

TL
553
U58j^o
1944

JUNGLE

DESERT

ARCTIC

OCEAN

361001

TL 553 U58jo 1944

13821040R

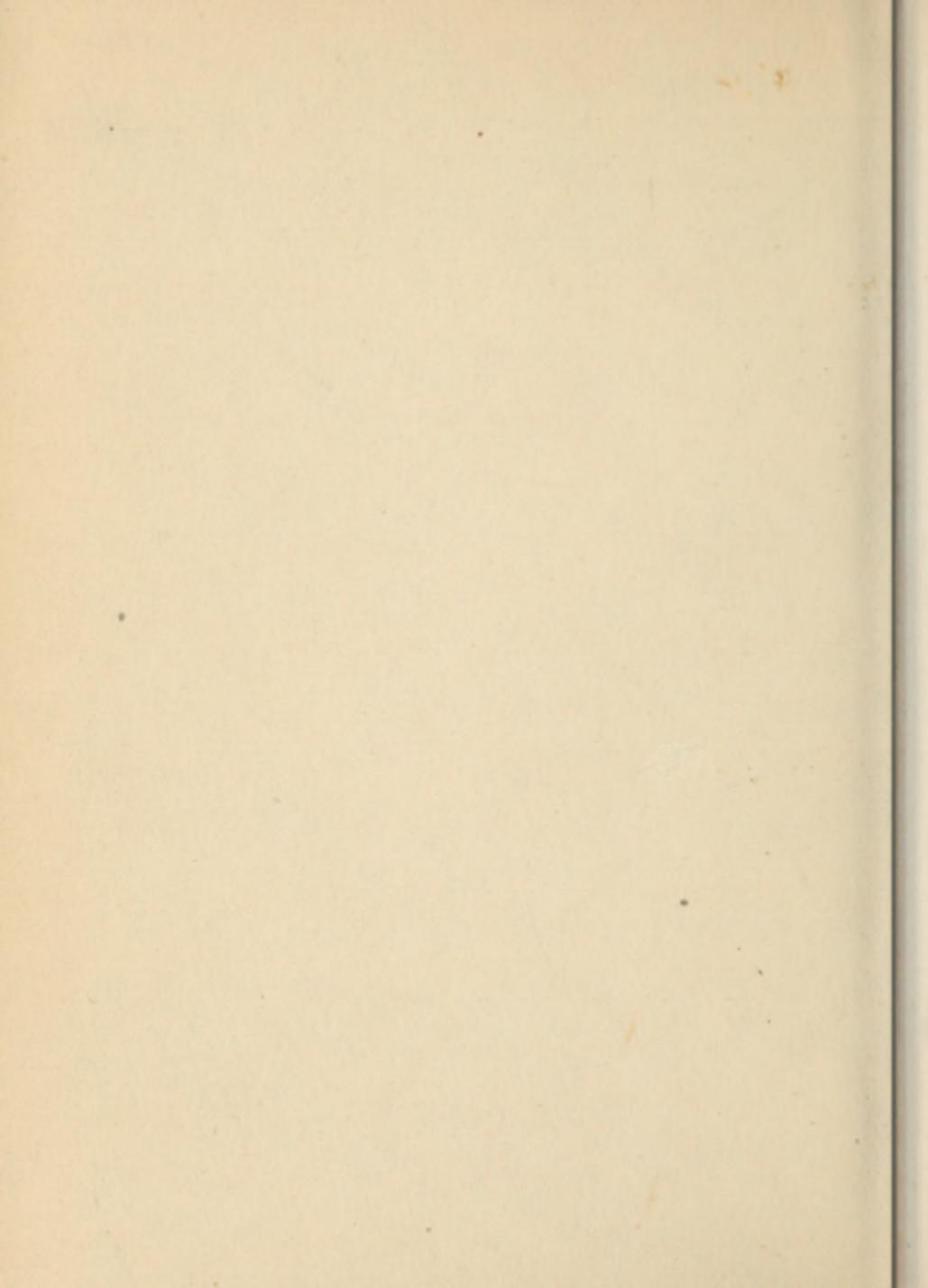


NLM 05097050 0

NATIONAL LIBRARY OF MEDICINE







War Case
Military Med.

J U N G L E

D E S E R T

A R C T I C

O C E A N ★

Emergencies



UNITED STATES, ARMY AIR FORCES

L500

TL
553
U58jo
1944

Pub
21 Feb 44

OFFICE OF FLYING SAFETY
SAFETY EDUCATION DIVISION

INTRODUCTION

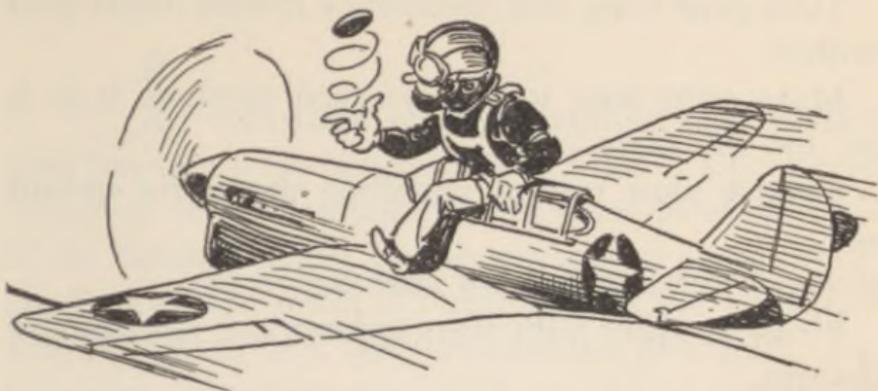
NO ATTEMPT has been made in this booklet to provide a complete and comprehensive guide to permanent bliss in the Arctic, the Desert, the Jungle, or the Ocean. Rather it is a brief and concise resume of suggestions which will materially aid you in the event of an emergency landing. The suggestions presented should be coupled with imagination, ingenuity, common sense, and the natural instinct of self-preservation—the result being no reason why you can't beat any terrain or climate.

In a lengthy list of experiences of men who have faced the situation of being forced to make it alone in the Arctic, the Desert, the Jungle, or on the Ocean, the necessity of maintaining a high morale and faith in the idea they will eventually get back is invariably stressed.

By following the few simple rules outlined on the following pages, the percentages will be all on your side.

A manual containing information for emergency procedures in the Jungle, Desert, Arctic and on the Ocean is placed in Parachute Kits and in some other types of Emergency Kits.

TO BAIL OR NOT TO BAIL



NORMALLY, A CONTROLLED CRASH LANDING, WITH FUEL TO SPARE, IS PREFERABLE TO BAILING OUT BECAUSE:

The intact outline of your airplane will help searching parties to find you.

The airplane will provide shelter.

Residual fuel and oil can be drained and burned for warmth and to supply smoke or signals to guide searchers.

Material will be available for improvised sun helmets, fish spears, shelter, bush knives, signalling devices, etc.

IF, HOWEVER, IT IS NECESSARY TO BAIL OUT, YOU SHOULD ATTEMPT TO:

Tuck your maps and emergency rations inside your clothes.

Make your way to the wrecked airplane if it is not too far away.

Prepare some sort of signalling device for instant use.

GENERAL SUGGESTIONS ON PREPAREDNESS:

Wear, or carry with you, appropriate clothing for the trip.

Wear shoes that you can walk home in.

FORCED LANDINGS

IN THE CASE of crash landing, any landing that you can walk or swim away from is a good one. However, forced landings can be made in which little or no damage occurs to the airplane or crew. Those landings are the result of forethought, calm execution, and adherence to a few fundamental principles. The following suggestions may help you. Think them over, then plan in advance for the day when you may be confronted with the problem of putting your airplane down safely in the Jungle, the Desert, the Arctic or ditching it on the Ocean.

Stay calm. This is the primary rule for any emergency.

Dump bombs in "safe," fuel, and other cargo that may endanger a successful landing, but when you dump be sure you are over open ground. Make sure that no loose equipment will be thrown around in the airplane by the impact of the crash.

Warn crew members of the impending crash.

Land "wheels up," unless you are positive that the terrain is such that a "wheels-down" landing will not cause a nose-over. Don't fear a belly landing; it can

be made with comparatively little damage. When landing in water, landing gear should always be retracted.

Maintain flying speed until the airplane is on the ground or water. If you lose speed while high in the air, you may spin or stall in.

Don't attempt turns near the ground or water; a stall may result.

Land as nearly up wind as possible, never more than 90 degrees from the wind.

Landing on water involves considerable skill. The pilot should familiarize himself with ditching procedures before taking off on a long over-water flight.

Use your flaps in land and water approaches so that the airplane will glide and land in the normal manner. Flaps will reduce your actual touching-down speed.

If any power is available, use it to level off before striking.

Just before the crash, turn off the ignition switch and the airplane master switch to avoid fire.

If a solid obstruction is ahead, groundloop to kill some of your speed and to get the wing in a position where it will absorb most of the blow.

CHAPTER 1 ★ JUNGLE

DON'T RUSH

THINK THINGS OUT, THEN ACT

**SLEEP AND FOOD ARE IMPORTANT,
DON'T FOREGO THEM IN YOUR
EAGERNESS TO GET OUT**

DON'T FEAR THE JUNGLE

A man can live for weeks in the jungle with safety if he will avoid panic and use his head.

GOOD FOOD AND GOOD WATER are fairly plentiful in the jungle if you know where to look for them.

MOST WILD ANIMALS won't bother you unless you bother them.

There is little more chance of being bitten by a **POISONOUS SNAKE** than there is of being struck by lightning back home. There are no poisonous snakes in Polynesia and in Malaysia they are rare.

With few exceptions **JUNGLE NATIVES** will be friendly if you make friendly approaches to them. **DON'T TRY TO BULLY THEM.** The exceptions include certain areas in Burma, western New Guinea where there are cannibals, and regions in Colombia, South America, where the Matalones live.

MALARIA is your worst enemy. Start immediately to take preventive doses of Quinine and Atabrine if you have a first aid kit.

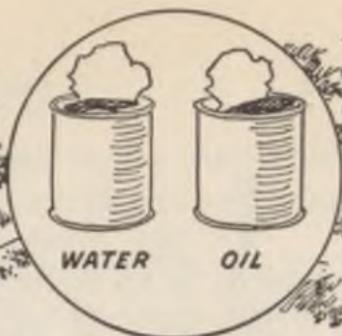
IF YOU WERE ABLE to land or crash-land your plane in an open clearing, plan to stay with it for a few days. If you crash-landed in the trees, make a temporary camp near the wreckage. If you were following your normal flight course when you were forced down, your plane will be much easier for searchers to locate than you will be.

In a multi-place plane, good quarters can be set up inside the plane by covering the door and cockpit openings with mosquito netting or with your parachutes.

