ground. The presence of such a canopy hides the general configuration of the ground and prevents aerial survey for mapping purposes.

ature may go as low as 60° and the humidity is always high. There is a noticeable scarcity of animal, insect and bird-life. Movement in this forest is extremely arduous and hazardous as the slopes are quite steep, the ground is slick and deep layers of ground moss cover the ground over hidden fissures of the surface. Although a cloud forest is a most eerie and uncomfortable place in which to live, it would suit the needs of a guerrilla force quite well.

b. Secondary Evergreen Rainforest (fig 7). A dense, tangled mass of scrub trees, bushes, and jagged grasses occupy the space between the tree trunks in this type of jungle. The upper story canopy of trees generally is between 50 and 100 feet tall, with a second story canopy ranging from 15 to 35 feet high. The top canopy is relatively open, allowing the sunlight to reach the ground in numerous places. Because of this, the plants in this forest form an almost impenetrable undergrowth. Although this forest is not nearly as dark as the primary rainforest, the horizontal visibility is considerably lessened by the dense undergrowth. The temperature is somewhat higher than in the primary forest and the humidity is somewhat less, but overall it is just as uncomfortable for troops.

c. Mangrove Swamp (fig 8). Associated with the evergreen rainforest, in coastal areas subject to tidal flooding, are extensive mangrove swamps. Closely spaced trees with branching “prop” roots form a barrier to any type of movement. With the ground obscured by standing water nearly all of the time and the steeply arching roots hampering horizontal visibility and providing an extremely
slippery surface on which to stand, a mangrove swamp is useful primarily as a place to hide. On their inland margins, where the water is less saline, mangrove swamps are bordered in many places by other types of swamp. The various types of mangrove swamps can usually be identified by the color of the bark of the larger trees. This is important as there are distinct differences of growth intensity, degree of flooding and incidence of vines. All these factors have a potential effect on movement and should be noted. Types of mangrove swamps and growths are:

1) “Red” mangrove grows in deeply flooded areas and produces both aerial roots which drop to seek water and ground roots which branch out in a tangled, tent-shaped mass, forming an almost impenetrable barrier. Figure 9 shows a typical stand of “Red” mangrove.

2) “Black” mangrove produces the maze of ground roots usually associated with mangrove growths. However, aerial roots are not usually found in this type swamp; thus, it can be expected that movement through this type would be comparatively easier than is the case with the red bark type. Figure 10 shows this difference.

3) “White” mangrove (figs 11 and 12), which actually appears gray in color, has no tent-shaped mass of prop roots. Also, there is more space between the individual trees and they are usually in a shallower stand of ground water. For these reasons it is easily the best of the three sub-types for ground movement; but, it must be remembered that even a white mangrove swamp is a very dense and difficult place for a unit to operate.

Figure 5. Typical “moss” or “cloud” forest.
Figure 6. A view of the forest floor in a typical moss forest. Here is the domain of gnarled trees, lichen-fringed and covered with moss and liverwort. Movement through this forest is all but precluded by the thick mat of growths which may be as deep as a normal man's height.
d. Swamp Forest Sub-Types.

(1) Palm Swamp. This is generally characterized by flooded ground and no canopy of overhanging trees. Two of the most common types are “Manicaria” and “Acosticium” palms. Manicaria palm produces common and useful palm fronds and usually stands in water that is not too deep to traverse. It is also mixed, normally, with many other types of growth, as is common with most jungle vegetation. Acosticium palm, which produces a beautiful fern, normally stands in higher water but usually grows by itself because of its tendency to choke out other plants. Figure 13 and 14 illustrate the several sub-types of palm swamps.

(2) The “Catival swamp” derives its name from the “Cativo” or “Catival” tree. Although this is a Latin American word, it should be understood that this type of forest can be found in most jungle areas of the world. Catival swamp is the transition between swamp forests and upland forests. It is so named for the common Catival tree, which produces a high, closed canopy of branches. These shut out the sunlight and prevent the growth of much low vegetation. Sometimes catival swamp has standing ground water, but it is often dry. Figure 15 shows a typical stand of Catival.

(3) Coastal thicket is another sub-type of swamp forest. It is found along sandy beaches near sea level. It is very thick and dense, very hard to traverse, and can be recognized by the presence of scattered coconut palm trees which will grow very close to salt water (figs 16 and 17).
type of areas of transition forests.

Catival: the sun- lamp has •

Figure 8. Typical mangrove root maze shown at low tide. Caution must be exercised when attempting to hide in or move through such growths as a man who becomes entangled in the root system could be drowned by the rising tide water.

e. Marsh. In areas where the water is not brackish enough for mangrove, but where it is too wet for most forest trees, marshes can usually be found. These generally are composed of tough, thick reeds up to 15 feet tall and form a solid mass of vegetation; usually it is impossible to see someone even a few feet away. Most of these marshes are relatively small, but those that are situated adjacent to a trail are ideal places for ambushes.

f. Dry Season Deciduous Forest.

(1) All of the vegetative types mentioned above occur in areas where the rainfall is fairly high throughout the year. Although there usually is a so-called dry season, it actually is more accurately a less-rainy season. In much of the tropics, however, there is a true dry season, lasting from three to six months, with almost no precipitation. In contrast to the tropical evergreen trees of the rainforest, many of the trees in the areas experiencing a dry season are deciduous, i.e., they shed their leaves sometime during the year. This does not mean that at the beginning of the dry season the trees lose all of their leaves; neither does it mean that the forest achieves the bare look in the manner of a deciduous forest in the mid-latitudes. The leaves fall gradually and it is a rare tree that becomes completely bare.

(2) The upper story canopy of a primary dry season deciduous forest generally is formed by trees that are not more than 100 feet tall. Where the canopy is continuous the undergrowth is very light. Where breaks occur in the canopy the
undergrowth is very dense (fig 18). Extremely dense undergrowth is characteristic of all of the secondary deciduous forest. High thorny shrubs, knife-edged and saw-toothed grasses, and spiny vines are common features. Even during the dry season these features reduce horizontal visibility to very short distances. During the rainy season climatic and soil conditions within this type of forest are nearly identical to those in the rainforest; but during the dry season the ground becomes dry and hard and temperature and humidity fluctuations are much greater than in the rainforest. Since the climatic conditions are somewhat more pleasant in areas having a dry season than in areas where rain falls the year round, there usually are more people living in the dry season areas. The greatest number of people depend on small scale agriculture for their livelihood.

9. Cultivation.

(1) Throughout the tropical areas of the world a large percentage of farmers till the land in a relatively similar manner. Several acres of trees are cut during the rainy season and the logs and stumps are left in the clearing. These then are burned during the dry season. At the beginning of the rainy season the farmers punch small holes in the ground with pointed sticks, drop a few seeds in each hole, cover the seeds by stamping the ground with their feet, and wait for the crop to grow. After the second year of use, a clearing is abandoned and a new clearing is made. This is commonly called “slash and burn” agriculture (fig 19). Abandoned clearings usu-
ally contain a dense growth of scrub vegetation in which relics of former crops, such as bananas, may be found.

(2) The cultivation of wet rice, though not directly related to jungle operations, is an important consideration in the more densely populated parts of potential operational areas. Wet rice is grown on both the lowlands and the hill slopes (fig 20). In the lowlands rectangular fields separated by dikes one to two feet high are flooded during the growing season through an intricate network of canals and irrigation ditches. On the hill slopes terraces are constructed on which to grow the rice; dikes surround the terraced fields and the fields are flooded by gravity flow. Since most of these rice fields are fertilized by human feces, accidental puncture of the skin while crossing these fields will almost certainly result in an infection.

(3) More closely associated with, and in some areas completely surrounded by jungle, are several types of tree crops, primarily rubber and coconut. These trees generally are grown in plantations, where the trees are planted at regularly spaced intervals and all underbrush has been removed. Having the appearance of well-tended parks, rubber and coconut plantations afford a welcome respite from the jungle but provide little concealment or cover.

h. Savanna. Tropical grasslands begin along the fringes of the dry season deciduous forests. The only trees found in the savanna grow in scattered small groves or isolated single stems. Grass which is as much as 15 feet tall in the more well watered areas to as little as 3 feet tall in the more arid

Figure 10. Black mangrove. Note the absence of aerial roots.
sections comprises the principal vegetation. Horizontal visibility in the tall grass is reduced to a few feet and in some places it is possible for walking men to be completely obscured from aerial observation. The highest temperatures in the humid tropics are recorded in the savanna areas, and the daily differences in both temperature and humidity are greater than in the other areas described. See figure 21 for a representative example of savanna grass.

i. Bamboo. This member of the tropical tree-like grass family grows in clusters or concentrations of varying intensity throughout the wet tropics. The springy, hollow jointed stems vary greatly in circumference and height. Some growths attain a height of well over a hundred feet. Horizontal visibility is extremely limited, usually to only a few feet. Movement through bamboo is slow and arduous. Men used as cutters and trail breakers in bamboo growths should be relieved at five to ten minute intervals. Inasmuch as bamboo offers such great resistance to penetration and because movement is out of necessity very noisy, it should be avoided or bypassed if possible.

10. Distance and Movement

a. General. Vines that entangle and trip even the most careful person, steep stream banks with slippery soils, shrubs and trees with thorns that penetrate and tear clothes, grasses with knife-like and saw-toothed edges that cut the skin, combined with constantly high heat and relative humidity, make jungle an extremely difficult place in which to move. Even where trails are available conditions are not improved to any great extent especially during, and immediately after, rains. In areas where the vegetation is extremely dense and deep it may take hours to pass through small streams. Soft, muddy, bottomless, and difficult to tread, these muddy conditions have a tendency to spread, making movement more and more difficult. The necessity of traveling through such jungles is an added hardship. In such areas where trails and streams are available a considerable amount of time is spent in travel. In order to move through such areas it is necessary to spend considerable time. In such areas where travel is possible it is necessary to spend considerable time. In such areas where travel is possible it is necessary to spend considerable time. In such areas where travel is possible it is necessary to spend considerable time. In such areas where travel is possible it is necessary to spend considerable time. In such areas where travel is possible it is necessary to spend considerable time.
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deep it may be necessary to follow the beds of streams. If the stream bottom is either rocky or soft, movement may still be very difficult. Darkness, which occurs with great rapidity in the jungle, compounds the problems of movement. In general, tropical nights are approximately 12 hours long throughout the year. Chief among jungle navigation problems is the difficulty of estimating distances. Rarely are there landmarks against which to check as reference points for the distance traveled. Only in very few instances will it be possible to correlate accurately a given jungle area to a map. In almost all cases a soldier will estimate that he has traveled much farther than he actually has because he usually will have expended a considerable amount of energy to go only a fairly short distance.

b. Estimating Time-Distance Factor. Terrain in jungle areas offers many variations. As a result, movement rates can be expected to vary similarly. Because of many factors attendant to movement such as physical condition of troops, equipment and individual man loads, weather, etc., it is most difficult to estimate accurately travel times for movement by infantry. It is best to express estimates in terms of time and not distance. For planning purposes the following data are offered, but it must be kept in mind that accurate estimates can be realized by commanders only through experience and knowledge of troop capabilities:

(1) Primary evergreen forest. The average rate of movement is about 1000 meters to the hour, dependent upon the incidence of hills, rivers or swamps which will slow progress considerably.

(2) Secondary evergreen forest. Average rate about 500 meters per hour.
(3) Swamps. Average rate about from 100-500 meters per hour.

(4) Bamboo. Extremely slow, dependent upon size. Closely growing bamboo is one vegetation that can slow movement to almost a standstill.

(5) Savanna. Rate of movement about the same as for secondary evergreen forest, but more taxing and exhausting.

(6) Trails. If their use is permitted or feasible under the immediate tactical situation, the speed of movement will approach that of movement in open country. All of this is contingent upon the factors described.

11. Transportation Facilities

With very few exceptions surface transportation facilities in the humid tropics are poorly developed. Railroads are rare and those that do exist are generally narrow-gauge and have very low carrying capacities; most serve as feeder lines from a commercial establishment (plantation, mine, or factory) to a port. Road nets are infrequent and limited and most roads have loose surfaces; many roads are impassable for vehicles during the rainy season. Trails passable only to pack animals or men on foot even during the best conditions are the only transportation links in large areas. In the more remote areas inland waterways are the principal transportation arteries. These same waterways are major obstacles to movement on land. There are few bridges and most of these are not capable of supporting military vehicles heavier than a ½ ton truck. Many streams are not even crossed by foot bridges. Heavy equipment can be a definite detriment in such areas, providing more difficulties than help. Because of the lack of cross connections between existing roads or trails, communications between units moving on widely separated axes is an addition to transportation problems. Waterways are used for operations and in the group’s withdrawal and recovery. Waterways are major routes of operation.

12. Distribution

a. Pacific. The islands of the Pacific, which are within the tropics, though many are in the temperate zone, live in close contact with the majority of human habitation. The exposure...
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The limitations of surface
transportation facilities transfer the major trans­
portation requirements to aircraft. When aircraft
are used, weight factors become very important.
In forested areas, the problem of getting troops to
the ground is paramount. The next problem is to
recover these troops following execution of a mis­
sion. With all of the attendant problems, jungle
operations will require the use of aircraft as a
major means of transportation.