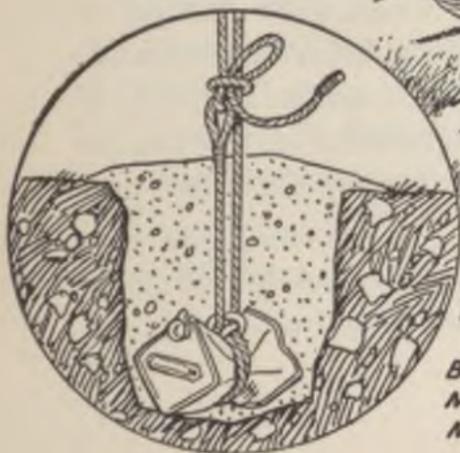
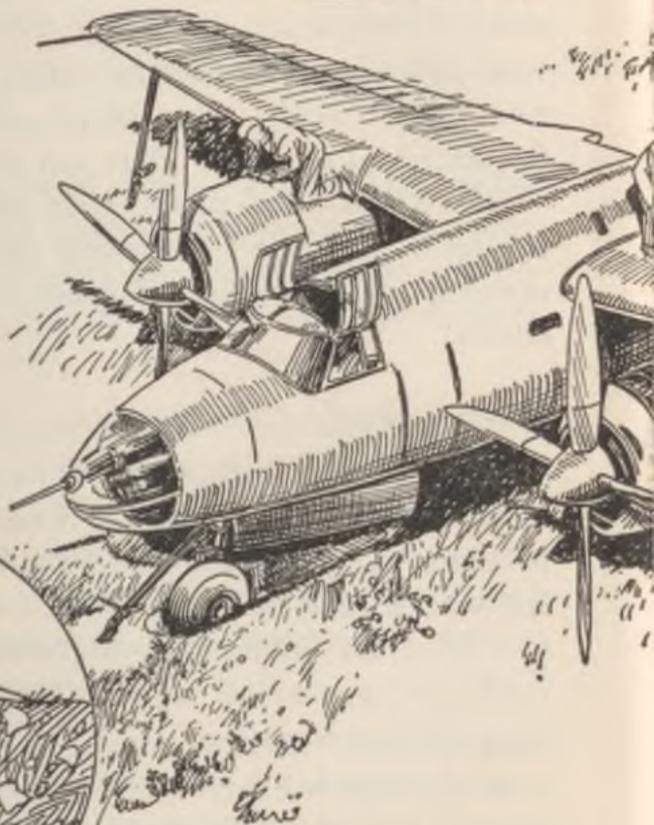
SIGNALS

If your plane is intact, and there is some chance that you may be able to fly it out, your first job is to secure it by digging hub-deep holes for the landing wheels and staking down the wings and tail. If you have no staking kit, improvised stakes can be made by burying oil cans or two or three-foot sections of tree branches.

Your second job is to attempt to establish radio contact and to set up signals.

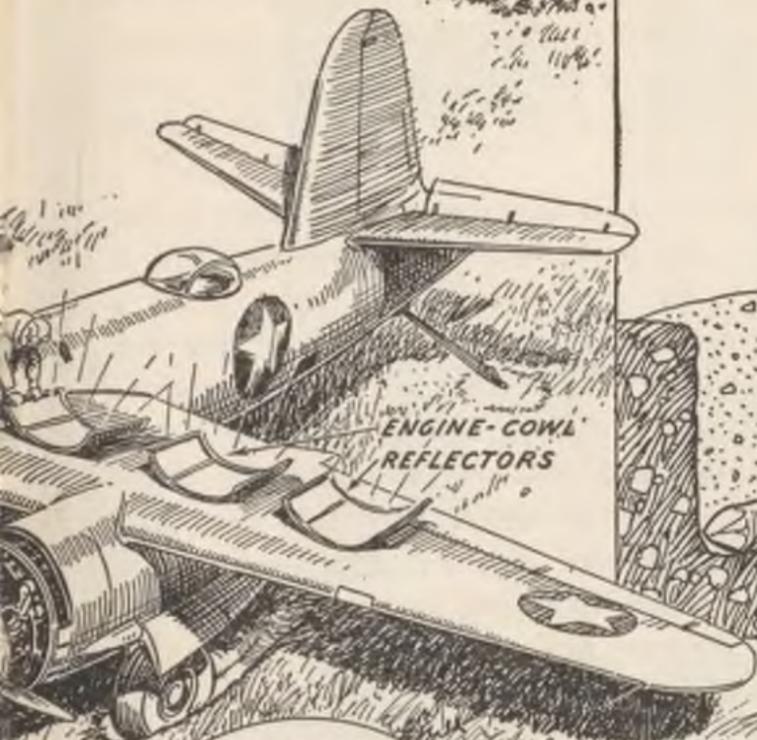


**SIGNAL FIRE —
OIL FOR SMUDGE,
WATER FOR WHITE
CLOUDS OF STEAM**

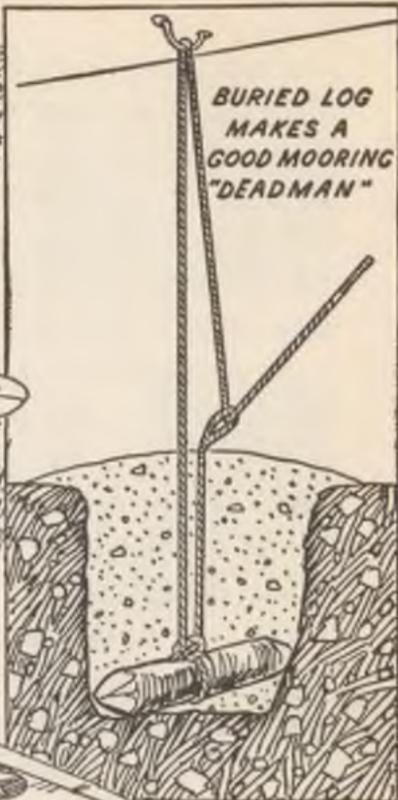


**BURIED CAN
MAKES A GOOD
MOORING "DEADMAN"**

SIGNAL FIRE



**ENGINE-COWL
REFLECTORS**



**BURIED LOG
MAKES A
GOOD MOORING
"DEADMAN"**

**HUB-DEEP
HOLES FOR CHOCKS**



**IF YOUR PLANE
IS TO SERVE AS
LIVING QUARTERS
COVER OPEN DOORS
AND HATCHES
WITH MOSQUITO
NETTING OR A
SINGLE THICKNESS
OF YOUR
PARACHUTE**

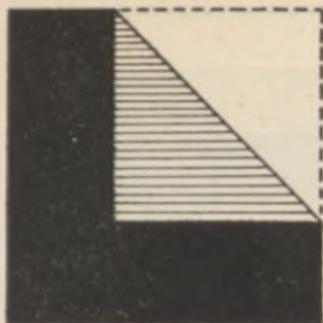
Place bright-colored or reflecting objects on the wings and around the plane. Cowl panels removed from the engine nacelles and placed upside-down with their unpainted surfaces pointing up form good reflectors. Line them up side-by-side on the wings where they can reflect the sun and will be readily visible from the air.

Lay several fires within a few hundred feet of the plane, so they can be lighted when a rescue plane is sighted during the day or heard at night. Place a small can of engine oil and a can of water near one of the fires—engine oil thrown on a fire will produce black smoke, water will send up billows of steam.

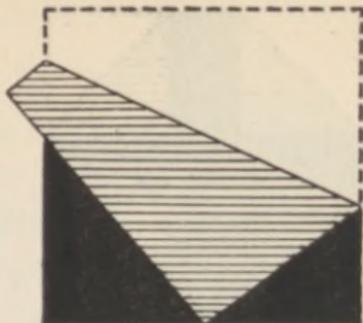
Do everything that you can to make the plane stand out against its background. Remember, your plane is a green-brown that by design is a good match for the ground. Objects whose colors contrast with that of the trees and grass, such as orange life-preserver cushions, will stand out against the background if they are put out on the fuselage and wings where they can be seen.

If you have an emergency kit or a life-raft kit, use the large yellow-and-blue panel to signal to rescue planes. Fold over the corners of the panel as shown on the following pages to transmit the corresponding messages.

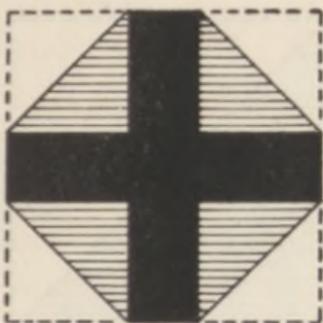
PANEL SIGNALS



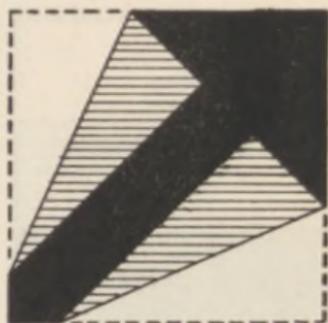
**Need Gasoline and Oil
Plane is Flyable**



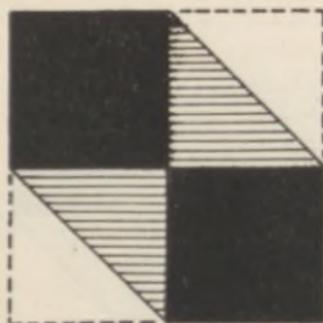
**Need Tools
Plane is Flyable**



**Need Medical
Attention**



**O K to Land—Arrow
Shows Landing Direction**



**Do Not Attempt
Landing**



**Indicate Direction of
Nearest Civilization**

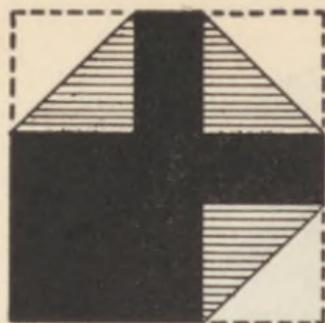


Blue

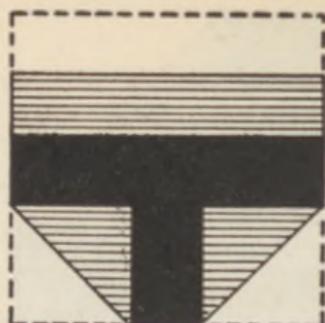


Yellow

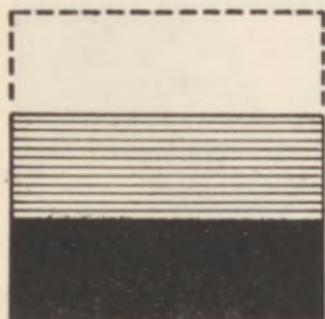
PANEL SIGNALS



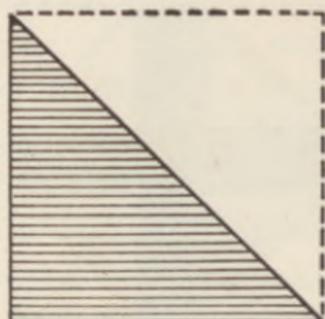
**Need First-Aid
Supplies**



**Need Quinine
or Atabrine**

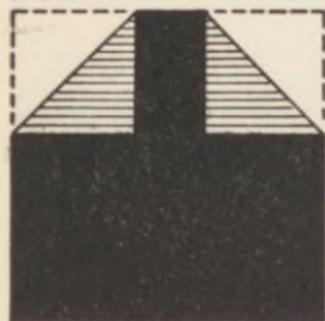


**Should We Wait
For Rescue Plane?**

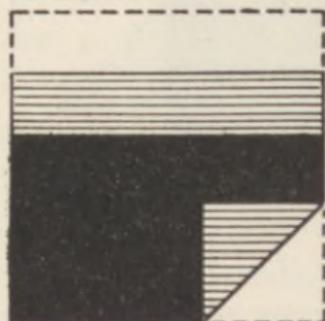


**Need Food
and Water**

← **USE BLUE
ON LIGHT
BACKGROUND**



**Need Warm
Clothing**



**Have Abandoned Plane,
Walking in this
Direction →**

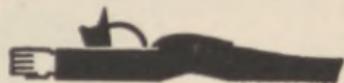
Blue



Yellow



BODY SIGNALS



**Need Medical Assistance
URGENT**

Once you have sighted a rescue plane and attracted the attention of the pilot, the body signals on this and the following page can be used to transmit messages.



**All O K
Do Not Wait**



**Can Proceed Shortly
Wait If Practicable**



**Need Mechanical Help
or Parts—Long Delay**



**Pick Us Up—
Plane Abandoned**



**Do Not Attempt
To Land Here**



**Land Here (Point in
Direction of Landing)**



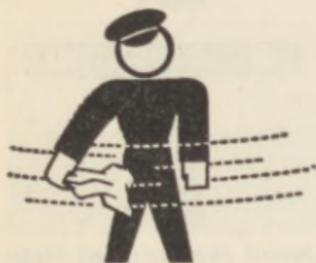
**Our Receiver
Is Operating**



**Use Drop
Message**



**Affirmative
(Yes)**



Negative (No)



Affirmative (Yes)

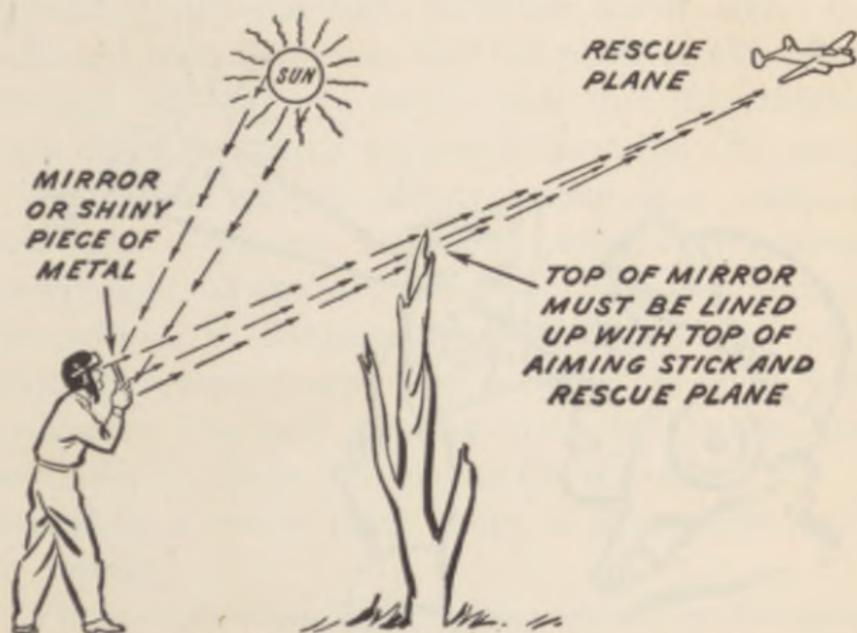
BODY SIGNALS



Negative (No)

MIRROR SIGNALS

When the sun is shining, a mirror or any piece of shiny metal—your rear-vision mirror, a food tin, or a piece of metal from the plane—can be used as one of the best of all signalling devices. However, the mirror must be accurately aimed if the reflection of the sun in the mirror is to be seen by the pilot of a passing plane. One of the simplest ways to aim a mirror is to use an aiming stake as shown below. Any piece of wood four or five feet long can serve

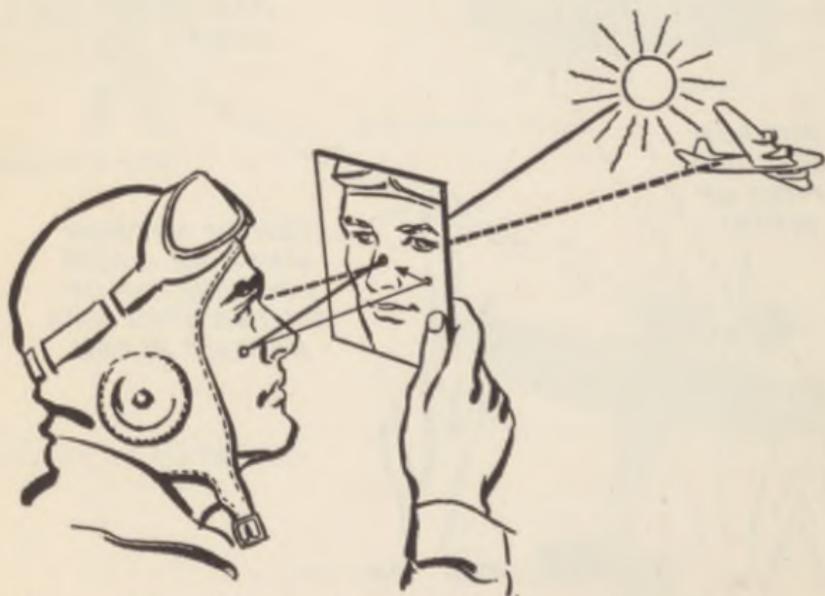


How an aiming stake can be used to aim a mirror for signalling

as the stake, or one of your party can stand in position.

Hold the mirror so you can sight along its upper edge. Change your position until the top end of the stick and the plane line up, then adjust the angle of the mirror until the beam of light reflected by the mirror hits the top of the stick. If stick and plane are then kept in the sighting line, the reflection will be visible from the plane.

Some emergency kits are now fitted with a special signalling mirror, which is a double-faced mirror



If your kit contains a mirror with a hole in it, use as above

(*i.e.* mirrored on both sides) and provided with a sighting or aiming hole. If you have one of these mirrors, use it as shown on the opposite page.

Hold the mirror about three inches away from your face and sight at the plane through the sighting hole. The light from the sun shining through the hole will form a light spot on your face and this spot will be reflected in the rear surface of the mirror. Then, still sighting on the plane through the hole, adjust the angle of the mirror until the reflection of the light spot on your face in the rear mirror just coincides with the hole. In other words, when the reflected spot disappears and the plane is still visible through the hole you can be sure that the reflected light from the sun is accurately aimed at the plane.

Divide the general duties among your crew. It will help to prevent fears and panic. Post a guard every night. If you are reasonably sure that you are not within, or dangerously near, enemy-held territory, the guard should keep a signal fire going continuously. This will conserve your signal-pistol ammunition or flares for the more important job of signalling a rescue plane when it is actually heard or sighted.

Fix your location by compass, octant, or the stars. Make scouting trips out from the plane in search of

STRAIGHT AHEAD



TURN RIGHT



TURN LEFT



Mark a trail, it will keep you from wandering around in circles

streams, making sure to mark the trail in the form of knife cuts on trees, bent branches, arrows, or bits of paper or cloth. Never go any distance from the plane without laying some sort of trail that can be followed back.

IT IS VERY EASY TO ROAM IN CIRCLES IN THICK FOREST OR JUNGLE.

WATER

If you find a stream, make careful note of its direction and position from your camp. It will not only provide you with water for drinking, washing, and

cooking, but it may lead you to civilization when you decide to give up hope of rescue and start to walk your way out.

If you can't locate a stream for drinking water, dig a hole in the lowest depression near your camp. If you don't strike water down three or four feet, try another spot. Unless you are on high ground, water should be located in a few tries.

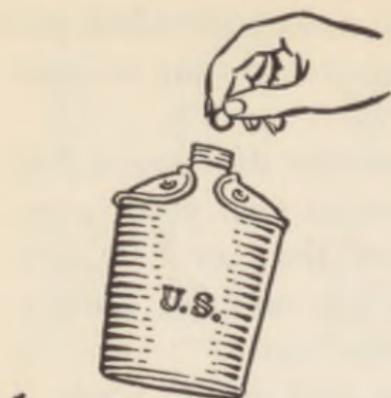
Animal trails will eventually lead you to water if you are careful not to get lost in the maze of intersecting paths.

ALL ANIMALS, WITH FEW EXCEPTIONS, TRAVEL TOWARDS WATER AT DAWN AND DUSK.

WARNING: All water for drinking must be purified either by boiling for three minutes or by treatment with Halazone tablets (or iodine if Halazone tablets are not available).

Although not as effective as Halazone, tincture of iodine can be used as an emergency water purifier. Add three drops of iodine to every quart of water which has previously been boiled and cooled. After adding the iodine, stir the water thoroughly and allow it to stand for thirty minutes before drinking.

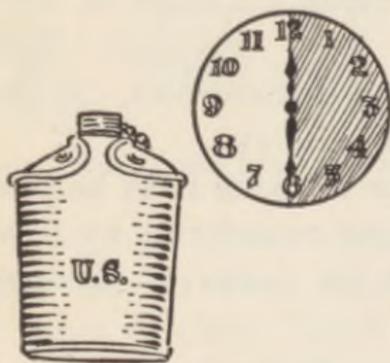
Be especially suspicious of water around native villages or what looks like the remains of a native village. The water is probably polluted.



1.



2.



3.



4.

PURIFYING WATER WITH HALAZONE. Pour water into a canteen or other container until it is within a few inches of the top. Then drop one Halazone tablet in for each quart of water, insert stopper, and shake the container. After a half hour, shake the container and remove the stopper. If a slight odor of chlorine can be detected, the water is ready for drinking. If chlorine cannot be detected, add one or two more tablets and repeat the process. Keep your supply of Halazone tablets in a dark, dry place—moisture and exposure to light cause them to lose their strength.

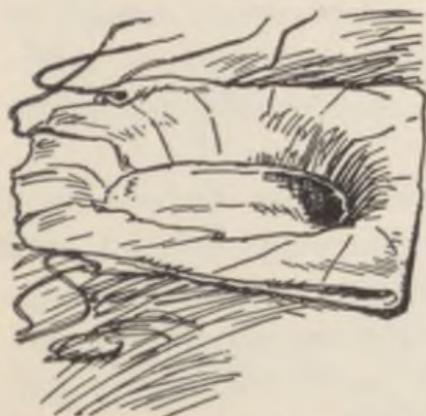
If no natural source of water can be found immediately, two common jungle plants will provide watery saps that are thirst quenchers.



A water substitute can be found in the stems of Lianas, above...



Grape vines, above, and large rattans. Cut stem, drink sap



Rain water can be collected by digging hole, lining with 'chute



After a rain, water can be collected from tips of large leaves

The stems of Lianas, Jungle grape vines, and large rattans contain a good water substitute. Cut them near the ground and drink the sap.

In forests, rain water often can be collected by digging a hole and lining it with your parachute. Also, the large lower leaves of trees collect a great deal of water which can be drained off after a heavy rain.