12. Diseases

a. Prevalence. Troops operating in the humid
tropics will be exposed to a variety of diseases
which are seldom found in the mid-latitudes. Al­
though many of the disease-producing organisms
live in the jungle some are common only in areas
of human occupancy. Various types of fungi pro­
duce the most widespread infections. Constant ex­
posure to high heat and high humidity cause most
troops to harbor fungus. These organisms grow at
an extremely rapid rate unless a constant effort is
made to keep the body dry. Foot care is most im­
portant, although fungus infections also occur quite
commonly in the ears and on the hands. Water in
most areas is polluted; unless precautions are taken
to purify it before drinking, it may cause intestinal
diseases such as dysentery. Even wells used by
villagers are usually contaminated. Although na­
tives drink this water with impunity, troops can
become violently ill. Malaria is another common
ailment of the humid tropics. All troop units going
into such areas for extended stays should be sup­
plied with anti-malaria medicines. Nets should be
used to protect troops against insects when sleep­ing.

b. Seriousness. Such diseases as malaria, filaria­
sis (elephantiasis), dengue fever, yellow fever, and
typhus will cause total incapacitation. Fungus in­
fecions, probably the most common of all dis-
Figure 16. Catival growth. The sparse undergrowth in this forest facilitates movement by foot troops.
orders, generally are more annoying and painful than incapacitating. Social diseases such as syphilis and gonorrhea are quite common in native villages; it is important, therefore, that troops avoid intimate contact with the local women. Imaginary ailments, with symptoms unheard of in medical books, often affect troops when they are first introduced to jungle environment; these imaginary diseases sometimes can be even more serious than those which are real. The stress of violent action under the conditions of high heat and humidity may cause troops to become unconscious. This phenomenon is not imaginary and may occur to both acclimatized and unacclimatized troops. Maintaining a healthy force under these extremely trying conditions is one of the most difficult of all the operational problems that troop commanders may encounter.

See paragraphs 8 through 16 for a more detailed discussion of medical problems encountered during jungle operations.

13. Visibility

a. Limits. Horizontal visibility in the areas of the humid tropics varies according to the type of vegetation (figs 22, 23 and 24). In the primary rainforests visibility is hampered by both the semi-darkness which prevails throughout the day and the vegetation, which, though not closely spaced, is relatively large in diameter. Even in the most open spaces in these forests a field of vision of more than 100 feet can be rarely obtained. In the secondary rainforest and both the primary and secondary deciduous dry season forests the fields of view are reduced to 30 feet or less in many places. In some secondary growth, views may be reduced to as little as 10 feet. In the plantations of tree crops it is quite possible to obtain views of up to 300 feet. In mangrove swamps visibility is hampered more
by the darkness than by the prop roots so it is possible in some of these areas to see as much as 50 feet. In the marshes and in the tall grass savanna fields of vision are reduced to only a few feet. In short grass savannas surface irregularities provide the principal hindrances to long distance views. Observation from the air is very difficult in all of these areas except the short grass savanna.

b. Problems. Control measures must be increased for operation in the jungle. At the same time, however, the need for silence is imperative. Even if it is not possible for men to see each other, they must have a method of knowing that the adjacent person is friendly. Whoever is doing the navigating through the vegetation must be able not only to maintain the direction of movement but also to relay information regarding progress, state of the ground, and other pertinent data to the commander of the unit. Objectives in jungle operations are normally limited to scope for this reason. Operations are usually conducted by small units to lessen the problems of control.

14. Plant Life

Plants suitable for use as food abound in most jungle areas. For a complete discussion of useful plants, see TM 10–420, FM 21–76, and paragraph 29 of this manual.

15. Animal Life

Most animals in the jungle will not attack man unless they are frightened. There are a few exceptions, however; the Asiatic Tiger, the Latin American Jaguar, and Peccaries (commonly called wild boars) may attack unprovoked. These animals are in the minority and are rarely encountered. Even snakes will not usually attack unless they are molested. Some reptiles, such as the crocodile, and some fish in South America.

For the most part, jungle are friendly and encounter.

16. Native Assistance

The native assistance in some reason before going least becomes part of the taboos of the area it is possible in an area and a support could be employed, construction with local interpreters to population is more advisable.
and some fish, such as the Piranha of Northeastern South America, will attack anything that moves. For the most part, the animals that inhabit the jungle are the least significant hazard troops may encounter.

16. Natives

The natives of an area can provide valuable assistance if they are made to feel that there is some reason for giving their help. It is necessary before going into an area, to learn about, or at least become familiar with, the customs, habits, and taboos of the natives. By violating a sacred taboo, it is possible to alienate the entire native element in an area and thus cut off a source of intelligence and a supply of potentially willing workers who could be employed as scouts, guides, carriers, construction workers, and litter bearers. The use of local interpreters when dealing with the native population can be more harmful than valuable. It is more advantageous to use sign language directly with the head man of a village or tribe because the possibility of projecting the information desired is greater through this means. Local interpreters, in their desire to be helpful and to maintain their favored position in the community or tribe, cannot afford to indicate they do not understand and they will provide the answers that they think are wanted. The following concepts should be considered when dealing with native populations:

1. Be friendly but cautious.
2. Be courteous.
3. Respect customs, religious beliefs, and property.
4. Offer gifts with prudence.
5. Avoid threatening gestures.
6. Do not molest women.
7. Offer all assistance possible, especially medical aid.
8. Do not confiscate food, etc.; pay a fair price for everything.
Figure 19. Dense undergrowth resulting from abandonment of clearing in the "slash and burn" agricultural process used by many natives in jungle areas.
Figure 20. Juncture of grassland and cultivation with primary jungle. Terraced rice fields are in the foreground.
Figure 21. Savanna grass. Note absence of large trees.

Figure 22. Jung quite easily if
Figure 22. Jungle trail. Horizontal visibility is frequently restricted on these trails and the trail can be lost from view quite easily if individuals step to one side more than a few meters.
Figure 23. Troops moving down a wide trail. Horizontal visibility is restricted by varying light conditions as shown in the photograph.

Figure 24. Large di...the trunk except a...restrict horizontal.
Figure 24. Large diameter tree common to primary rainforests. The limbs of these trees usually do not branch out from the trunk except at heights from 80 to 100 feet above ground level. It is not difficult to see how these large trees would restrict horizontal visibility severely even when the underbrush is sparse.
Figure 25. These photographs illustrate the problems of visibility and control caused by jungle vegetation. In the top picture the soldier was photographed at a distance of nine feet; he took two paces and was partially hidden from view as shown in the center photo; two more paces and he was completely lost from sight.

17. General
Movement extremely difficult; features can present an obstacle, such as a bridge in combination with bridging equipment. The soldier at any depth is lost from view; the soldier is not possible. Developed on the distance to jungle terrain with features. Small jungle operations informed of the movement of other, competent plans.

18. Observation
a. Observations in paragraph 13 is extremely limited and will provide little information on jungle canopy and vegetation. This active detection possible in numerous bodies of undetected movement. If defending force moves and unknown to limited observation, control of the situation. Flanks can be turned, leaders of the opposite events have occurred.

b. Fields of view of automatic weapon areas. It is not shaped fields of coverage of sectors of fire. Limited to the center, movement and fire.

TAOG MIA
Section III. MILITARY ASPECTS

17. General

Movement either by vehicle or on foot is extremely difficult in jungle areas. Minor terrain features can present major obstacles to movement in combination with the dense vegetation. Because bridging equipment generally will not be available at any depth in the jungle, it is necessary to improvise for almost every river crossing where fording is not possible. Planning criteria must first be developed on the time factors involved rather than the distance to be covered. Defensive action in jungle terrain is considerably aided by natural features. Small units are the essential element in all jungle operations. They must be kept fully informed of the known situation, so they can make competent plans and decisions.

18. Observation and Fields of Fire

a. Observation. Ground observers are at a distinct disadvantage in jungle areas. As mentioned in paragraph 13, the range of horizontal visibility is extremely limited (fig 25). Aerial observation will provide little useful information because the jungle canopy will conceal most activity underneath. This activity may include movement of substantial bodies of troops over fairly long distances. Undetected movements of this type can mean disaster if defending troops cannot properly man defensive positions before the attack. Conversely, the attacking forces may also use the jungle cover and concealment to get into positions undetected by and unknown to the defenders. In these areas of limited observation and fluid frontal conditions the control of the fighting becomes doubly difficult. Flanks can be turned, fronts can change, and the leaders of the operation may never know that these events have occurred.

b. Fields of Fire. The traditional employment of automatic weapons is impractical in jungle areas. It is not normally advisable to clear fan-shaped fields of fire to provide maximum arc and coverage of sectors with these weapons. To do this would indicate clearly to the enemy the friendly fields of fire. Rather, "fire tunnels" should be carefully hollowed out of the vegetation to define the sectors of fire. For the most part coverage will be limited to the control of trails and other routes of movement and fire will be confined to very shallow areas. Even the range for snipers will be very short. Short range, quick-burst, quick-response weapons are the most useful.

19. Concealment

In nearly all types of vegetation in jungle areas the concealment potential is tremendous. The opportunity to conceal troops from most types of surveillance devices is afforded in all types of vegetation except the very young secondary growth group. If camouflage techniques are used properly there are very few situations or conditions in which troops cannot be concealed from ground observers. Seasonal changes of coloration must be studied. Stringent discipline must be maintained in all movements and bivouacs to insure against unnecessary clearing of overhead cover and thereby permit aerial observation. Many of the vegetative features that afford concealment because of their opaque surfaces provide no resistance to bullets. It is easy for troops to mistake concealment for cover.

20. Cover

Except in the primary evergreen rainforest, the trees in most jungle areas will not provide extensive cover. Average tree trunks are generally not more than 12 inches in diameter; in areas where large trunked trees are located the trees are usually widely spaced. Most of the cover in jungle areas will be afforded by surface irregularities, such as ravines, gullies, and large rocks. These are to be found in abundance.

21. Obstacles

The jungle itself is the obstacle. This feature with its attendant psychological pitfalls and its physical adversities must be overcome before any thought can be given to an enemy force. The stresses placed on men to merely traverse the ground and the heat generated by such stresses induce a type of hypnotic spell in which the next step becomes the most important consideration, all of which dulls the mental discipline necessary to remain alert. Augmenting the natural conditions that serve to break down the spirit and fighting will of the soldier are the manmade obstacles erected by the enemy. If these obstacles are encountered when troops are in a state of fatigue they may forget that the obstacles are almost always controlled by maximum enemy firepower. Only a determined,
disciplined force in peak physical condition can hope to move and fight successfully in the jungle.

22. Key Terrain Features

All features that expedite movement, resupply, and evacuation may be key terrain features. Roads are the most critical; trails that afford relatively easy access are next in priority. Navigable waterways are also significant. Any clearing in which a helicopter can load or unload may tactically be a key feature in a major operation (fig 26). Villages, bridges and prepared fords must also be considered. Unlike conditions in more barren areas, high ground is not necessarily important; from the heights the possibility of controlling or observing trails or critical approaches through the valleys is rather remote.

23. Avenues and Routes of Approach

It is not possible to provide a formula for deciding the approach route that would serve the needs of the commander best. If he has a choice, his immediate needs and the time/distance factor will guide him in his decision as to routes for movements. Consideration should be given to the fact that in any movement security is of major importance. Although the terrain may permit movement along trails, ridgelines and valleys, normally these routes will be guarded by enemy forces. On the other hand, while travel across ridgelines and valleys will normally offer more security, it will be much slower and extremely tiring for the troops, especially so if large quantities of food and ammunition are to be carried.

24. General

A practical inherent in jungle warfare is the necessity of only remedies for movements. Understanding it is liable to be attacked, individual soldiers must be prepared to live in harsh conditions before such a campaign is conducted in training situations. Any jungle, will be in areas are not the nonavailability of the nonavailability of must employ terrain for training purposes by the opportunities for training in simulating restricted moves by the jungle.

25. Initial Task

a. The first phase of the task is the combat to the psychological combat to the through sound and tactics to eliminate the animals, and units must not only facts must not only be and temperature.


**CHAPTER 3**

**JUNGLE TRAINING**

Section I. THE INDIVIDUAL

24. General

A practical appraisal of the abnormal difficulties inherent in jungle operations will reveal that the only remedies for such conditions are training and experience. Unless, however, experience is based on sound, thorough, realistic and constant training it is liable to be quite costly. Therefore, the individual soldier and operational units should be prepared to live and fight in jungle environments before such a mission is actually assigned. Training conducted in actual jungle constitutes the ideal training situation; however, application of guidance herein described, in areas other than the jungle, will benefit the soldier, in event jungle areas are not available. Under circumstances of the nonavailability of jungle terrain, commanders must employ vigorous and imaginative approaches to training for jungle combat taking advantage of the opportunities offered by dense woods, river beds, swamps, marshes or thickets for training purposes. Application of night fighting techniques when utilizing conventional or relatively barren terrain for training will prove to be quite effective in simulating the reduced ranges of assault, restricted movement, and control difficulties imposed by the jungle.