PARACHUTE

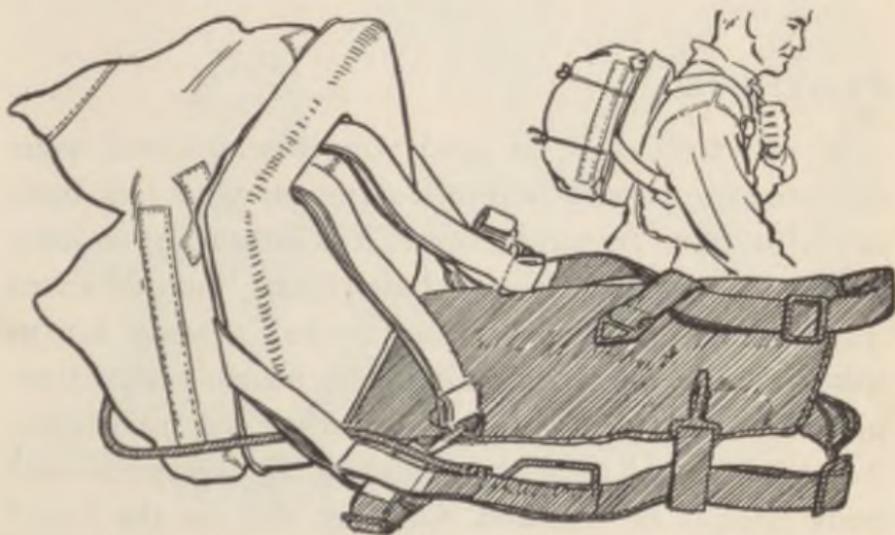
Save your parachute, or as much of it as you can. The shrouds cut loose can be braided into a strong rope and the canopy can be cut and folded to form a good tent. A single parachute shroud line has a minimum breaking strength of several hundred pounds, so a double strand will be strong enough to carry your weight with plenty of strength to spare. However, shroud line will chafe easily when run over rocks or tree bark.

Save your parachute pack—it can be converted into a handy knapsack for carrying tent, kit, and other supplies. The pack forms the base of the knapsack and the web straps form the shoulder straps.

Additional equipment can be carried in your gas-mask bag.



SAVE YOUR PARACHUTE—the canopy makes up into a good tent



... and the pack makes a knapsack by cutting off the shaded parts



Don't wear wet clothes. Dry them on a drying rack of crossed sticks

CLOTHING

If you were able to land your plane, check your equipment carefully before leaving for your trek back to civilization. In jungle travel it is important to keep as dry as possible. If you have them, include extra shirt, pants, underwear, and socks in your kit in spite of the weight they add. The jungle's high temperatures and high relative humidity will make you sweat freely and any rapid cooling of your sweat-wet body should be avoided. Chilling due to the rapid evaporation of the sweat reduces body resistance and

can be the cause of pneumonia, bronchitis, stomach cramps, and skin infections like fungus and prickly heat.

Wet clothing should be changed for dry as soon as practical. If you have no change of clothing, build a fire, strip, rub your body, arms, and legs vigorously to dry them and increase the circulation of your blood and then remain naked until your clothes dry.

Avoid tight-fitting clothing—it is hot and constricts your movements. If you have your choice, cotton shirts are better than wool, they are cooler and more resistant to snagging and fungus rot.



Bundles of food or life rafts can be carried on a pole by two men

If you have a pair of gloves, take them with you. They will protect your hands against burrs and nettles and also provide mosquito protection.

LIFE RAFTS

If you are traveling as a group, take your life rafts with you. They can be floated on jungle streams and can be used for transporting equipment if not yourselves. However, beware of rapids in hilly country. No attempt should be made to shoot these. Be safe and portage around. Rafts can be separately wrapped in canvas and swung on poles that can be carried by two men.

BEFORE LEAVING YOUR PLANE BURN ALL PAPERS, TECHNICAL ORDERS, AND TRIP DATA THAT MIGHT BE SECRET, RESTRICTED, CONFIDENTIAL, OR CLASSIFIED. SECRET INSTRUMENTS SHOULD BE SMASHED AND THE PARTS BURIED.

IF YOU ARE IN OR NEAR ENEMY TERRITORY, BURN THE PLANE.

PART THE JUNGLE, DON'T TRY TO PUSH THROUGH IT

Travel in the jungle forests is slow. Try to follow a stream downstream, and try as far as possible to stick to natural trails, or native trails. Don't try to break your way through. Blundering ahead only leads to bangs on the head and thorn scratches on your face. You will get through faster if you watch your step and pick your way. Keep your head up and your chin'in.

If you can't find a stream or a native trail, follow the swampy hollows which generally run in chains and eventually join a stream.

In hilly country, the ridges are easier to follow than the valleys, but precipices may make long detours necessary.

In elephant country, follow the elephant trails. Elephants do not wander aimlessly. If a track shows frequent use, follow it. Elephants never go where they are likely to fall or get bogged. Elephant trails are 3 or 4 feet wide, other game trails are a foot to 18 inches wide.

You can't look through the jungle, but sometimes you can look under it. The heavy growth of foliage generally ends about a foot above the ground. Often



You can't see through the jungle, but often you can see under it

you can see much more of your surroundings by getting flat on your stomach than you can by standing up.

Rely on your compass and your map, but don't try to follow a direct compass line. It will take too long and be too tiring.

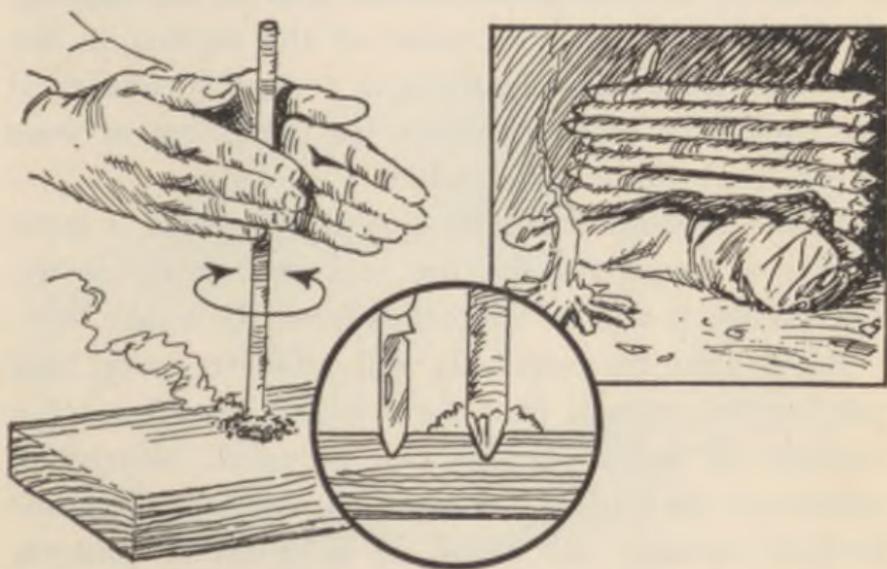
Do your walking early in the day. Darkness comes early in the jungle. By five in the afternoon very little light can penetrate through the thick foliage. Start looking for a place to camp around three or four.

Take plenty of time for sleep and rest. Don't force yourself beyond your physical limits.

CAMPS

Avoid the banks of rivers and streams in picking a camp site. Seek a small knoll a few hundred feet back. Half way up a hill is satisfactory. Avoid dead trees and beware of dead limbs overhead. If jungle growth separates you from the stream, all the better.

Build yourself a fire every night. Wood is plentiful,



A simple fire maker. Fuzz scraped from palm leaves is good tinder. At right, a log reflector increases the heat from a fire

and even in rain forests comparatively dry wood can be found hanging in the network of vines and rattans. Any standing dead trees will be dry even if it is raining, only the outside will be wet. Wet wood can be used by splitting it and digging out the heart wood. For tinder, if you are in palm country, simply scrape the fuzz from the bottom sides of palm leaves.

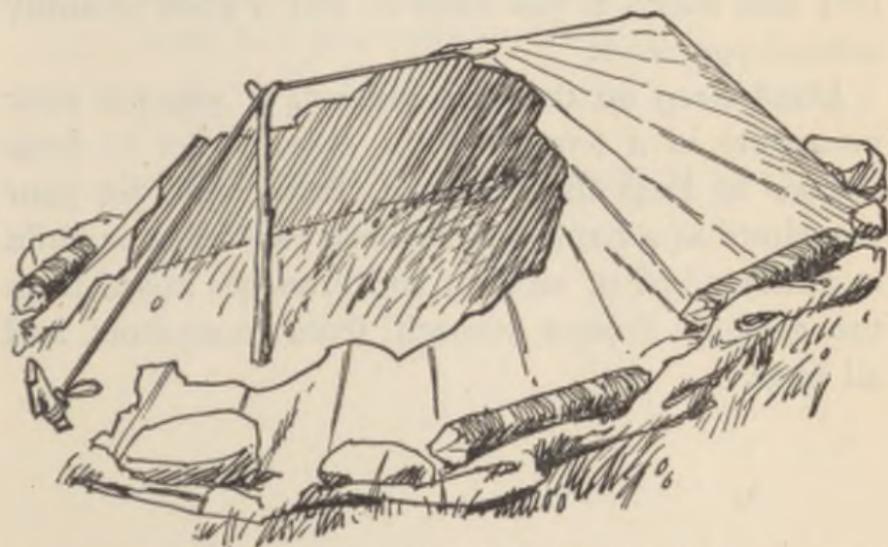
A simple fire maker can be made from a flat stick of soft wood and a foot and a half length of fairly hard sapling about $\frac{3}{8}$ -in. in diameter. Bore a cone-shaped hole in the stick with your knife and whittle a similarly shaped point on the end of the sapling. To start a fire put the point of the sapling in the hole, pile your palm leaf tinder around it, and twirl the stick back and forth between the palms of your hands until the tinder catches.

Before settling down for the night, gather a good supply of wood for the fire and stow it inside the tent where it will be protected from the rain.

Build your fire small. It will take less wood and yet furnish enough heat for cooking. Any one of a number of types of fires can be used. Nearly all natives in the tropics—African, Australian, and East Indian—arrange the wood in a radiating pattern, like the spokes of a wheel. Such an arrangement provides a steady uniform fire.

WILD ANIMALS

In just about ninety-nine cases out of a hundred, jungle animals will be just as frightened of you as you are of them. They will hear you long before you can see them and in most cases they will do their best to keep out of your path. If you are traveling alone and want some form of protection at night in a particular area where you feel large animals are present, build a fire and pile on bamboos. They will go off like gunshots and make enough noise to scare away any animals that may be nearby. In



Another type of parachute tent. In districts where there are ground bugs, fold the 'chute to form a floor covering

an emergency, a shot from your signal pistol will scare off an angry elephant or a tiger.

WARNING: *One of your worst enemies in the jungle is the mosquito.* Never go to sleep without some sort of protection—regular netting if you have it or your parachute. Either cover the upper part of your body with it, taking care to see that your hands and face don't touch the netting, or use it as a covering for the door to your tent. If it is used as a door covering, be sure to kill all mosquitoes inside the tent after you have closed the netting door. As an additional precaution, apply mosquito repellent to your face and hands if you have it. Put a good quantity behind your ears.

Don't sleep on the bare ground. If you use your parachute as a tent, fold the edges under to form a floor to keep the bugs out. Better still, rig your parachute as a hammock between two trees, or build a platform bed of saplings and branches raised from the ground. Protect yourself from mosquitoes and all bugs.

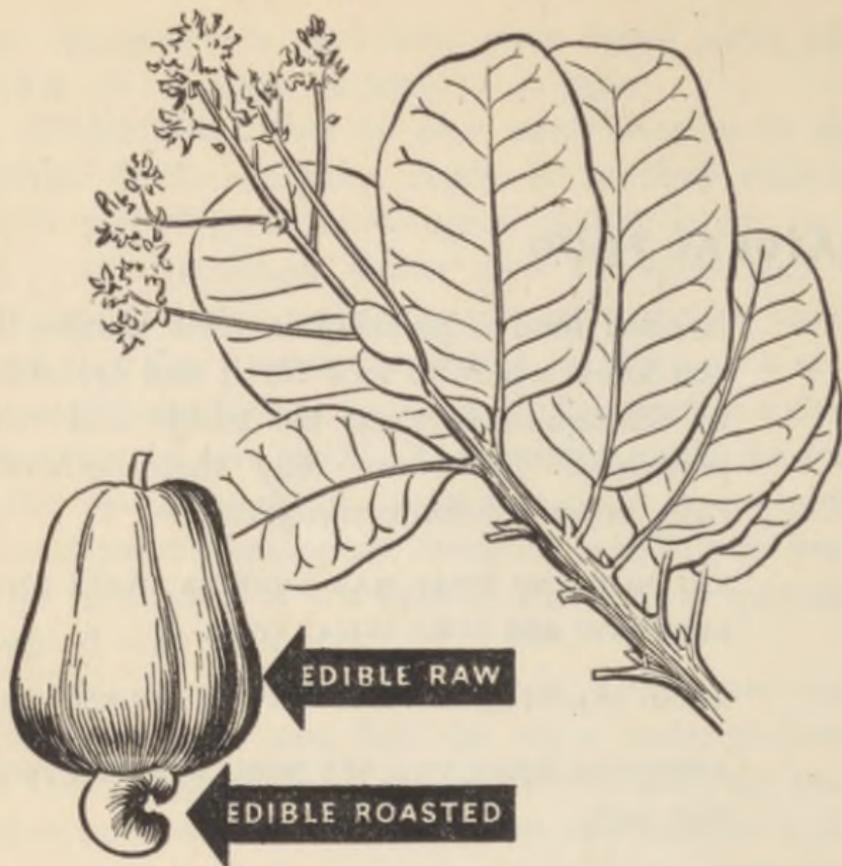
NATURAL FOOD

Natural food is plentiful in most jungles if you know where to look for it and are able to distinguish between the edible and the poisonous. There are only three general rules beyond definite recognition—

EAT NOTHING THAT HAS A BITTER TASTE UNLESS YOU ARE SURE WHAT IT IS.

AVOID ALL PLANTS THAT HAVE A MILKY SAP.

ANYTHING THAT YOU SEE MONKEYS EAT, YOU CAN EAT.

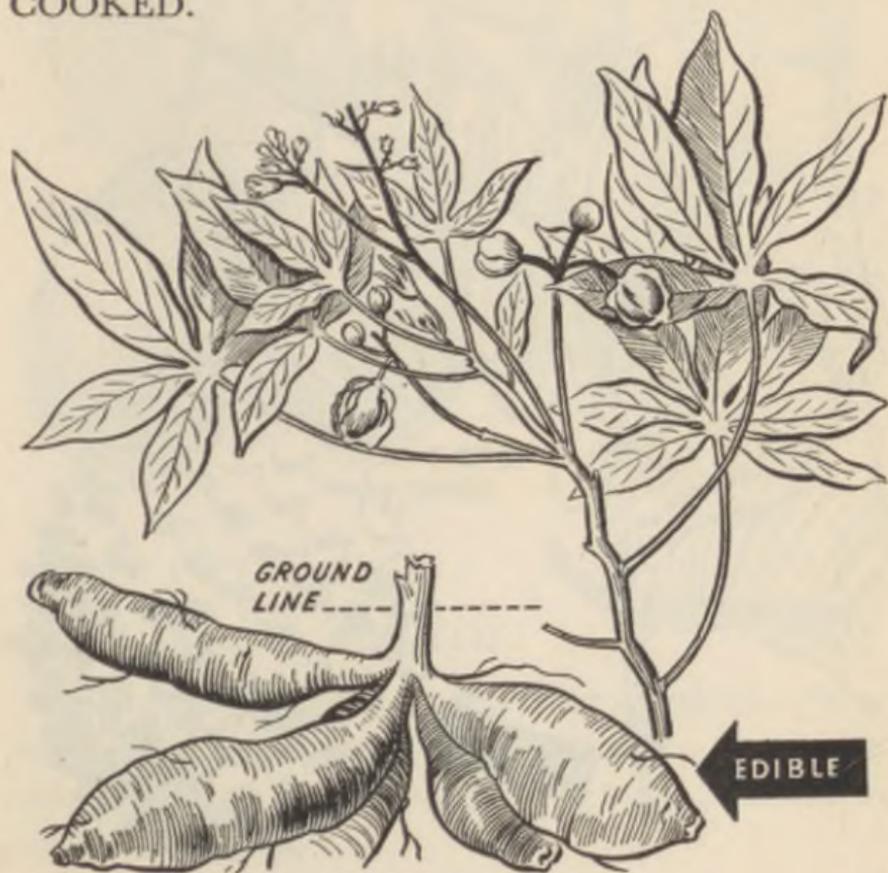


CASHEW

A small or medium-size tree. The upper, yellowish or purplish fruit, with the exception of the extreme lower tip, is refreshing and can be eaten raw. **WARNING:** Oil of the green cashew nut causes a rash like poison ivy. They must be roasted before eating.

CASSAVA

A shrubby plant about four feet high with tuberous roots rich in starch. **WARNING:** There are two kinds of cassava—bitter cassava and sweet cassava. Sweet cassava roots can be eaten raw. **BITTER CASSAVA IS POISONOUS RAW, IT MUST BE COOKED.**



GUANABANO TORETE

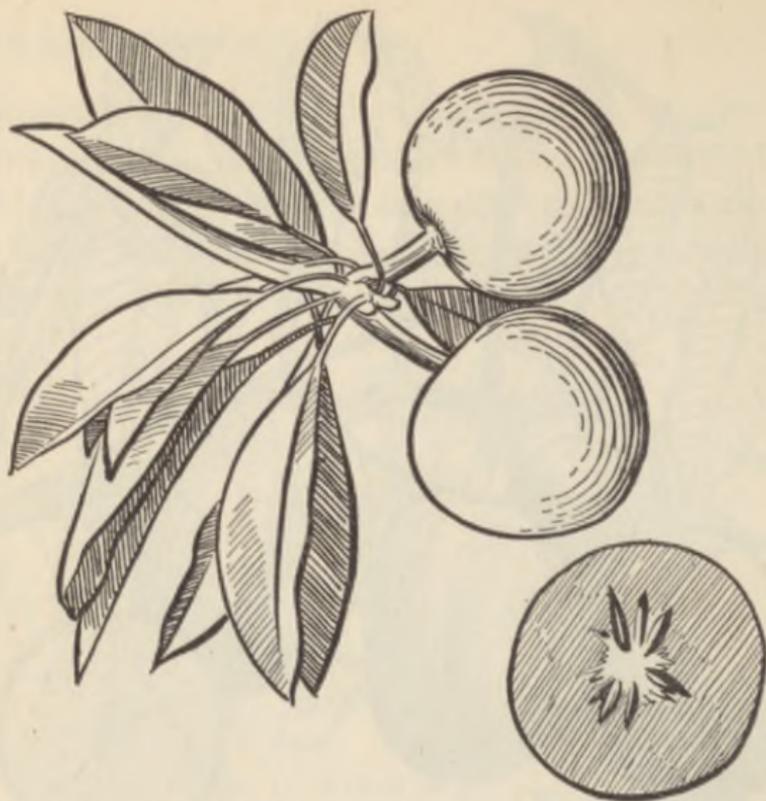
Guanabano, a tree that grows to a height of twenty-five feet, is common in Central America. The fruit, which has a brown skin, orange-colored meat, and large flat seeds can be eaten raw. It is neither meaty nor overly nutritious.





HOGPLUM OR CIRUELO

The hogplum tree bears fruit that is reddish orange when ripe and resembles a small plum. It can be eaten either raw or cooked. It is most common in Central America.

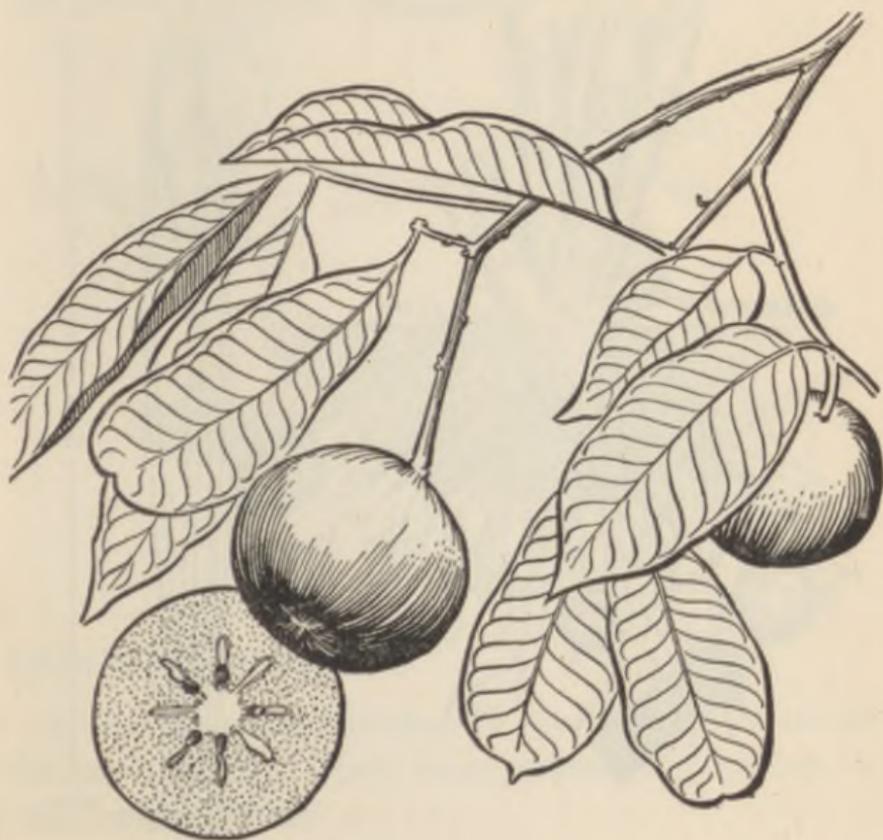


NISPERO

The tree grows about fifty feet high and has dark green leaves. The fruit is small and ball-shaped and has a thin brown skin. It can be eaten raw only. Although the milky sap of the tree is not poisonous, it is **NOT A GOOD SUBSTITUTE FOR WATER.**