25. Initial Training Objectives

a. The first concern of commanders who are faced with the task of preparing individuals for jungle combat is the physical and mental acclimation of troops to the oppressive jungle environment. Psychological conditioning and knowledge imparted through sound instruction are the only means to eliminate the common fear of snakes, insects, animals, and unknown, foreboding terrain. Troops must not only be physically hardened; in addition, they must be able to adjust to weather, climate, and temperature changes to be expected when deployment to wet tropics from temperate areas takes place.

b. The objectives of jungle training are to prepare the individual and unit to function effectively in jungle environments. Training situations should be created which require execution of missions by small units operating independently. Control of units should be decentralized requiring reliance upon the junior leaders and even the individual soldier. Training should demand individual self-reliance, teamwork, skill, and determination on the part of participating troops. The scope of the training program should extend from survival of the individual in the jungle, to participation of units in combined operations.

26. Acclimation to Heat and Humidity

a. General. One of the secrets of successful training or fighting in a wet tropical climate is the knowledge and proper use of information regarding the acclimation process of the body, heat disorders, and basic heat rules. It must be emphasized that understanding and remembering this information are not enough; only by proper use of this knowledge can troops avoid becoming heat casualties.

b. Heat. Heat is a physical form of energy generated through combustion, chemical action, or friction. There are two types of heat which are of interest to the soldier, the heat of the environment caused by the sun, and the heat of the body generated by converting food into energy. The normal temperature of the human body is between 98°F and 99°F depending on the individual. When excess heat acquired by the body from the environment or from energy producing foods is not dissipated, and this internal temperature departs significantly from normal, serious sickness or even death will result. The human body dissipates ex-
cess heat in three ways: conduction, radiation, and evaporation. Conduction of body heat occurs when the temperature of the air is less than the body temperature. Radiation of body heat occurs when the surface temperature of surrounding objects is lower than the surface temperature of the skin. Normal responses to heat stresses are dilation (enlargement) of the blood vessels and an increase in the rate of heartbeat. These adjustments increase the temperature of the skin and thus increase heat loss through conduction. When radiation is not sufficient to maintain the normal body temperature, the activity of the sweat glands increases and evaporation of the perspiration from the surface of the skin becomes the most important means of cooling the body.

c. The acclimation process. Acclimation can be defined as the adaptation by the individual to work in the heat with maximum efficiency and least discomfort. If the body does not become accustomed to heat, the individual becomes irritable and sluggish and is unable to sleep. In general, the performance of this individual becomes substandard and inefficient. Some soldiers may never become acclimated but, fortunately, the percentage is very small. The acclimation process is automatic. The ease and rapidity with which the body becomes acclimated depends upon several variables. One such variable is the degree of temperature change between the two climates involved. Troops going to the wet tropics from a southerly location in the mid-latitudes will become acclimated easier and faster than troops from a place farther to the North. A similar condition would exist if such a move is made in the summer instead of the winter. A second variable is the abruptness of the change from one climate to another. Troops who are transported to wet tropical areas by surface transportation will not experience as much discomfort when they arrive as would troops who are transported by air.

(1) Characteristics of the acclimation process.
(a) Acclimation begins the first day of arrival in the wet tropics and is well developed by the fourth day.
(b) As the process continues, sweating increases and begins more readily, but salt loss becomes less.
(c) Physical exercise speeds the acclimation process by inducing profuse sweating.
(d) The body will remain acclimated from one to two weeks after departure from wet tropical environment.

(2) Proper clothing for the acclimation process.
(a) Clothing must fit loosely. Tightly fitted uniforms will become saturated with sweat and will hinder the cooling process of evaporation and air circulation around the body.
(b) One loose layer of clothing is the most effective dress for the jungle as it affords some protection from brambles and insects and allows rapid evaporation of sweat.

27. Heat Disorders—Prevention and Treatment

a. General. Heat disorders are a serious problem in the wet tropics. The best defense against this potentially fatal threat is knowledge. Troops must know what these disorders are, what causes them, how to prevent them, and how to recognize the symptoms as evidenced by a victim. Of special importance is the individual soldier’s ability to render effective treatment either to himself or to others in event of occurrence of these disorders.

b. Dehydration. Approximately two-thirds of the human body is water. If water is not replaced as it is lost in exposure to heat, the body becomes dried out—dehydrated. Individuals become sluggish and listless as this condition develops.

c. Heat Exhaustion. After dehydration the most common heat disorder is heat exhaustion. It is caused by excessive loss of water from the body. Symptoms of heat exhaustion are headache; confusion; dizziness; drowsiness; weakness; incoordination; loss of appetite; vomiting; visual disturbances; rapid, weak pulse; and cool and wet skin. To treat a victim of heat exhaustion, remove him to a cool, shaded place for rest; elevate his feet to improve circulation of the blood and give him salt solution (two salt tablets, well crushed, dissolved in a canteen of cool water) to drink. Prevention is much easier than treatment; make sure that there is ample water available and that troops drink enough to avert heat exhaustion. During normal operations, soldiers should drink from 6 to 15 canteens of water a day, depending on how much the individual sweats. At temperatures of 100°–200° this should change to as much as 25 canteens per day. Water must not be rationed in training. There
This cloth is essential that the individual
who is conducting jungle operations is adequate, as issued, for wear in heat and
away body heat. The fatigues, therefore, must be worn. This is application of the "single
layer" principle.

Food is the most important source of salt
in the cool of the day if this is possible.

Troops should wear all, directed to the peculiarities and the
unique jungle environment before he is committed
to actual combat in this type of terrain. If not
properly acquainted with the jungle, troops are
liable to become occupied solely with their
surroundings and give little attention to the assigned
mission. Troops must know how to protect them­

selves from the elements and difficulties of the
jungle, if their fighting efficiency is to be main­
fined. This is best accomplished by practical sur­
prations which emphasize the importance of
individual resourcefulness, imagination, and deter­
mination.

28. Living in the Jungle

a. General. It is essential that the individual
should be conditioned to the peculiarities and the
unique jungle environment before he is committed
to actual combat in this type of terrain. If not
properly acquainted with the jungle, troops are
liable to become occupied solely with their
surroundings and give little attention to the assigned
mission. Troops must know how to protect them­selves from the elements and difficulties of the
jungle, if their fighting efficiency is to be main­tained. This is best accomplished by practical sur­vival training which emphasizes the importance of
individual resourcefulness, imagination, and deter­mination. The soldier should acquire and apply
sound habits to the everyday routine of living when
operating in the jungle for extended periods. Jungle
operations require independent actions by small
units. As a consequence, the soldier must be pre­
pared to care for his own needs.

b. Aspects Affecting Troops Living in the Jungle.

(1) Individual uniforms, clothing, and equip­
ment. Troops conducting jungle operations
will usually have to manpack their essentials as normal methods of logistical
support will not usually be available. Therefore, each soldier must learn what
his requirements for clothing and equipment are, how to keep these requirements
to a minimum, and how best to use them.

(a) Combat uniforms (fatigues). This clothing
is adequate, as issued, for wear in
the jungle. To insure maximum cooling
of the body, ventilation must carry
away body heat. The fatigues, there­
fore, must fit loosely; they should not be “cut-down” or tailored. To aid ventilation, troops should be allowed to wear the jacket on the outside of the trousers. To take advantage of the blending color of the fatigues with the background offered by the jungle, the clothing should not be excessively faded from the original olive green color. Faded and light colored fatigues will outline the wearer's form against the jungle green. Fatigue clothing should also be in serviceable condition. Worn or threadbare cloth will not protect the soldier from insect bites, brambles, and direct sunlight as well as new or heavy cloth. The skin needs all the protection it can be given. Troops should not depend upon a uniform that may tear easily and expose areas of the body.

(b) Poncho. The poncho is a raincoat and is issued as such. However, if the poncho is worn as a raincoat its non-porous structure will cause perspiration and will cause the soldier to be more uncomfortable, and wetter, than he would be if he did not attempt to clothe himself against the rain. Also, the vegetation will literally tear the poncho from the wearer's body. By employing the poncho as an expedient it will be found that it has many more useful purposes that will serve troops better. The poncho is very useful in the construction of shelters. Figures 27 through 35 illustrate some of the varied uses of the poncho. The poncho can also be used to gather rain water, as an improvised parachute for material drops and for the

Figure 27. Improvised pup tent constructed from forked sticks and two ponchos.
aincoat and
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perspiration
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also be used
 improvised
y and for the

construction of brush rafts (figs 36 and
106).
(c) The jungle boot. It is light weight and
has built-in drainage screens located at
the inside arch. These two features aid
swimming while wearing the boots. An
outstanding advantage offered by the
boot is its cleated sole, which aids in
negotiating steep slopes and ground cov-
ered with wet and decaying vegetation.
If jungle boots are not available, cleated
soles should be provided on the standard
combat boot.
(d) The insect (mosquito) bar. The mos-
quito bar is a most important item of
equipment. Although it is very light it
can be bulky if not folded carefully.
For efficient packing the mosquito bar
should be folded inside the poncho, the
roll being as tight as possible. This roll
can then be fastened onto the top of the
combat pack with straps, or attached to
the suspender harness with light rope
if the pack is not worn. The mosquito
bar should be utilized whenever troops
sleep in the jungle. If conditions pre-
vent construction of a shelter the bar
can still be used by tying to trees or
brush. Besides providing protection
from insects, the mosquito bar will offer
protection from bats, whose bites are a
potential source of rabies. One word of
cautions. Troops should not allow any
portion of the body to contact the mos-
quito bar when it is hung, as mosquitoes
and bats will bite through the net.
(e) Gloves. If available, soldiers should
wear gloves when moving through vege-
tation. Some protection from thorns,
brambles, insect bites, and snake bite
will thus be afforded. Gloves will also protect the hands from blisters when using the machete for prolonged periods of time and will prevent burns when repelling rapidly. When not actually needed, they should not be worn, because they will soften the skin unnecessarily.

(f) Suspenders. The suspenders issued with the combat pack should be worn when the accouterment belt is worn. Because it is advantageous to travel light, troops should not wear the combat pack except when the mission dictates. As much as possible, individual equipment and ammunition should be worn on the belt. The suspenders will help support the weight by relieving weight from the hips and, as a result, the load will be easier to carry, being better distributed.

(g) The machete. The machete is the most important and useful piece of equipment available to the jungle fighter. It is an effective weapon as well as an excellent cutting tool. The employment of the machete as a weapon can be integrated with other combat training. As a tool, however, the machete shows its worth. To gain the maximum use from the machete, it is necessary to learn and practice the proper grip (fig 37). The proper way to grasp the machete is as follows: take a firm grip on the handle, the power of the grip being asserted by the thumb, the index finger and the third finger; the ring finger and the small finger should be held loosely around the handle; the last two fingers will be tightened around the handle immediately prior to the blade striking the target. Simultaneous with this last action a pronounced “snap” of the wrist will be made. This will increase the power of the strike. To realize the maximum efficiency of the blade, the angle of strike should be 45°. Figure 38 illus-
HUNG FROM BUSHES

Figure 38. hastily shelter made by suspending the poncho from low underbrush. The simplicity of this shelter allows erection during darkness.

The machete is hung from bushes during the cool of the night as an excellent employment of the poncho can be integrated with sleeping. As a tool, it shows its worth.

The machete is as flexible as the user learns and practises (fig 37). The machete is held loosely on the handle, finger and the last two fingers are held loosely striking the palm of the wrist will increase the realization of this angle. Caution should be exercised to ensure that the blade does not strike the target at an angle greater than 45° as the blade will make only a shallow cut. If the target is struck at an angle less than 45°, the tendency is to ricochet. Besides being ineffective, this is very dangerous to the wielder of the machete and to those around him. The machete is also used to cut grass. However, when the machete is employed to do this, repeated blows may be necessary to cut one clump of grass. This is caused by the resiliency of the grass and the resultant lack of resistance offered to the blade. A simple expedient can solve this difficulty. A forked stick will compress the grass so that the blade will cut it. This stick will also flush away from the user's immediate vicinity any snakes that might be there. Certain precautions must be taken when troops use the machete. Users should not cut towards the body; they should swing the blade away to the left or right. In cutting vines, when making a trail, the cut should always be upward to avoid jerking the tree tops to which the vine is fastened, and thus alerting any enemy observation. Individuals should not work too closely to one another. The back of the blade is thin and can injure, so care should be exercised when the blade is drawn back in preparation for a strike. When not in use the machete should be sheathed. If it must be carried unsheathed, it should be grasped by the back of the blade between the
PITCHED CANOPY FASHION

Figure 81. Hasty shelter constructed with the poncho.
thumb and the index and third fingers. Thus, if a soldier should fall the blade will be dropped and the reflexive action of extending the arms to break the fall will not result in injury. Like any other tool, the machete must be properly maintained.