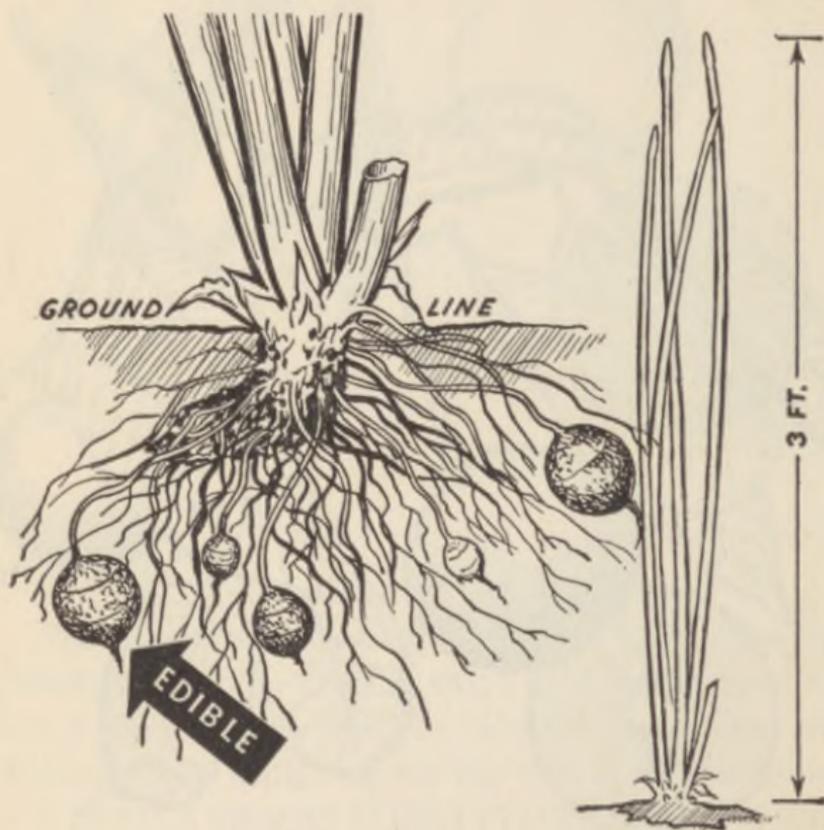
STAR APPLE

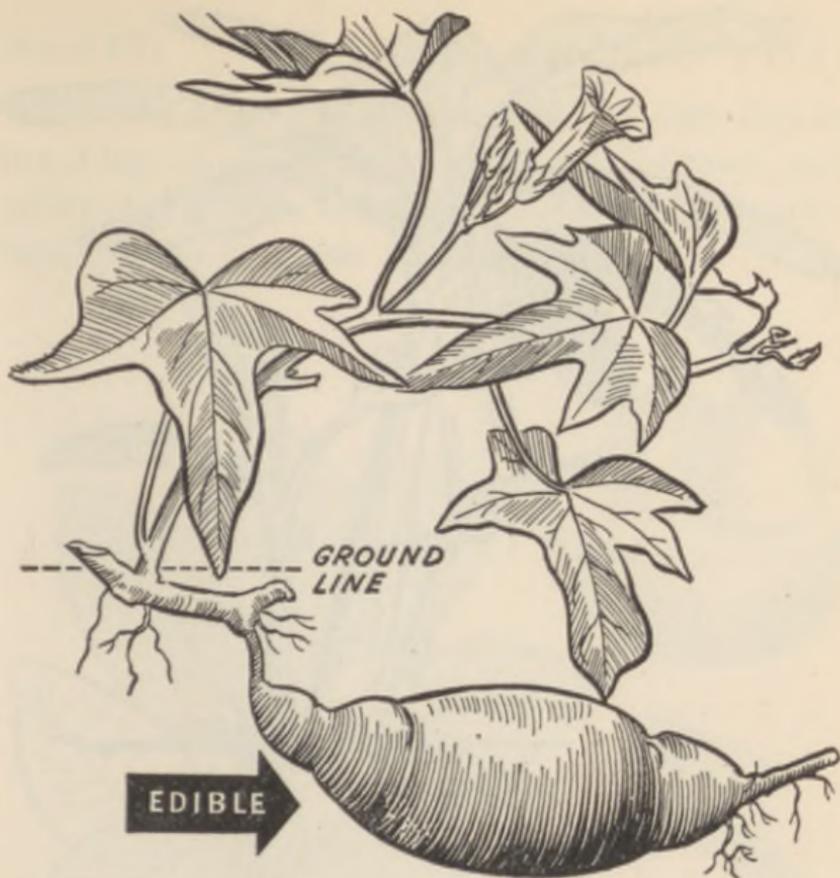
The star apple tree grows to a height of about sixty feet and has dark green, shiny leaves. The fruit resembles a small apple and when cut through its brown seeds form a star. It can be eaten raw only and has a sweet taste.



WATER CHESTNUT

Water chestnuts, common in the Far East, grow in swampy, watery places. Their stalks grow to a height of about three feet. The chestnuts are a part of the root system. They should be cooked before eaten.





YAMS OR YAMPI

A vinelike plant common in the forests, not unlike the sweet potato. Their large tuberous roots can be eaten when cooked.

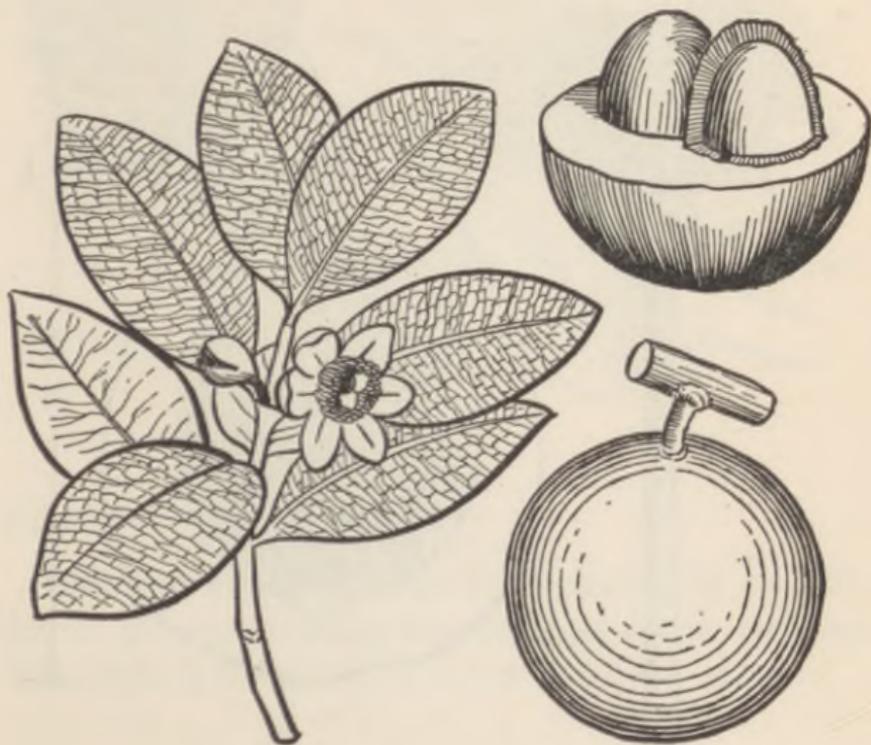


BANANA

The banana tree is easily identified by its large long leaves and its familiar cluster of fruit. Green bananas make a good substitute for potatoes when they are boiled.

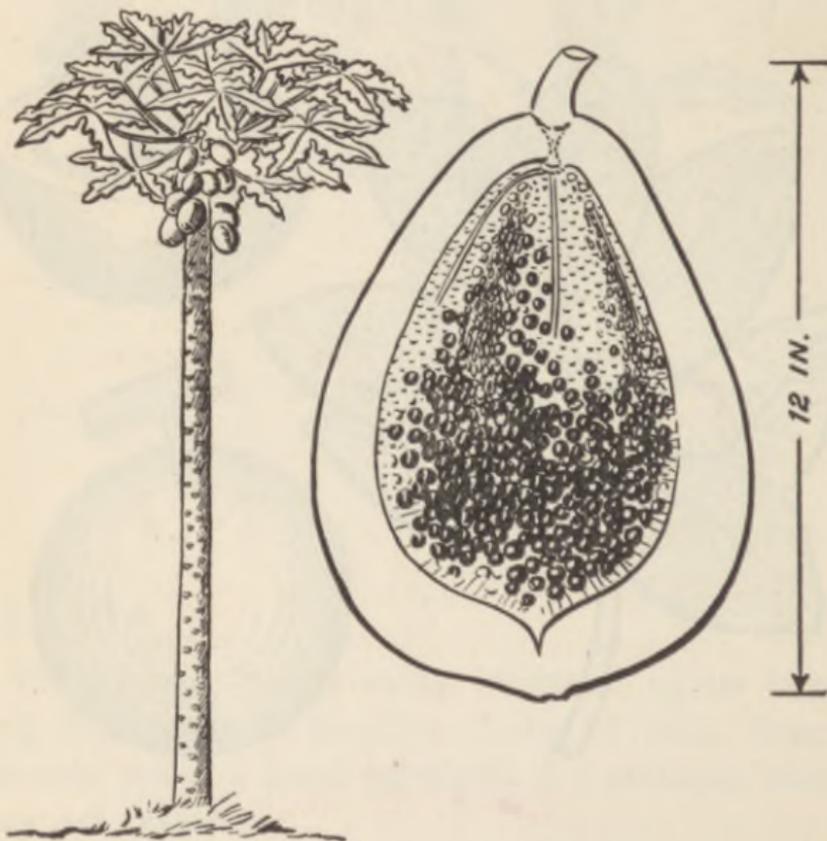
MAMEY

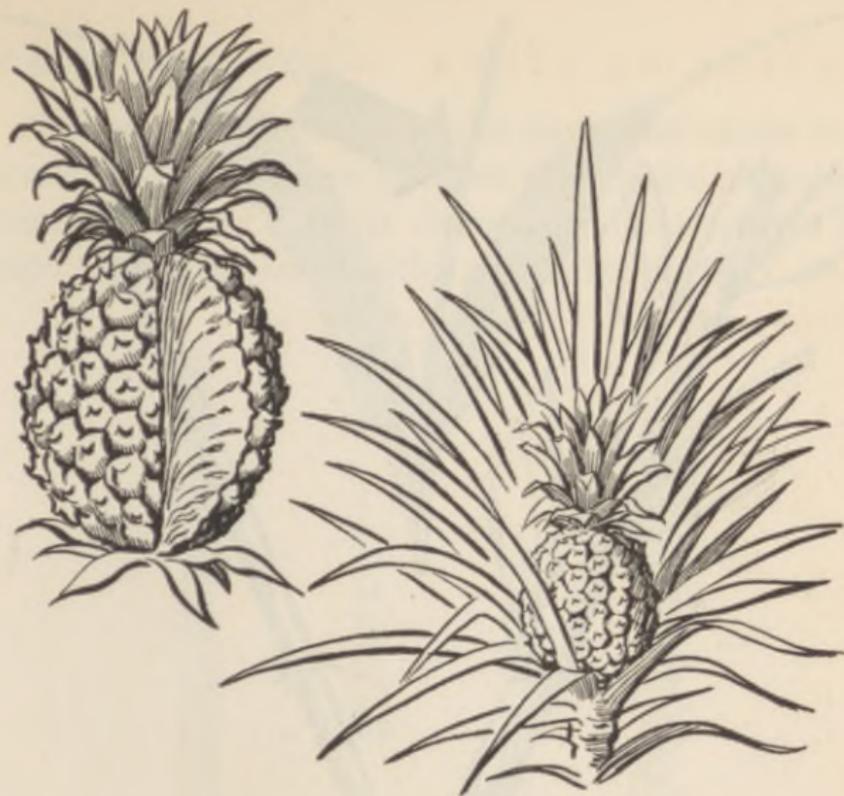
The tree often grows to a height of sixty feet and has a top of glossy leaves. The fruit is brown, has a yellow or reddish meat, and resembles a peach in taste. It can be eaten raw or cooked.



PAPAYA OR PAPAWE

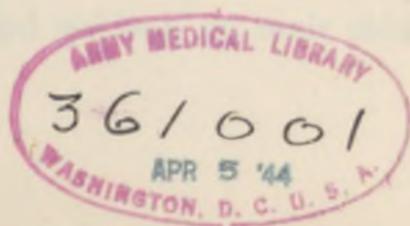
A straight-trunked tree bearing melon-shaped fruits in clusters like coconuts. The fruit is excellent food and can be eaten raw or cooked. The young leaves and stems also can be eaten if boiled in several water changes to remove the bitter taste.





PINEAPPLE

Although generally cultivated, pineapples are often found growing wild in Central and South America. The fruit is located in the center of the plant.





RATTAN

Rattans are a good source of both food and a substitute for water. The tender spike at the upper end of the vine is edible both raw and cooked and the sap of the larger vines is drinkable. A man can exist for a considerable time on nothing but rattans.

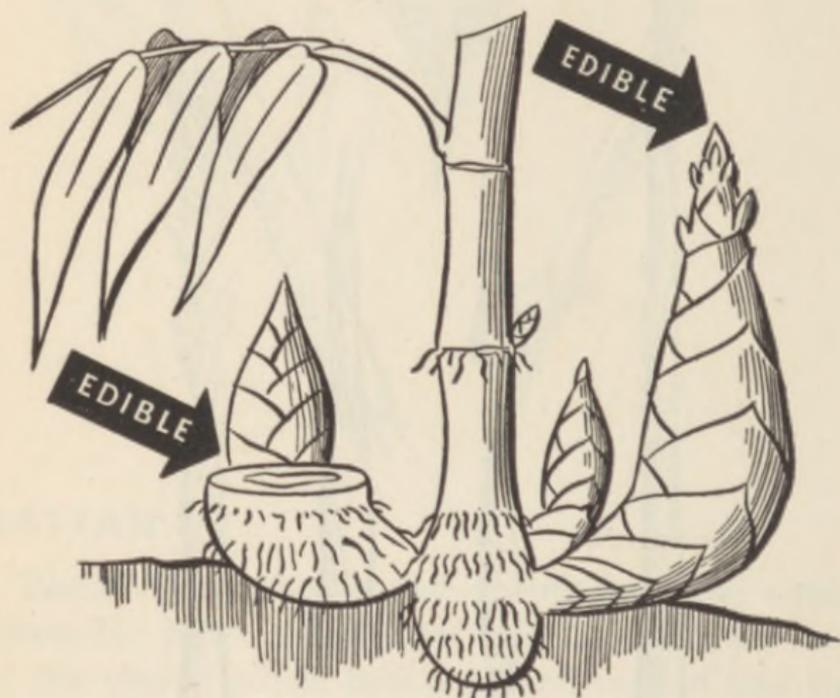
PALM CABBAGE

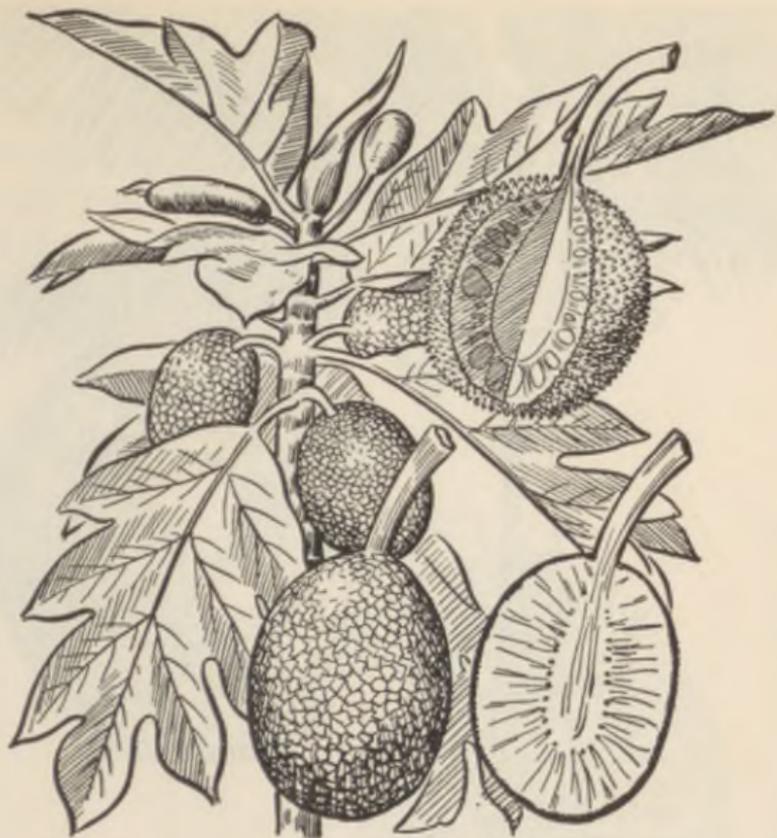
The spike or terminal bud in the center of the leaf cluster of a palm tree is called the "palm cabbage." Like the rattan spike it forms a plentiful source of food. It can be eaten either raw or cooked.



BAMBOO SHOOTS

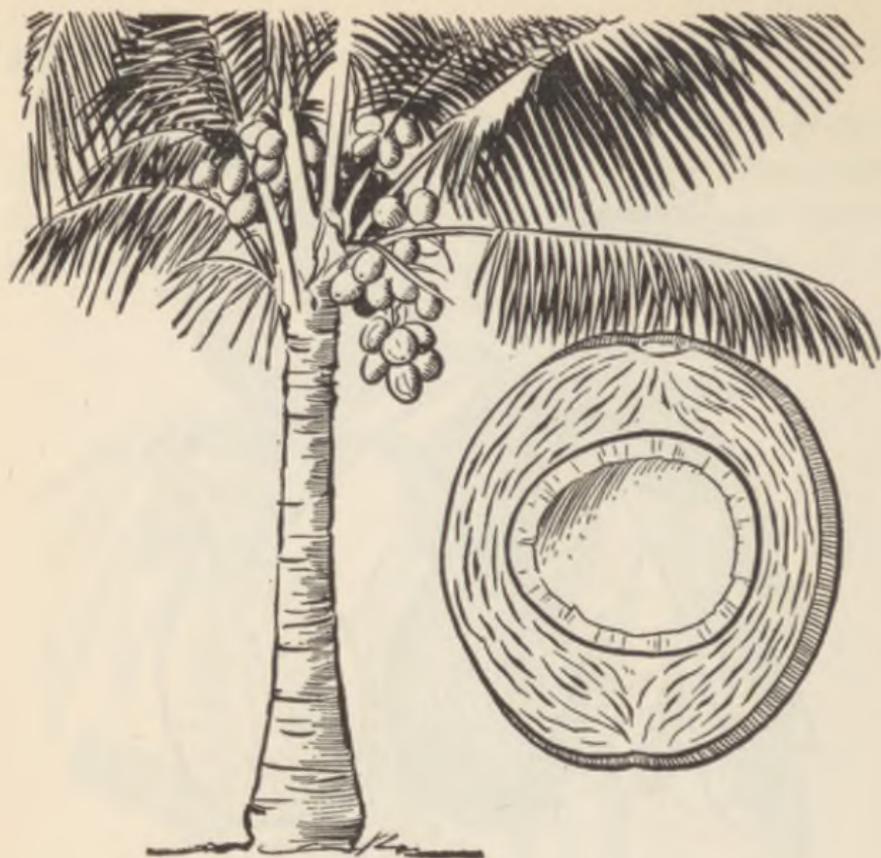
Bamboo shoots are the spikelike young shoots growing out from the base of the bamboo. The shoots can be cut off at the ground level. They can be eaten raw but are best when cooked.





BREADFRUIT

The breadfruit tree often grows to a height of forty feet. The fruit, about a half-foot in diameter, grows near the ends of the tree's branches. It is starchy and provides a good substitute for potatoes. Baked, the fruit resembles bread.

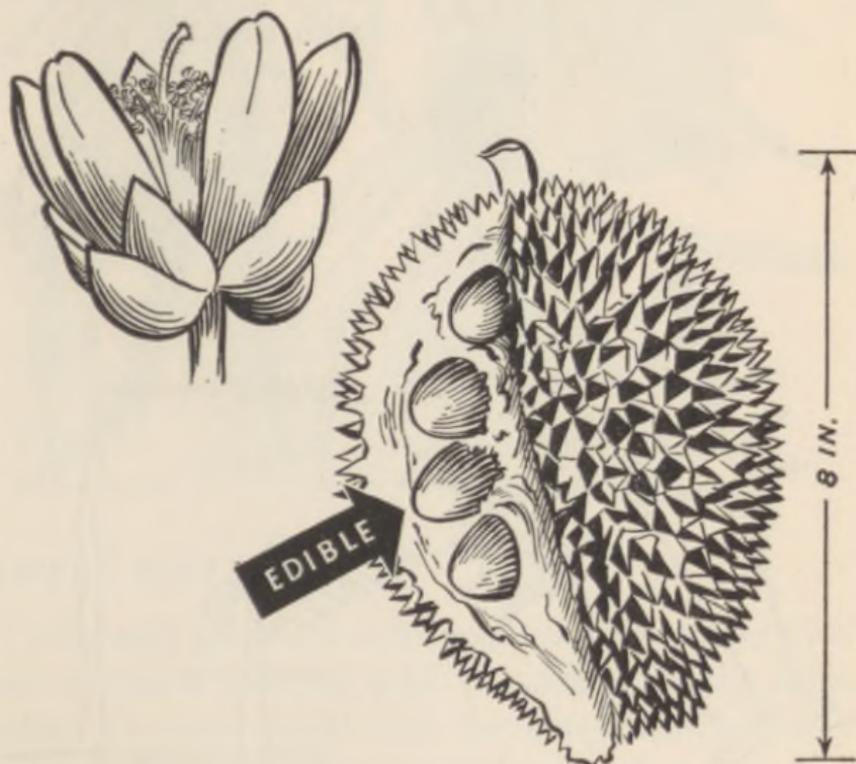


COCONUTS

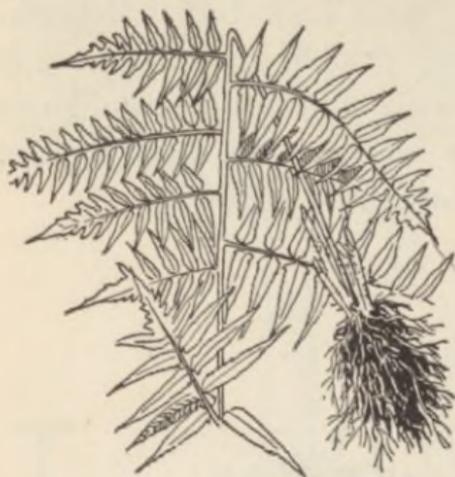
Besides the meat and drinkable milk of the coconut itself, the coconut palm also provides a good source of food in the form of its large terminal bud or shoot in the center of its leaf cluster. This bud is the "cabbage" and can be eaten raw or cooked.