(2) Sanitation and personal hygiene. In no other type of military operations is sanitation and personal hygiene more important than in jungle combat. Jungle operations place greater responsibility for safeguarding health upon the individual soldier. In jungle areas, units and individuals will not have the protection afforded by the modern sewage and water systems of built-up areas. Each unit will have organic medical personnel, but since the jungle favors operations by small groups operating on their own, every soldier must have at least an elementary knowledge of how to care for his own health. The characteristics of wet tropical areas favor disease. The warm and humid climate favors rapid reproduction, growth, and spread of disease-causing germs. Most of these areas have a high rate of endemic disease; the primitive sanitation systems compound this condition. All wet tropical areas have great numbers and varieties of insects that spread and carry disease-causing germs. The problem posed by disease in jungle areas has previously been mentioned in chapter 2. A detailed discussion of the types of diseases prevalent in jungle areas can be found in paragraphs 138 through 147.

(3) Water. The very abundance of water found in the jungle can cause many problems if the greatest care is not taken to properly purify it before consumption. There are many sources of water in the jungle. Streams and rivers, water holes,
and "water vines" will furnish water for the soldier. Actually, there is no such thing as a water vine; any vine can be a source of water if it passes three tests for potability. A segment of large vine should be cut in a length of about three feet. If the sap is clear, odorless, and tasteless, the water is safe to drink. Banana tree stalks, wrung out like a wet cloth, are a source of water. Bamboo saplings have a good supply of water in the lower sections. Rain is a good source of water. However, the jungle canopy is inhabited by thousands of arboreal creatures. Troops should wait for the rain to fall for ten to fifteen minutes to insure that water that falls through the canopy is free from contamination caused by excretion of these creatures. Special care must be taken against water-borne diseases. All water, except

the water from vines, bamboo, and bananas must be purified prior to consumption. Boiling, for at least one minute plus one additional minute for every 1000 feet above sea level, or chemical purification by halazone or iodine tablets, is necessary. Troops should be made to practice these precautions regardless of the area in which they are training or operating.

(4) Jungle shelters. It is essential that troops be able to protect themselves from the elements when they must live in the jungle over extended periods. Sleeping on the ground will cause the soldier to suffer the effects of dampness and from the various insects that inhabit the jungle floor. Therefore, in the course of training, troops should be trained to construct appropriate shelters.

(a) Types of shelters. Jungle materials are
available for construction of shelters of many types, the only limitations being the imagination of the individual soldier, restrictions of the tactical situation and time available. Temporary shelters are constructed from a combination of jungle materials and issue clothing and/or equipment. These shelters can be erected with minimum time and labor and are intended to be occupied for short periods. A semi-permanent type, constructed entirely of jungle materials, is more elaborate and requires more labor and time, but can be occupied for extended periods. Figures 39 through 41 show representative examples of the various types of jungle shelters.

(b) Building sequence. The building sequence for jungle shelters begins with

selection of the site. High ground should be selected if available and the tactical situation permits because of better drainage, the possibility of a breeze, and, as a result, freedom from a great variety of insects.

(c) Collection of building materials. For construction of jungle shelters only living materials of the hardwood variety should be used. Wood that is dead deteriorates very rapidly and is usually infested with insects. For roofing thatch, either banana leaves, palm fronds or other suitable green leaves can be used. These materials are either split for shingling, used without splitting or a combination of both. The most workable combination is palm fronds and banana leaves, if these materials are available.
(d) Lashing materials. The jungle soldier should not use rope, if this has been issued to him, for lashing the shelter together. There are other uses for his rope. The vegetation of the jungle offers excellent lashing materials in the form of vines and inner bark of softwood trees. In selecting the vine, it should be tested by tying a knot in the vine and tightening it. The tighter the soldier is able to get the knot, the stronger the vine. Vines can be used in the construction of traps as well as shelters. Another substitute is the inner bark of softwood trees. To obtain the inner bark, cut the tree at the desired length and peel off a portion of bark. Care must be exercised in separating the inner bark from the outer bark. The thickness of the rope will be determined by the width of the bark and the number of strands used. To make a strong, durable rope, three strips of the bark can be braided together. To do this, first tie the three strips in a knot at one end and then weave the three strips by alternately taking the outer strip and placing it in the center. When the bark has been braided to the end, another knot is tied. This rope can be extended by adding strips at the end, insuring that they overlap at least two or three inches. Bark rope is very handy in making small ties and in the construction of traps.

(e) Useful hints.

1. Occupants of shelters should always hang personal clothing inside the shelter. This will enable clothes to dry and will minimize the chance of insects or snakes crawling into the folds of the clothing. Boots should always be placed inside the shelter also; before a boot is placed on the foot it must be shaken vigorously to dislodge insects or snakes.

2. If the shelter is off the ground the occupant should always inspect the ground before stepping down.

3. The roof of the shelter should be struck several sharp blows before the occupant exits the shelter. Snakes and insects are attracted by sources of warmth, especially at night. Some of these may have found their way onto the roof of the shelter.

4. Upon awakening, the shelter occupant should carefully inspect the area in the immediate vicinity of his body before moving; some snakes and insects are alarmed by sudden movement.

5. Soldiers must keep shelter areas me-
bites.

Two or three handy in

the construction

handy in

the construction.

should always inside the

 Folded clothes to dry

Always be

before it must be

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Tropical Plants and Foods

a. General. So much has been written about the dangers and discomforts of jungles that the fact that more people live in them than in any other tropical environment is often overlooked. The tropical areas of the world are particularly well supplied with plant, fruit, and nut species. They vary greatly in flavor, shape, quality, and season of maturity. The principal factors that affect plants and fruits are elevation, rainfall, sunlight, humidity, soil, and winds. There may be occasions where individuals or small groups will be required to live off the land for considerable lengths of time while accomplishing their mission. It is beyond the scope of this manual to cover all the plants and foods found in the wet tropics. Only a few of the more easily identified edible plants and foods, a few poisonous plants and foods, and some general rules on how to recognize the various kinds of foods which are common throughout the tropical areas will be discussed. In the course of training, troops should be exposed to the prospect of depending upon wild produce for subsistence. By thorough familiarization with this aspect of survival, troops will
Figure 37. Proper initial grip on the machete handle.
Figure 38. Cutting a sapling with the machete employing the correct grip, snap of the wrist and angle of strike technique. The "break" of the wrist has increased the velocity of the blade to the degree that it was not caught in flight by the camera. Note the complete severance of the tree.
not only become more efficient but self confidence will increase. This will do much to dispel many misconceptions about the jungle.

b. Finding Food. Many of the foods discussed here will not be found growing in the jungle itself but will be found in cultivated or semicultivated lands and in secondary growth areas. The secondary growth areas, as mentioned previously, are areas that were once cultivated and subsequently abandoned. Many foods, once cultivated, can be found in these areas.

c. Citrus Fruits. Throughout the tropical and subtropical areas the citrus fruits are found in great quantity and varieties. However, they are all quite similar to those found throughout the temperate zones. There are numerous species of oranges, lemons, limes, grapefruit, and tangerines. They are basically a cultivated crop but after years of neglect in secondary growths some trees can be found still producing fruit. They usually are of poor quality, thick skinned, sour, small in size, and grow sparsely on a tree. All citrus fruits are eaten in the conventional manner; however, in an emergency they can be eaten green but will taste quite sour or bitter. Some nourishment can be had by making a tea out of the leaves of the lemon and lime trees. Figures 43 through 47 show some of the wild citrus fruits common to the tropics.

d. Other Edible Fruits.

(1) Banana. The banana (musa sapientum) is the most prolific food crop and is grown in most tropical areas. Many species and varieties can be found. The banana grows on a plant that is from 10 to 20 feet high and has large, long, broad leaves protruding from the head or top of the stem.
be found still poor quality, grow sparsely in the conve­ncy they can sour or bitter. Making a tea out trees. Figures citrus fruits (a sapientum) and is grown many species and banana grows to 20 feet high leaves protrud­ing of the stem (trunk) of the plant. The fruit is borne on a stalk which is made up of from 5 to 20 hands with 12 to 15 fingers to each hand. At the end of the stalk there grows a purplish terminal bud or flower. The stalks grow so that the fingers on the hand point upwards. When ripe, the banana may be green, yellow, brownish or red in color (fig 48, 50, 51, 52 and 53). When ripe, they may be eaten raw. If only green bananas are available they may be cooked and made into excellent potato substitute. The tender portion of the inner stalk or trunk, near the root, has a high starch content; it also may be cooked and eaten. The purplish terminal bud (fig 48) may be boiled like cabbage and it can be eaten as a vegetable substitute. Occasionally a bud of the bitter variety will be encountered. In this case, the cooking water must be changed a few times; the bitter, harmless tannic acid will then disappear.

(2) Plantain. Plantain (musa paradisica) can be safely eaten in the raw state when ripe, but must be cooked when green. Plantain is usually cooked and used as a potato substitute. It can be prepared in as many ways as potatoes. The plantain grows on a plant that is almost identical to the banana. The easiest way to distinguish between the two plants is that the stalk of plantain has only a few hands with 3 to 6 fingers on each hand. The hands as well as the fingers are spaced further apart than the banana. The finger of a plantain is much larger than a finger of a banana. Figures 49 and 50 illustrate this difference.
(3) Mamey. The Mamey is a compact, erect, tall tree with dense, dark green, glossy, oval leaves 5 to 8 inches long which grow clustered towards the top or crown of the tree. The fruit is round, 4 to 6 inches in diameter, brownish in color, with firm yellow to reddish flesh. It is good tasting and is flavored somewhat like a clingstone peach. The fruit has a definite projection or nipple. It contains from 1 to 4 large, rough seeds. It may be eaten raw when ripe or stewed with sugar. The green mamey should be cooked prior to being eaten. The mamey (Mannea Americana) is found in the West Indies and in the American tropics. It is found cultivated and wild in the mountainous regions.

(4) Mango. The Mango is considered to be the apple of the tropics. There are literally hundreds of varieties and species of Mango (Mangifera Indica). They are native to the Himalayan mountains and today are found in a cultivated and a wild state in all tropical areas of the world. They are generally the same shape but differ in size, color, and taste. Mangoes will weigh from a few ounces to over a pound and vary from green, brownish, bluish, yellowish, purplish, or reddish in color. It is possible for the mango to be a combination of colors. The mango is sweet with a yellow/orangish, stringy pulp and a very large seed. Most mangoes have a taste that suggests a tinge of turpentine. The thick peeling should not be eaten since it contains a substance that will cause some people to break out in a rash. In addition, peelings of the poorer varieties contain a purgative...
Species of Mango are native to India and today are wild state in Id. They are in size, and vary in color, from green, yellowish, to red. Mango trees can grow to a height of about 35 feet. They have dark green, somewhat leathery leaves, from 4 to 6 inches long. Mango trees can grow to a height of about 35 feet. They have dark green, somewhat leathery leaves, from 4 to 6 inches long. Figure 54 shows a type mango.

Papaya. The Papaya (Carica Papaya) grows on a tree-like plant which is soft-stemmed and unbranched. The tree grows to a height of from 6 to 20 feet. The large, dark green, many fingered, rough edged leaves are clustered at the top of the plant. The fruit grows on the stem clustered under the leaves. There are several varieties which differ in size, shape, and flavor. The most common are similar in shape to a small watermelon. The fruit averages from two to eight pounds, but some species grow much larger. The skin varies from a greenish to a yellow color. The meat or pulp can be orange or red when ripe, and can be eaten raw but should be cooked like a vegetable when green. The center of the fruit is hollow with many black, rough seeds clinging to the inside wall of the pulp. The papaya is found cultivated and wild. The wild variety usually has very small fruits measuring about 2 to 3 inches in diameter. Although the papaya is native to the New World tropics, in recent years it has spread throughout the tropics. Soldiers should be extremely careful while picking or preparing papaya. The slightest cut will cause a milky sap to flow from the rind as well as the plant itself. The commercial meat tenderizer and digestive enzyme (Papain) is derived from the milky sap. If this sap should get into the eyes, it could cause temporary or permanent blindness. Some natives wrap meat in the
leaves of the papaya taking advantage of its tenderizing qualities. The papaya is appreciated as a dessert, a salad, and specifically for its digestive and laxative qualities. Figure 55 shows the papaya fruit.

(6) Guava. The Guava (Psidium Guajava) is famous for the jelly made from the fruit. It is a yellow, tough skinned fruit with a whitish or pinkish meat containing an abundance of seeds. It grows on a large spreading shrub or small tree. The tree attains a height from 10 to 20 feet. The fruit is about the size and shape of a large crab apple. The fruit can be eaten raw when ripe if one ignores the musky odor. When the guava is green it should be cooked. The tree is easily recognized by the pale brown bark that is smooth and peels off in thin sheets like paper. Its leaves are light green with fine hairs underneath. The venation is deep on top and raised to prominent veins underneath. Some natives claim that a tea made from the leaves of the guava tree is a good cure for dysentery (fig 56).

(7) Sour Sop. The Sour Sop (Annona Muricata) is a very curious looking fruit. It is green in color, very spiny and grows as large as a man's head. It may weigh up to 12 pounds. When ripe the sour sop can be eaten raw. The chief use is for making a beverage by crushing the pulp and then adding water or milk and sugar. The sour sop is a good water substitute. The leaves of the

some text is missing from the right side of the page.
of the tall, sparse tree are smooth, dark green, and approximately 4 to 6 inches long growing opposite each other. The leaves have a strong scent when crushed. Some natives brew a tea made from the leaves as a cure for an upset stomach (fig 57).

(8) **Sweet Sop.** The Sweet Sop (Annona Squamosa) is a cousin to the sour sop. This small tree with simple, oblong leaves has a fruit shaped roughly like a long, blunt pinecone with thick grey-green or yellow scales. The fruit is easily split or broken when ripe, exposing numerous dark brown seeds which are imbedded in the cream colored, very sweet pulp. The sweet sop is always eaten raw and is used in the same manner as the sour sop. The sweet sop, like the sour sop, is a native to the American tropics and can be found from Florida in the United States to the northern and eastern South American tropics. It has been introduced into many places in the Old World tropics.

(9) **Other sops.** There are two other fruits that are kin to the sops. They are the Cherimoya (Annona Cherimola) and the Custard Apple (Annona Reticulata). The Cherimoya, native to the mountain valleys of Peru, looks similar to the sour sop, but the skin is much smoother. The pulp is less cottony, and more creamy in consistency when it is ripe. It has fewer seeds than the sour sop. The fruit varies in weight from 4 to 16 pounds. It is the best tasting fruit of the Sour Sop family. The
Figure 47. Wild lemon.

Custard Apple is an excellent and substantial fruit of a small tree native to the West Indies, Mexico, and Northern South America. It may be called under the local name “bullocks heart” suggesting its shape and appearance. When ripe it begins to discolor and blacken like the sour sop. At this stage the white or cream colored flesh becomes sweet and aromatic. It has numerous large brown seeds and is always eaten raw. There are many hybrids and varieties derived from the custard apple.

(10) Nispero. The Nispero or Sapodilla (Manilkara Sapodilla-Arches Sapota) is one of the most common of the tropical American fruits. It originally came from the Yucatan Valley where the wild trees are tapped for their white sap which gives Chicle for chewing gum. Cultivated fruits vary in size, but are usually shaped like a ball about 2 inches in diameter. There are from 3 to 6 glossy, blackish-brown seeds imbedded in a brownish, granular pulp. The grayish or brownish skin is smooth and slightly rough in texture. The tree grows up to 60 feet tall and has dark green leaves. The sap is milky but not poisonous. The sap of the nispero is not a good substitute for water. The nispero fruit is eaten fresh only.

(11) Ice Cream Bean. The Ice Cream Bean (Inga Spectabilis, Inga Ingridea) is often referred to as Inga. It is quite common in wet tropics. The leaves are 6 to 8 inches long, are dark green underneath and light green and hairy on top. The leaves grow opposite each other. The fruit is a bean type pod, about 15 inches long, greenish brown in color. When the pod is broken open numerous sections of whitish soft pulp covering the large seeds can be seen. The white pulp is eaten raw and tastes like watered down vanilla ice cream.
The tree grows dark green and is not poisonous. It is a good substitute fruit is eaten raw.

Cream Bean (Tapioca) is often common in 6 to 8 inches stalk and light leaves grow fruit is a bean long, greenish pod is broken soft pulp be seen. The and tastes like am.

Figure 48. Stalk of cultivated bananas. The purple terminal at the end of the stalk is edible.
(12) Malay Apple. The Malay Apple (Syzygium Malaccensis) has its origin, as its name indicates, in Malaya. It has since been introduced into the Hawaiian Islands and tropical America. The tree attains a height of from 30 to 60 feet and has large oval leaves. On the naked branches of the tree a great profusion of flowers form and are followed by egg or pear shaped fruits. The fruits, waxy in appearance, are rose, striped or white in color, depending upon the amount of sunshine that reaches the fruit. The meat is somewhat dry, insipid, white, and rose-scented. They may be made into desserts and jellies (fig 58).

(13) Rose Apple. The Rose Apple (Syzygium Jambos) is often confused with the Malay apple. The rose apple is a small garden tree native to Indo-China or Java. The fruits are round and are from one to two inches in diameter. They are usually whitish or ivory colored. The crisp, white flesh is thin and there is usually a hollow cavity between the meat and the large seed.

(14) Pineapple. Contrary to popular belief, the Pineapple (Ananus Comosus) is not native to Hawaii but to tropical America. It has become one of the most important tropical fruits and is grown in almost all tropical areas. The plant is basically a rosette of long, stiff, spiny leaves. The fruit is borne on a leafy stalk up the center of the plant. The basic difference between the wild and the domestic fruit is the size, the wild fruit being considerably smaller. The wild pineapple plant also has spiny edges on the leaf, where the much cultivated varieties have a smooth surface.
Star Apple. The Star Apple (Caimito) is common in the tropical forests of the Americas. The tree grows up to a height of 60 feet. The leaves are dark green on top and have shiny, silky, brown hairs on the bottom. The fruit looks like a small apple or plum with smooth greenish or purple skin. The meat is greenish colored and milky in texture. When cut through the center the brown elongated seeds make a figure like a 6 to 10 pointed star. The fruit is sweet and eaten only when fresh. When cut the rind will, like other parts of the tree, emit a white sticky juice or latex which is not poisonous.

Sapote. The Sapote or Zapote (Calocarpum Mammosum) is one of the best known fruits of tropical America and closely resembles the mamey. It is cultivated and is sometimes found wild. It is a milky-sapped tree which sometimes attains the height of 100 feet. The fruit is shaped like a ball, 4 to 8 inches in diameter, with rough, brownish skin and pink or reddish meat in which there are imbedded several large, brown, shiny seeds. The fruit is usually eaten raw but is sometimes made into a preserve. The Sapote has a scent of bitter almonds and is used for flavoring purposes. The tree is easily recognized by its size and shape of the fruit. The leaves cluster at the end of the branches, are

Figure 59. Commercial banana. Compare with figure 49 and note the subtle differences from and similarities with the plantain.
slender and light green in color and are from 6 to 12 inches long.

(17) Jackfruit. The Jackfruit (Artocarpus Heteraphylla) is a large, handsome tree native to India and has long been grown in the Malayan tropics. The Jackfruit has since been introduced into the American tropics. It has a simple, dark green, shiny leaf and produces a rough or prickly compounded fruit the size of a large watermelon. The fruit grows on a short stalk directly from the branches or on the trunk proper. The large, brown seeds are edible when roasted. The fleshy, sweetish, yellow pulp about the seeds is boiled. The pulp itself has a very musky odor (fig 60).

(18) Sugar Cane. Sugar cane (Saccharum Officinalis) is a well known giant grass grown throughout tropical regions of the world. It has a sweet juice which is the common source of sugar. It is normally found growing in clumps in secondary growth areas. The soft, juicy stalks can be chewed to obtain the juice. Sugar cane has green to reddish leaves, often striped silvery. It is best to remove the hard outer layer before chewing (fig 61).

(19) Hogplum. The hogplum (Spondias) can be found in cultivated and uncultivated areas in the tropics. Usually its color varies from yellow to red and in size from ½ inch to 1½ inches. It grows on trees from 15 to 30 feet high. The fruit has a sweet pungent smell similar to normal plums (fig 62).

e. Edible Nuts.

(1) Coconut. The largest and probably the most common nut found in wet tropics is the coconut. It is of diverse use both in the stages of development, and the stage of the coconut is usually outside of the fruit and can be obtained by spooning out the coconut as a whole. The coconut has a firm meat which is used for a number of purposes. The meat is rich and plentiful and is good for making the coconut milk.
the coconut. The coconut has three stages of development. It is edible in all three stages but its use will vary depending on the state of its growth. When green, the coconut is an excellent source of water; the fluid is always cool regardless of the outside temperature. The meat is soft and can be scooped out of the shell with a spoon. The green coconut and its water act as a mild laxative and may adversely affect susceptible persons. The ripe coconut produces the copra of commerce. The firm meat is most commonly shredded and used in pastries and candies. In this stage the meat of the coconut is firm or hard. The milk or water of the coconut is less plentiful, stronger in taste, but it is still good to drink. The germinating or sponge coconut is less desirable. In this stage the meat has fallen away from the inside of the shell and has absorbed the water. The meat is then found in a spongy ball. The nut has started to grow with shoots protruding from the coconut hull. The meat of the coconut is edible in the sponge state; however, there is no water. (Figure 63 shows the coconut in the three stages of development.) To husk a coconut, cut a length of hard wood (iron wood or guava are excellent) about 3½ feet long and 2 inches in diameter, sharpen one end and place the dull end firmly in the ground. Hold the coconut horizontally by two ends and drive it down on the husking stick forcing the coconut downward until all the outer husk is off (the dry husks make excellent tinder). The nut can then be opened by punching a hole or by hitting
firmly in the center with a blunt instrument such as the back of a machete.

(2) **Cashew.** The Cashew (Anacardium Occidentale) is a peculiar fruit. It is pear or bell-pepper shaped, reddish when ripe. It is soft, sweet and edible in the raw state. It bears, at the tip, a hard, kidney-shaped nut which is smooth, shiny and green or brown in color (according to its stage of maturity). In this kidney-shaped pod is found a seed which is the cashew nut of commerce. The nut is edible only after being boiled or roasted until all its oil is gone. Troops should avoid the green or brown hull surrounding the nut as it contains an irritant poison which will blister the skin like poison ivy. Caution must be taken when roasting or boiling the cashew because the steam or smoke can cause temporary or permanent blindness (fig 64).

(3) **Almond.** The Indian or Tropical Almond (Terminalia Catappa) is widely dispersed in all tropical areas and is primarily found in cultivated and secondary growth areas. The tree attains a height from 50 to 60 feet. In some areas, it may be as high as 100 feet. The leaves are dark green, shiny and are somewhat tear-drop shaped. Some of the leaves may be red in color. The nut is inside the fruit which forms a fibrous exterior hull. When ripe, the hull can be chewed to provide some nourishment. The seed inside the shell can be eaten raw or roasted. Although this is not the almond of commerce, it is a cousin to the commercial almond and has a similar flavor. The nut is borne on the end of the branch amid a cluster of leaves. When ripe the hull turns a yellowish color. The tree is deciduous and bears two crops annually just prior to dropping the leaves (fig 65).

(4) **Black Palm.** The Black Palm (Asiracaryum Standleyanum) is quite prevalent in most wet tropical areas. The tree is easily identified in that it has uniform bands of stiff black, needle-like spines protruding from the trunk. It produces an edible fruit and nut. The fruit is ball shaped, roughly 1½ inches in diameter and is orange or red-orange in color. The fruit is sweet and, although stringy, it can be eaten. The nut is oily and is flavored like a coconut. The black palm nut can be eaten raw only. The nut is inside an extremely hard protective shell (figs. 66 and 67).

(5) **Canna Brava.** Another common palm is the Canna Brava (Bactris Minor). This plant is a small palm with stems from 1½ to 2 inches in diameter. It usually grows in clumps and has long, thin, needle-like spines on the stalk. These spines, or needles, grow on the trunk as well as on the palm fronds and are usually brown in color. It is often confused with the black palm. One sure distinction is the fruit. The fruit of the canna brava is purple when ripe, and the clusters are quite small as compared to the black palm (figs. 66 and 67).

(6) **Corozo.** One of the Caribbean's important fruits is the One of the Caribbean's important fruits is the Corozo (Pilicia Longifolia). It is a tall, slender tree with long, narrow leaves. The fruit is orange and the seeds are large and hard. The Corozo is often confused with the coconut, but it has a different flavor and aroma. The seeds are often used for handles on tools, and the fruit is eaten fresh or dried. It is a common sight in tropical forests and is grown commercially in some areas.
Ike can cause indolence (fig 64). Ophiodon Almond, a widely dispersed daisy, is primarily a secondary growth plant height from 50 to 150 cm, it may be as high as 1.5 m when leaves are dark green, the tear-drop shape, may be red in the fruit which is white. When ripe, the leaves provide some shade for the nut can be eaten raw. Although this is a cousin, it is a cousin of the American jungles and has a similar color to the end of the black palm. When ripe, it is purple in color. The leaves are dark in color. The tree can be quite small as compared to the long, hanging bunches of the black palm. The fruit and nut can be eaten raw. Both the fruit, which is fibrous, and the nut, which is coarse, are of poor quality and taste (fig 68).

(6) Corozo. The Corozo (Scheelea Zonensis) is one of the most common palms in the American jungles. The trunk may be thick and short or it may be very high, resembling a royal palm. The fronds may be over 30 feet long and up to 6 feet wide. The drooping bunches of fruit are 4 to 6 feet long and grow very close together. The orange colored fruit looks like small coconuts (fig 69). The oil from the nuts must be squeezed out and is excellent for cooking. Like most palms, it has a "heart" or folded, young, unborn leaves near the top of the tree which can be eaten raw or cooked. This "heart of palm" resembles crisp cabbage or heart of lettuce and is a good vegetable substitute (fig 70).

(1) General. Probably the most basic food served, in the western world, is the potato. The potato is not common in the wet tropics; however, potato substitutes take its place in the basic diet of native peoples. One of the most common of the potato substitutes is the plaintain or cooking banana (para 29d).

(2) Breadfruit. The Breadfruit (Artocarpus Communis) tree is from 30 to 40 feet high and has enormous dark green, shiny, leathery, many fingered leaves. The fruit, borne on the branches, are green, somewhat scaly and from 4 to 6 inches in diameter. The breadfruit is native to the East Indies (fig 71).

(3) Taro. Taro is one of the most common potato substitutes found growing in the wild state in wet tropics. However, it is called by many names. There are almost as many varieties of taro as there are...
names. Discussion here will be confined to the most common species.

(a) Dasheen. The Dasheen (Colocasia Esculenta) is grown for its potato-like tuber. It is eaten in a manner similar to the potato and must be cooked. Dasheen grows wild; however, it is also widely cultivated. The leaves and the tubers contain calcium oxalate crystals which are poisonous but are destroyed by cooking. The calcium oxalate or oxalate of lime crystals will cause a sharp, hot, burning sensation in the mouth. The crystals are broken down and disappear when heat is applied. The tender leaves of the plant can be boiled and eaten. The plant is from 1½ to 3 feet high with the leaf stem growing from the base of
The tubers of the Oto are much smaller than the dasheen and grow off the side of the main root whereas the dasheen tuber grows straight down. The leaf is shaped like an arrow and is very similar to the elephant ear. The leaf stem joins the leaf at the apex of the V. However, the leaf is on the same plane as the ground. The leaf and leaf stem are dark green and lusterless. The edges of the leaf also have the purple coloration (figs 74 and 75).

(4) Yams. The Yams and Yampi (Discorea alta, bulbifera, esculenta) are excellent potato substitutes. The yam grows on a twisting vine and is common in the culti-
vated and the wild state (fig 76). Most yams grow under the ground like sweet potatoes. Some will weigh up to 30 pounds. The color of the flesh will vary from white to purple. The vine leaves of yams can be distinguished by their heart or arrow shape. Some yams have leaves which are small and pointed with each leaf having 3 or 5 points. The vines of the yam resemble creeping vines and normally dry up when the yams are ready to be taken from the ground. Some yams are poisonous in their raw state and since the soldier cannot normally distinguish between the safe and the poisonous, all yams should be thoroughly prepared. To prepare yams that are not definitely known as safe, use the following procedures:

(a) Cut the yam in thin slices.

(b) Coat with ashes.

(c) Soak in a stream or salt water for 3 to 4 days.

(d) Dry in the sun.

(e) Cook them changing the water a few times.

(f) Eat a little of the yam and wait for about 3 hours. If you have no ill effects, eat the remainder of the tuber.

(5) Yuca, Cassava or Tapioca (Manihot Escu-terto). These can be eaten only when cooked. The stalk-like leaves are deeply divided into numerous (3 to 7) long, pointed sections or fingers. The woody stem is slender and at points appears to be sectioned like a bamboo. Yuca grows to a height of 7 feet. The brown tubers are white inside. The yuca can be boiled, baked or roasted and eaten like potatoes. The
It water for 3 to 10 days, and remove the water a few times.

The water a few times, and wait for about 3 or 7 days. If the water is not ill effects, eat the yuca.

Manihot Esculenta (yuca) is eaten only when the leaves are deeply green (3 to 7) long, and the yuca is bitter. The woody roots appears to be edible. Yuca grows to a brown tubers are boiled, baked, or fried. The potatoes. The white meat of the tuber can be grated, dried, and powdered into flour. This is the commercial source of tapioca. There are two distinct varieties, the sweet and the bitter. There is no sure way to tell the varieties apart without tasting them. Both varieties contain poisonous Hydrocyanic Acid, which breaks down and disappears when cooked. The bitter variety contains a larger quantity of the acid giving it a bitter, burning taste. The sweet variety, if eaten raw, may not have any effect on the digestive system; however, it should be eaten only after cooking as the poisonous (bitter) variety cannot be distinguished by observation or smell (fig 77).

g. Vegetables and Vegetable Substitutes.

(1) Akee (Blighia Sapida). A tree of West African origin and cultivated throughout most of the tropics, the tree is small (approximately 20-30 feet high) and has double leaves and about 10 large, oblong leaflets. The fruit is three-celled, colored from a range of yellow to a reddish or reddish orange, and shaped somewhat like a bell pepper. The Akee fruit contains three large, black, shiny seeds that are located at the end of the white pulpy mass. The seeds and hull are poisonous and must NEVER be eaten. The white meat, shaped like a half walnut or brain, is the only part that is edible. The white meat is...
Figure 69. The wild pineapple.
Figure 60. The jackfruit. This native of India reaches a length of over 3 feet and may weigh as much as 60 pounds at maturity.
Sugar cane. This tropical member of the grass family may be found in cultivated areas or in secondary growth. It may also be found growing wild in some swampy areas.
usually boiled in salt water and fried; however, it can be eaten raw. When ripe, the fruit opens naturally, exposing the black seeds and a portion of the white meat. The fruit must be gathered at the right time, because if it is unopened or overripe (opened too long) it is DEFINITELY POISONOUS. If other foods are available, the Akee should be avoided (figs 78 and 79).

(2) Avocado (Persea Americana). The fruit is also called the alligator pear. It is native to tropical America but is widely grown in other tropical areas. The avocado tree grows to a height of about 60 feet. It has dark green, leathery leaves which are approximately 6 inches long. The peeling is green in color during all stages of development. The meat varies from a yellow to yellow green when ripe. It has an excellent flavor and is extremely tasty in salads. The large nut or seed can be eaten; however, it is of poor flavor. The avocado has been nicknamed “Soldiers Butter” because it is soft when ripe and has been used as a spread for use on bread (fig 80).

(3) Heart of Palm. Every palm tree, regardless of size, has a “heart”. The heart is merely the “unborn leaves” (underdeveloped leaves) of the tree. It is found at the top of the tree, just under the base of the fronds, in the top center portion of the trunk. The heart may be used as a lettuce or cabbage substitute and makes an excellent salad. It is also called “Swamp Cabbage” (fig 70).

(4) Bamboo. Bamboo shoots may be cooked and eaten. They are wrapped in protective sheaths which are tough and coated with tawny or red hairs. If eaten, these hairs...
Figure 63. The coconut is shown here in the three distinct stages of development. At the top is a green coconut, in the center is a ripe nut and at the bottom is a germinating or "sponge" coconut.
cause much irritation of the throat. Remove these outer sheaths carefully before eating the shoots. Bamboo deserves special mention because of its many uses to the soldier in the jungle. Two or three sections of bamboo can be fashioned into excellent canteens that will carry almost a gallon of water. By poking through the inner sections of the bamboo, a soldier can fashion an excellent waterproof map carrier. Bamboo sections split and packed with plastic explosive make excellent expedient explosive containers.

h. Poisonous Plants.

(1) *Huevo de Gato* (*Thevita Nitida*). One of the most common poisonous plants found in the American tropics, it has a scarlet colored fruit that looks like two fruits grown together. When cut, the fruit will dispense a white milky sap. The leaves of the 12 to 15 foot shrub are leathery, light green and oval shaped and are about 8 to 10 inches long. The stem, when cut or broken, also emits the white milky sap. It is commonly found along the roadsides and in other secondary growth areas. It is dangerously called the “wild tomato” by some people.

(2) *The Sand Box Tree* (*Hura Crepitans*). This is a common jungle tree found in the American tropics as far north as Mexico. The tree is usually medium in size but it is not uncommon to find one that is over 100 feet high. The trunk is densely covered with short, sharp, rose-like thorns. The trunk is usually a gray-tan color while the light green leaves are usually clustered at the top of the tree and usually form a canopy. The fruit of the Sand Box is 2 to 4 inches wide and is shaped like a pum-
Figure 65. The Indian almond.
kin, turning brownish in color when ripe. Inside the fruit there are about 15 one-seeded, woody cells that look like sections of an orange. When ripe, the fruit explodes violently with a loud report throwing the seeds a considerable distance. The seeds are poisonous and contain an oil which is violently purgative. Death is sometimes caused from eating these seeds. The milky sap of the tree is also poisonous and serious inflammation is caused when it comes in contact with the skin. If the sap comes into contact with the eyes, it can cause temporary or permanent blindness (fig 81).

(3) Elephant Ear (Alocasia Macrorhiza). This poisonous plant has a heavy concentration of oxalate of lime crystals. It is used mainly for ornamental purposes but is discussed here because it is very similar to the dasheen, oto or other varieties of taro. The leaves are shaped like an elephant’s ear or an arrow. The leaves vary from a light green to a dark green in color and have a yellowish leaf stem. The leaf is very waxy in appearance. The leaf joins the leaf stem at the apex of the V. However, the axis of the leaf is on the same plane as the leaf stem. There is no edible tuber; however, since it is a member of the Arum family, as is the Oto and Dasheen, its young, tender leaves can be eaten in an emergency if boiled and the water changed often. The resulting product will resemble spinach (fig 82).

(4) Strychnos. There are at least two distinct species, the Strychnos Toxifera and the Strychnos Panamanthis. Both are poisonous with similar properties. The Strychnos
Toxifera is a slender, woody vine or shrub which has opposite growing leaves with green veins; one vein runs down the center of the leaf and two are located on each side of the center vein paralleling the outside edge of the leaf. The two outer veins are not prominent in a young leaf and, at times, are obscure in a matured leaf. The plant stem as well as the leaves are easily recognized by the numerous brown hairs that give it a wooly, soft appearance. The nickname “Cat’s Paw” is derived from the shape of the soft, wooly leaves. The fruit is shaped like a ball and is usually two inches or so in diameter and has a hard, green or yellow skin. The fruit has several large seeds. This plant is famous as one of the sources of CURARE, one of the deadliest poisons known. A small quantity in the bloodstream will soon cause death as the motor nerves are paralyzed almost instantly. If curare were injected into any part of the body, death would occur in a matter of seconds. Curare is obtained from the bark and roots by mashing them in water and boiling until a small amount of brownish colored paste remains in the bottom of the kettle. It has been used by the South American Indians (Jivaro) for poisoning their arrows and darts.

i. Distinguishing Edible and Inedible Plants. There is no absolute method that can be used to determine whether an unidentified plant or fruit is edible or poisonous. However, an expedient method, which is not positive, will probably suffice in an extreme emergency. If the plant or food in question emits a white milky sap, it should be discarded. If the plant has no milky sap but emits an unpleasant odor, it is unsafe. If the fruit or plant passes these first two tests satisfactorily, it should then be tasted by placing the tongue on a very small portion of the substance. If the taste is agreeable, the plant should then be peeled and cooked. The water should be changed three or four times. A very small portion of the food should then be eaten and the consumer should wait three or four hours before a decision is made to eat the remainder.

j. Preparation of Rice for Consumption. In most tropical areas of the world the cereal grain rice is a staple food. This is especially true in the Orient. The individual soldier should know how to prepare this food properly either in small portions or in quantity. To prepare rice for one soldier utilizing a
I brittle and punctures used by the ivaro) for poi­

U!dible Plants.
can be used to plant or fruit is a expedient method, suffice in an food in question more discarded. If an unpleasant plant passes these small portion of able, the plant water should small portion of the consumer a decision is

Figure 68. Canna brava nuts.
canteen cup as the cooking vessel, the following procedure is recommended:

1. Take one-quarter canteen cup of rice.
2. Add one-half cup water.
3. Add salt.
4. Place the cup on the fire until the rice begins to boil.
5. Cook until the water level meets the level of the rice.
6. Take it off the direct fire and place it near the heat where it will not scorch.
7. Steam the rice until done. When cooking larger quantities use the same cooking process, 1 part rice to 2 parts water by measure.

k. Other Wild Foods. In all tropical areas there is an abundance of food, in the form of animal life, fowl, snakes and fish. Any fur-bearing animal that is apparently healthy, if freshly killed and properly prepared, can be eaten. Any bird or fowl that digests its food can be eaten. Boil all fowl for at least 20 minutes to kill all parasites. The buzzard ingests its food and its meat is not appealing or appetizing but it can also be eaten. Any snake that is healthy can be eaten. To be safe, cut off the head 4-6 inches from the tip. Water is abundant in the jungle, thus providing a source of fish of all types. Avoid all ugly looking fish with parrot-like mouths, puffed up bodies, spine covered bodies, or sunkey eyes. This applies especially to fish which are caught along coastlines, inside reef barriers, coral holes, lagoons, or sheltered coves.

30. Jungle Animals and Other Wildlife

a. General. The wet tropics abound in wild animal life. The tremendous varieties of animal species that are found in jungle areas throughout the world preclude discussions of each in this manual. How-

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Figure 69. Corozo nuts. Note the large size of the cluster.

Figure 70. Kitchen "heart" with essential features.
ever, a description of the more prominent species is necessary as the soldier should be able to recognize these inhabitants of the jungle environment. It is essential that troops realize that just as man has an inherent fear of some animals, the opposite is also true. With some exceptions, animals of the jungle will withdraw from any encounter with man. By becoming familiar with the wild inhabitants of the jungle, the soldier will better understand this type of environment. This will induce him to respect, not fear, the surroundings in which he must fight.

b. The Cat Family.

(1) **Tigers (Panthera Tigris).** Among the largest members of the cat family, tigers are found only in Asia where they occur as far north as Mongolia. The tiger is quite prevalent in the jungle areas of China, Burma, India, Malaya, Laos, and Viet Nam. Tigers may reach a height of 40 inches and a weight of 500 pounds or more. These cats are distinguishable by their yellowish-orange coat with vertical, black, generally looped stripes, white underside and white patches over the eyes. This is the reason for the popular saying that a tiger should not be baited with food, for at least for as long as the tiger ingests it. Removal of the appetizing stomach is healthy for the animal, for 4-6 inches are removed from the jungle, thus providing fresh habitat for other animals. Avoid all animals that have, puffed up eyes. This is a sign that they have been caught along the rivers, lagoons, and gorges.

**Wildlife**

Inhabiting the wild animal species of the world is an interesting phenomenon. How-
Figure 71. The breadfruit.
Figure 7b. Leaf of a daikon plant.
Figure 73. The dasheen tuber.
Figure 74. Old leaf.
lus of hunger overcomes timidity, leading to the discovery that man is by nature defenseless and easily killed. When any tiger is surprised or alarmed it may attack man.

(2) Leopards or Panthers (Panthera Pardus). The leopard is distinguished by the spotted pattern of its coat. It has a longer tail than the tiger and is smaller in size. The coat is rosette patterned. Each rosette is composed of four or five solid spots forming a round or angular figure enclosing a pale central area and sometimes containing one or more small black spots. Both coloring and patterns are subject to much variation. The leopard ranges over parts of both Africa and Asia. It thrives in the jungles of the Indies and Ceylon. It penetrates the heavy forests of Africa which the lion will not enter. At one time it was supposed that the Panther and the Leopard were two distinct species. It is now accepted that there is but one species represented by a number of local races differing in color and size in various climatic conditions.

The leopard is smaller than the tiger. It is smaller than the tiger. It is smaller than the tiger. 
size in accordance with varied environments. The dominant type is the yellowish leopard of the jungles of India and the East African fringe. The Javan leopard is smaller and more rusty in hue. The black leopard replaces the spotted in Southern Malaya. The voice of the leopard is distinctive; it is like a deep, rapidly repeated, barking cough, comparable to the sound made by a coarse saw passing through hard wood. The leopard is a tree climber and frequently lies in ambush along branches overhanging a forest. They are seldom dangerous to man unless wounded, alarmed, or cornered. The leopard grows as large as 2 to 3 feet high at the shoulders and a total length of about 7 feet, of which the tail is less than 3 feet.

(3) Jaguar (Panthera Onca). The largest, most powerful member of the cat family and the sole representative of the leopard group, the jaguar is found in the American tropics. Generally, it can be said that the jaguar has a golden yellow coat spotted with black rosettes. This cat closely resembles the leopard in color and pattern of the coat and voice and habits, but may be distinguished by its larger head, shorter tail, and more robust build. As a rule, the rosettes are large, and fewer, than the leopard. The male attains a length of 6 to 9 feet, with a tail about 20 inches long, and weighs up to 250 pounds. Its legs are

Figure 76. One type of yam.
short and muscular. The jaguar is an agile climber. It hunts monkeys and birds and is at home in the water, being an excellent swimmer and fisherman. It is primarily a dweller of forests and jungles and feeds upon deer, peccaries, and other small animals, in addition to monkeys, birds, and fish.

(4) Puma or Cougar (Puma Concolor). This animal ranges throughout the Americas. The coat of the puma is a cinnamon color tinged with gold. While it feeds primarily on small game, it often kills calves and is especially fond of young horses, killing many annually. It is believed to be more friendly toward man than any other cat because of its practice of playing around camps at night without offering to harm the occupants. The puma, however, should not be trusted when encountered in dense forest.

(5) Ocelot (Leopardus Pardalis). The ocelot abounds in the jungles of Central and South America. It is a small, lean savage cat whose coloring closely resembles that of the jaguar. While resembling a jaguar, its markings are more beautiful and intricate. Most of the ground tint of the fur is smoky-pearl in color with black "rosettes" or egg-shaped ocelli, ranging from dots on the legs to large markings on the body. The ocelot will attain a weight of approximately 40 pounds and a length of 3 feet when fully grown. It can be easily tamed when young but becomes increasingly unmanageable with growth. Typical ocelots are shown in figure 83.
(6) *Jaguarundi* (*Felis Yaguarundi*). This cat is fairly common in the Central American jungles. It is extremely savage by nature and will not hesitate to attack a larger animal. It attains a size, when fully grown, of about 30 inches in length. The color of the jaguarundi ranges from a dark brown to a light, rusty red. The jaguarundi, like most cats, is nocturnal and does most of its hunting at night.

(7) *Margay*. The margay is the smallest member of the cat family found in the Central and South American jungles. It is golden yellow in color, with small black spots and resembles the ocelot. When fully grown, it is about the size of a very large house cat.

c. *Deer*. Members of the deer family are found in most jungle areas. They are not abundant due to the fact their only defense against the arch enemy, cats, is flight. In the Asian jungles several species of deer frequent the low, marshy areas adjacent to rivers. In the American jungle, two species of deer are most common. The “white tailed” deer of the jungle is found in thick upland forest. It is much smaller than the North American species and seldom attains a weight of more than 80 pounds. Another deer found in the American jungles is the “brocket” or jungle deer. This is a small, reddish brown deer which attains a height of about 23 inches. Extremely shy, it is found mostly in dense cover as it has no defense against other animals.

d. *Pigs*. All jungle areas have members of the pig family. In habit pigs are gregarious and are omnivorous in diet. They will eat any small animals they can kill, although they feed mainly on roots,
tubers, and other vegetable substances. The most common species found in the Old World jungle are the Javan wild boar, the Indian wild boar, the Babirusa of the Celebes, and the Central African Forest Hog. In the American tropics, peccaries are common. These pigs are represented by two species, the "white lipped" peccary and the "collared" peccary. Both, being a basic grizzled black color, are distinguishable by the markings from which they derive their names. The white-lipped peccary, the larger of the two, is black in color with a white under-snout and has the reputation of being the more ferocious. It attains a height of approximately 18 inches. The collared peccary, reaching a height of 15 inches, is identified by the white or grey band around the body where the neck joins the shoulder. Peccaries travel in small or large packs with as many as 30 or more comprising a pack. While individually they are not particularly dangerous, a pack can effectively repel any enemy and can make short work of a jaguar, cougar, or man. There are recorded instances of such happenings. Both types of peccaries have musk glands which are located four inches up from the tail on the spine. This gland must be removed immediately when the animal is killed, otherwise the flesh will become tainted and unfit for consumption (fig 84).

d. Raccoons and Kinkajous.

(1) General. The number of genera (different animals within a family) and species of raccoons are comparatively small. They are found only in America. In the Central and South American jungles, the most common are:

(a) Forest Raccoon. This animal may be recognized by the black mark around the eyes not being on the same side and the brown or grey coloration. It weighs between 10 and 20 pounds. It is a terrestrial animal, the muscles of the upper arm and foreleg are well developed and the tail is 12 inches long. It is noted for its cunning and often climbs trees to escape pursuers. It is a voracious eater, relying on small mammals, birds, and fruit. The forehead is broad and flat, the ears are small.

(b) Crab-eating Raccoon. This animal is smaller, weighing 8 to 12 pounds, and has a brown back with a white underbelly. Its feet are suited for climbing and it is particularly fond of crab and other similar crustaceans. It is found in the American jungles and is always a close enough acquaintance to be killed. It is a must-see for any enthusiast of the jungle.

(c) Coati-Mundi. The coati-mundi is a large animal with a long, slender body and a long, bushy tail. It is not commonly seen in the American jungles but is often found in the forests of Central America. The coati-mundi is a nocturnal animal and is often seen foraging on the ground. It is a scavenger and feeds on a variety of food, including fruit, insects, and small mammals. The coati-mundi is a social animal and is often found in family groups.

Figure 79. Another view of the Akee. The brain-like pulp is the ONLY part of this fruit that can be eaten. The rest of the fruit is POISONOUS.
dangerous, a pack can make short work of the animal. There are rings. Both type are located four line. This gland when the animal is some tainted and

gen (different and species of remarkably small. They
In the Central kjenes, the most
animal may be mark around its

eyes and its ringed tail. Grey in color, this raccoon has long hair and five toes on all feet. It is noted for washing all its food prior to eating it even if the food is caught in the water. The forest raccoon weighs about 20 pounds, and eats small mammals, birds, eggs, corn and grain.

(b) Crab-eating Raccoon. This animal is brown in color and is slightly larger and considerably stronger than the forest raccoon. Its principal sources of food are fish, crabs, frogs, and other amphibians. He is an excellent swimmer. Raccoons are formidable fighters and troops should be cautious when attempting to kill them for food.

(c) Coati-Mundi. This member of the raccoon family is identified very easily. Its long, pig-like snout is usually carried close to the ground as the coati is one of the best scavengers in the jungle. Its long, hairy tail is usually carried high, vertically from the ground as the animal trots through the jungle. The coati-mundi varies in color from a dark to light brown and its kinship to the raccoon can be seen by the face mask which is a dark color. Coati-mundis may travel in packs up to 20 or more in number and always have scouts when crossing danger areas. Usually the older ones lead with the younger ones bringing up the rear. Figure 85 shows the distinctive characteristics of the coati-mundi.

(2) Kinkajou. This member of the raccoon family is a small animal about the size of the common house cat. It has a coat which is usually light brown in color. The prehensile (well adapted to grasping, like a hand) tail is quite prominent. The Kinkajou uses his paws quite well and has a very large tongue which is used to draw food into the mouth. Food consists primarily of honey, bees, and insects.

f. Rodents.

(1) General. Jungle areas have large numbers of the various species of mice, rats, squirrels, and rabbits. Only the more unusual ones will be discussed here.

(2) Capybara. The capybara is the largest rodent in the world. It is found only in the American jungles. The capybara is about the size of a small pig and may reach a length of 4 feet and weigh over 100 pounds. It has webbed feet, small ears, coarse brown hair, and no tail. It is an excellent swimmer and lives in or near water, eating vegetation both in and out of the water.
Figure 81. A sand box tree. Note the shape of the thorns on the bark. This tree is often cut into small pieces and pulverized by jungle natives. The pulp is then thrown in large pools of water or slowly flowing streams to stupefy fish. This allows easy collection of large numbers of fish and, curiously enough, does not taint the flesh. The sand box tree may exceed 3 feet in diameter at maturity.
Figure 82. Leaf and tuber of the Elephant Ear. (The tuber is NOT edible.)
Figure 83. Ocelots.

(3) *Paca.* The tail appears longer than it actually is, about 20 inches in length. The name *Paca* is applied to various American species of ocelots, and is mainly used on the Pacific Coast and less so by hunters.

*Canines.* The name is equally applied to Asian and American species and most commonly used with the names of the American species. The musk glands that are used in the musk trade are produced by *Paca,* and the glands are collected in a ritualistic manner when preparing for sacrifice. The glands are used in the trade for various purposes, including perfumes and medicines. The glands are the source of the musk that is used in the perfume industry.

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(3) *Paca*. The paca is a rodent similar in appearance to a large guinea pig, weighing about 20 pounds. The toes are hooflike and the tails are very short or entirely absent. The name “painted rabbit” has been applied to this animal by natives of the American tropics because of the white spots, or broken lines, down each side. It is mainly a forest animal, but it also lives on the plains. It feeds on grass, plants, and leaves of all kinds.

*Canines.* The dog family is not prevalent in wet tropics. Jackals are found in some areas of the Asian jungles and wild dogs live in the South American jungles and in the Indian jungles. By far the most common representatives of the dog family in jungle areas are the foxes. Care should be taken when preparing fox as food. Many have offensive musk glands that must be removed prior to eating. The crab-eating fox of Central and South America is not a palatable meal because of its fishy diet.

*The Primates.* Tropical areas of the world abound in monkeys. There are tremendous numbers and varieties of sub-orders of the monkey family and it would not be possible or practical to attempt to discuss all of the species of monkey that are found in jungle areas. Monkeys offer a source of food to troops operating in the jungle. Monkeys are curious and can jeopardize operations by the noise they create and the attention they draw. In Old World jungles some of the man-like apes, such as the gorilla and the mandrill of the African jungles, are large and powerful enough to constitute a danger to man.

*i. Anteaters.* These are odd-looking and rather clumsy animals. Only the more common types will be discussed here.

(1) *Great Anteater.* This animal grows to a length of about 4 feet although some re-
ports indicate it may reach a length of twice that. It is completely devoid of teeth, relying on an extremely long tongue to procure its food which consists mainly of ants, termites and their larvae. A sticky saliva traps the food and the tongue withdraws into the tiny mouth at the end of a long tubular muzzle.

(2) Lesser Anteater. The lesser anteater is about one-half the size of the great anteater and weighs about 15 pounds. It is black, white, and tan in color with a prehensile tail which acts as a fifth limb, allowing the animal to climb and move about in the trees.

j. Tapir. The tapir is indigenous to the American tropics and the jungles of the Malay Peninsula, Sumatra and Borneo. It is a timid, inoffensive creature that browses on forest foliage and dashes away through the underbrush when alarmed or plunges into a river to escape an enemy. It is mostly nocturnal and solitary, two or three at most being found together. It grows to about 4 feet in height at the shoulders and weighs up to 600 pounds. Its coat is dark brown or black, the hair is thin and the skin is very thick. The tapir is pig-like in appearance, but has a proboscis or trunk about 12 inches long. The fore feet have four toes, the hind feet have three toes and all are encased in large, horn-like hoofs. The tail is a mere stump. The tapir is an excellent swimmer, sometimes diving into a river and walking on the bottom. It is a vegetarian and its cry is a shrill whistle, like that of a big or very small animal. Figure 86 shows one of these unusual animals. The East Indian or Malay Tapir is distinguished by its peculiar color and markings. The head, fore quarters and legs are black and the loins are white.
and dashes away armed or plunges. It is mostly nocturnal, not being over 4 feet in height and weighing 600 pounds. Its coat is thin and the small, bear-like in appearance, about 12 inches in length, the hind feet very large, horse-like. The tapir is a very jantly animal, and the bellies are white. It is larger than the American tapir, standing over 4 feet high.

k. Sloth. Native to the American jungles, the sloth is completely arboreal (adapted to tree life). It will eat nothing but leaves and is practically defenseless. Nature has not been kind to the sloth as regards its appearance and its small and poorly developed brain. The head is round and the mouth and ears are small. The hair of the sloth is shaggy and arranged so that heavy rain downpours will drain readily. This creature spends almost all its life hanging upside down from the branches of trees. The sloth moves very slowly. It seldom falls as its slow movement allows a secure hold on one branch before moving to another. It sprawls when on the ground, however, and has great difficulty in moving. The sloths are equipped with long, curving claws on both fore and hind legs for climbing and hanging in the trees. The two-toed sloth, or unau, is brown or black in color and has two claws on the fore legs and three on the hind legs. The three-toed sloth, or ai, is white or dirty grey in color and has three claws on all legs. The sloth eats leaves found in the trees it inhabits, gaining sufficient moisture from them to satisfy its water needs. The sloth's defense against enemies is to curl into a ball while hanging suspended from a limb. This presents a striking resemblance to the stump of a lichen covered bough. The sloth is an excellent swimmer (figs 87 and 88).

l. Amphibians. Jungle areas are infested with crocodiles and related amphibians. The crocodile is aggressive, vicious, and powerful. Troops should be cautious when approaching a river bank or swimming across a river in the jungle when crocodiles are near. The crocodile reaches a length of sixteen feet and has an olive green skin with black markings. The shape of the head is triangular and the snout is pointed. These features distinguish the crocodile from all other aquatic animals.
from the cayman (alligator), which is native to Central and South American jungles. The cayman is similar in appearance to the crocodile, grows to about 12 feet in length, is dark brown in color and has a broad, wide snout (fig 89). The cayman is not as aggressive as the crocodile. Crocodiles must be considered man-eaters in Central and South American and Indian, Asian and African jungles. Although primarily fresh-water dwellers, they are found in salt water on the shores of jungles in India, Ceylon, Southern China, North Australia, and the Malay Archipelago.

n. Elephants. There are two kinds of elephants, the Asiatic or Indian and the African. Although there are differences between the two, this is an academic consideration and will not be discussed. Elephants are vegetable feeders and need plenty of food and water. They are normally found in the jungle, heavy forest, or bush and are never very far from rivers, streams, or pools. Elephants are gregarious and travel in herds. Their eyesight is poor and their hearing is not good; however, their power of scent is unusually keen. They move exceedingly well in spite of their bulk and can climb steep inclines very fast. Elephants are dangerous when in musth, alarmed, wounded, or when calves are with them. Under these conditions they are apt to charge. Elephants will consume several hundred pounds of foliage, grass, cane, fruit, bark, tubers and the like each day. An elephant observed alone should be avoided, as chances are that such a solitary animal has been expelled from a herd and could be an extremely dangerous “rogue” elephant.

n. Wild Cattle and Buffaloes.

1. Gaur. The gaur is one of the largest and handsomest of the wild cattle. It is a huge animal with large curved horns, standing six feet at the shoulders and weighing as much as...
Elephants are generally slow-movers, their power and size exceed extremity, and they climb steep, dangerous when in the presence of calves are with the like to charge. While some hundred pounds of their tusks and the like alone should be avoided, a solitary animal could be an opponent.

The largest and heaviest of the family is a huge elephant, standing 20 feet high and weighing as much as a ton. Gaur are native to the jungles of India, Burma, the Malay Peninsula, Laos, Viet Nam and Cambodia, and are usually found in marshes and low, swampy places. When alarmed or wounded it is extremely dangerous.

(2) Buffaloes. The animals of this family are often called “water buffaloes”. Water buffaloes are native to the jungles of India, Burma, Malaya, Laos, Viet Nam, the Philippines and other islands dominated by jungle. Some water buffaloes are huge (example: the Indian buffalo is about 5½ feet at the shoulders and may grow to 9 feet in length) and many have little fear of man. They live in herds, usually in swampy areas and get the name “water buffalo” from their habit of mud-wallowing and lying for hours immersed in water, with only the head above the surface. Water buffaloes have large horns and they are usually black in color.

o. Insects. The intense heat, high humidity, heavy rainfall, and incidence of low swamplands coupled with dense vegetation of the jungle constitute an ideal environment for insects. These pests exist in an astounding number and variety. Aside from the fact that some insects are carriers of serious diseases, they constitute a serious threat to health of troops by promoting infections. The natural tendency of a victim is to scratch an insect bite which, in the jungle, leads to infection. The soldier must be made to understand this threat to his health and must be made to apply medication to even the most trivial bite. Leeches are a serious problem in the Asiatic jungles. Troops should cover the maximum surface...
of body skin when moving in water-covered ground or when swimming rivers. At the first opportunity each individual should closely inspect his body for leeches as their presence is not usually felt until some time after they attach themselves to the body. They will cause profuse bleeding in some cases. The individual must not pull the leech out of his skin. Tobacco juice or a lighted cigarette should be applied to the leech; this will cause the parasite to back out of the skin. This is necessary as the head will be left in the skin if the leech is pulled out and serious infection and bleeding will result. This same procedure applies to the removal of ticks. In addition to leeches, ticks, lice, and mosquitoes, ants are another enemy of the jungle soldier. Some are merely irritating; some are so large that their bite can be incapacitating. Troops must be required to make maximum use of the mosquito bar and insect repellent. For a detailed discussion of diseases caused by insects, see FM 21-76, FM 21-10, FM 21-11, and paragraphs 138 through 147 of this manual.

p. Birds. Tropical birds exist in the greatest variety and abundance in the jungle. Although their brilliant plumage assists in easy detection, they are very difficult to obtain as food. They are very noisy and contribute heavily to the constant, weird noises heard in the jungle. When alarmed, birds may also betray the movement of a body of troops.

31. Snakes

a. General. The widespread terror of “the snake infested jungle” prevalent in the minds of most peoples is an imaginary mental image. It is true that the number and variety of snakes are high in the wet tropics; however, the incidence of poisonous snakes is no higher than in some of the swamp areas of the Temperate Zone. Although snakes are generally classified as poisonous or nonpoisonous, troops should be conditioned to consider all snakes to be poisonous until positively identified. Because of the threat of snake bite and the requirement for proper first aid in event of bite, the individual soldier should be able to identify common poisonous snakes of the tropics. The following descriptions consider snakes by geographical areas.

b. Snakes of the American Jungles.

(1) Bushmaster (Lachesis Muta). This oval-headed, longest and heaviest viper of the American tropics averages between 7 and 12 feet in length. It is the only American viper which lays eggs (10 to 14 at a time), all the others producing living young. It is the second largest poisonous snake in the world, second only to the King Cobra. This snake has a saddle pattern of black and brown with triangular white patches, scaly skin, and a sharp ridge surrounding...
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(3) Bushmaster. This oval-
biggest viper of the
is between 7 and
the only American
8 at a time),
living young. It
nonpoisonous snake in
the King Cobra.
the back. The venom of this great pit viper
is not as deadly as that of some other New
World species, but great fang length and
the large amount of poison injected by a
single bite make it the most formidable of
the New World poisonous reptiles. It is
most frequently found in lowland forests
on slight ground elevations—seldom in
hollows. The poison of the bushmaster is
both meotoxic, destruction of the red blood
corpuscles, and neurotoxic, destruction of
the nervous system. Figure 90 shows typi-
cal markings of the bushmaster skin.

(2) Fer-de-lance. In Central and South Amer-
ica this snake is sometimes called “barba
amarilla” or “Equis”, which translated
means “yellow beard” or “X”. This is
prompted by a yellow color found on the
throat and lower jaw area and by the
X-like design of body markings. The length
of this snake may reach 8 feet though some
species are much smaller. Coloration is
variable, from grey to olive green, brown,
or even reddish, with dark, light-edged
crossbands or triangles, the apex of which
extends to the center of the back. The
definition of the name signifies “head of
a lance” and is appropriate as the snout is
pointed, the temporal region swollen and
the aspect of the head like a javelin point.
A female fer-de-lance has 40 to 70 live
young; all are fully-charged with poison
at birth. The poison (venom) is hemo-
toxic, which destroys the red blood cor-
puscles. Figures 91 and 92 describe the
markings of the fer-de-lance.
Figure 91. Fer-de-lance. This photograph shows the characteristically lance-like head which gives the snake its name.

(3) Hog-nosed (Bothrops) vipers, species confused in the 70 brown or boid man to 18 inches than the Atlantic species and spend. They are de-lance, are known powerful blood cor...
(3) Hog-nosed vipers. Pacific coastal species (Bothrops Lansbergii) and Atlantic coastal species (Bothrops Nasutus) are true pit vipers, very poisonous and must not be confused with harmless namesakes found in the Temperate Zones. Both are dark brown or black with faint brick red rhomboid markings on their backs and from 12 to 18 inches long. The tipped-up nose of the Atlantic species is more prominent than that of its Pacific relative. Both species are predominately ground snakes and spend little of their time in the forests. They are less apt to strike than the fer-de-lance, and few bites from either species are known. The venom is composed of powerful hemotoxin, which destroys the red blood corpuscles.

(4) The Eyelash Viper (Bothrops Schlegelii). The eyelash viper is the most common arboreal viper found in the American jungles and reaches a length of 22 inches. It is widely distributed and can be expected in any thickly-wooded area from near sea level to elevations of 3,000 or more feet. It is sometimes called the “palm viper” but this is somewhat misleading in that these snakes do not confine themselves to palm trees alone but may be found in any type of bush or low tree growth. The eyelash viper is markedly different from the other species by having 2 or 3 pointed, horn-like scales between the eyes and the appearance of having eyelashes. This pit viper may occur in two distinct color phases— one a mossy olive green with red and black

Figure 92. Another view of the fer-de-lance. This picture shows the X-like markings on the sides and back of this snake.
and the other being a pale lemon color with black markings.

(5) **Coral Snakes.** There are many species and subspecies of coral snakes which are well known. In Central and South America alone over 40 different species have been identified. They normally are found from sea level to altitudes of 4,000 feet. These snakes average 12 to 40 inches in length and are brightly colored with bands of red, white, yellow, and black normally encircling the body. All such colored snakes should be considered poisonous until proven otherwise. The head of the poisonous coral snake is little, if at all wider than the body, and a neck does not exist as it does in other snakes such as the pit vipers.

The tip of the snout and all of the upper surface of the head as far back as the eye are black. The eye is very small, being little more than pinhead in size. The paired poison fangs are small, permanently erect, grooved, needle-sharp teeth located near the front of the upper jaw. For the coral snake to eject its venom, it is necessary for it to chew.

(6) **Sea Snake.** There are more than 50 different species of sea snakes. Superficially, they resemble an eel in having a long, flattened head and compressed paddle-like tail which is used in swimming. Their colors vary as well as the pattern marking. Most will have black and yellow markings, with half the snake being one color and the other being pale lemon color in bands.

Their J-shaped fangs are poison-tipped, and they exhibit no structures that can be distinguished from those of nonpoisonous snakes.

(7) **Boa Constrictor.** This snake is in molt. Note the saddle markings from the head to the midsection and the X patterns on the skin toward the tail. The Boa is often confused with the Bushmaster during this molting stage as the skin becomes rough and scaly much like that of the poisonous snake.