DURIAN

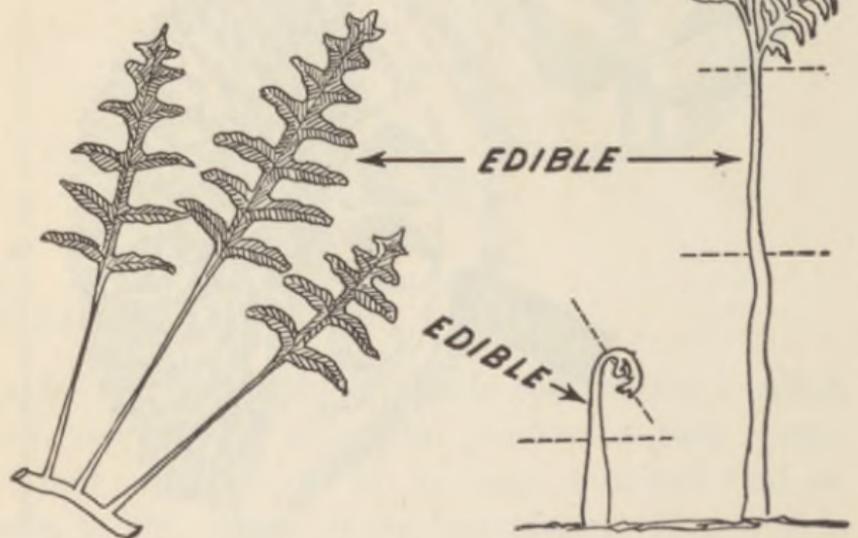
Durian are plentiful on most East Indian Islands. The eight-inch fruit has a prickly rind and a soft creamy pulp that is not only edible but considered a delicacy. Don't let the odor of the pulp bother you. The seeds can be roasted and eaten.



GROUND FERNS



The young shoots of most ferns growing along swift streams and rivers are edible. Boiled, they resemble spinach in taste. They also can be eaten raw.





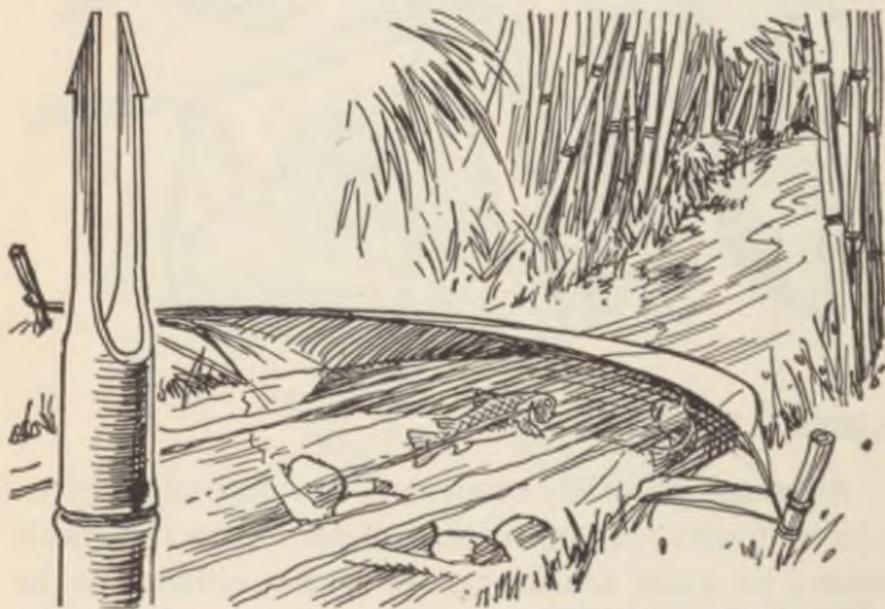
SWEET POTATO

Although generally cultivated, sweet potatoes often can be found growing wild. In addition to the edible tubers or roots which can be eaten either raw or cooked, the young shoots and leaves when boiled resemble spinach in taste.

FISH

Fish are easy to catch in most tropical streams. A hook and line will generally bring results, but since many tropical fish are suckers, a spear made by whittling sharp double points on a bamboo shaft or a small sappling will yield more food in less time.

If both of these methods fail, your parachute-tent can be used as a fish net. On small streams it can be spread across a narrow portion to trap fish as they swim downstream.



Your parachute can serve as a fish net and a spear can be made from bamboo

Don't eat any fish that have spiny or leathery skins. Skin *all* fish and frogs before cooking.

FISH SHOULD ALWAYS BE BOILED. Boiling is not only a precaution against infection due to pollution of the water in which the fish was caught, but it retains more of the food and vitamin value of the fish than either frying or baking.

BIRDS AND ANIMALS

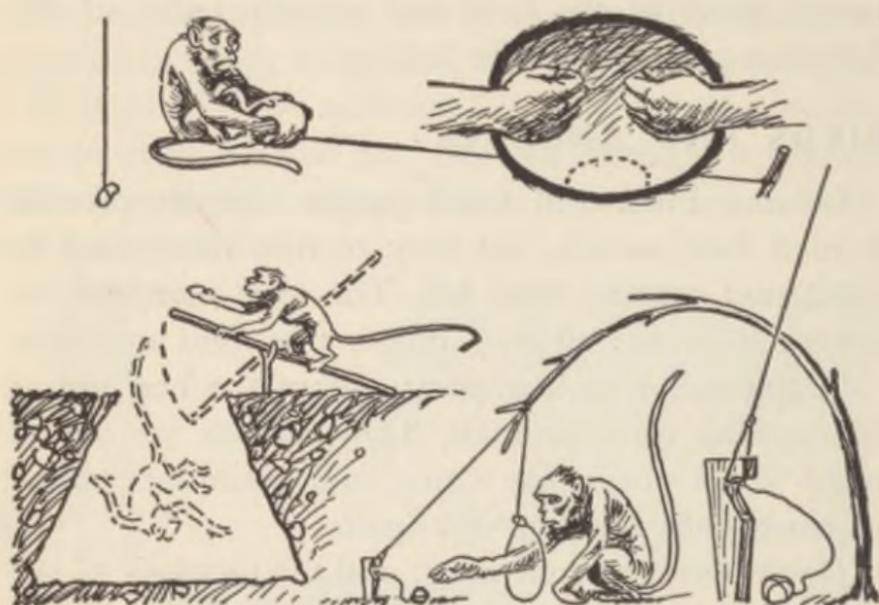
Ground birds and small jungle animals provide a good food source, but they require more time to catch and prepare than fish. The most common are ground pigeons, turkeys, jungle rats, and monkeys.

Simple snares and traps are about the best means of catching these animals. They can be set out at night when you make camp and taken up in the morning before setting out again.

Don't overcook your meat, and use as much of the animal or bird as you can. Entrails, the heart, the liver, and the kidney contain essential vitamins that will make up for any possible lack of greens and roughage in your diet.

As with fish, meat should be stewed rather than fried or baked. Chunks of meat one or two inches across should be dropped into a pot of cold water over the fire. Two minutes after the water has come

to a boil remove the pot from the fire and place it to one side to cool to eating temperature. This permits the meat to cook thoroughly yet prevents over-cooking.



Three monkey traps. Top, a coconut with a small hole in each end and fastened to the ground by wire or cord. Bait is placed inside. Monkey reaches in, closes fist, and won't let go even though he can't pull fist through hole. Bottom left, tip-up trap—monkey climbs inclined pole to reach food hanging on cord, pole tips up dropping him into pit. Bottom right, Monkey reaches for bait, trips trap, sapling springs back holding monkey. Bait should be walled in at back and sides with rocks or logs to force monkey to reach in through the loop.

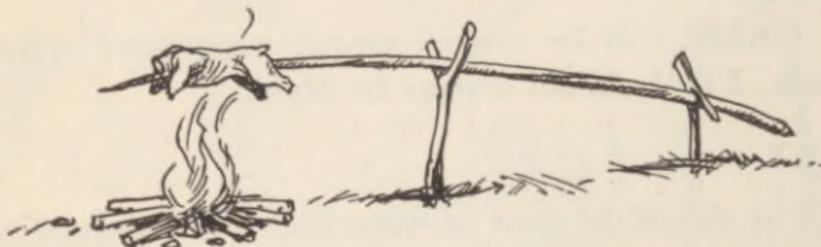
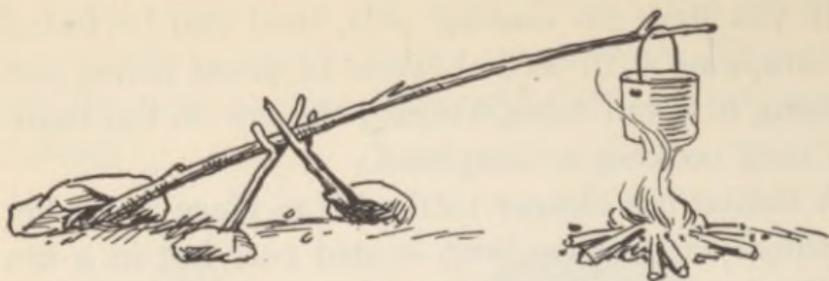
If you have no cooking pots, food can be baked by wrapping it in several layers of green leaves and burying it in hot ashes, keeping the fire on top burning until cooking is completed.

A similar but cleaner method is to place a number of stones which have been heated very hot in a fire in the bottom of a shallow, dry trench scooped in the ground. Cover the stones with green leaves, place the leaf-wrapped food on the leaves, surround it closely with other hot stones, and cover the whole thing with more hot stones and a light topping of dirt. It will take about two hours for most foods to cook.

GAME can be cooked on an improvised spit or stick, FISH should always be boiled.

FAT

Fat should be part of your diet. Save unused fat from animals killed. Don't waste it. Starchy foods are easily obtained in most jungles, but proteins and fats are not. It may not always be possible to get birds and animals, so a reserve of protein and fat should be carried. Melt the excess fat in a pan, boil it for a few minutes, skim off any solid material, and pour it into a small can with a tight-fitting top—one or two empty friction-top coffee containers from



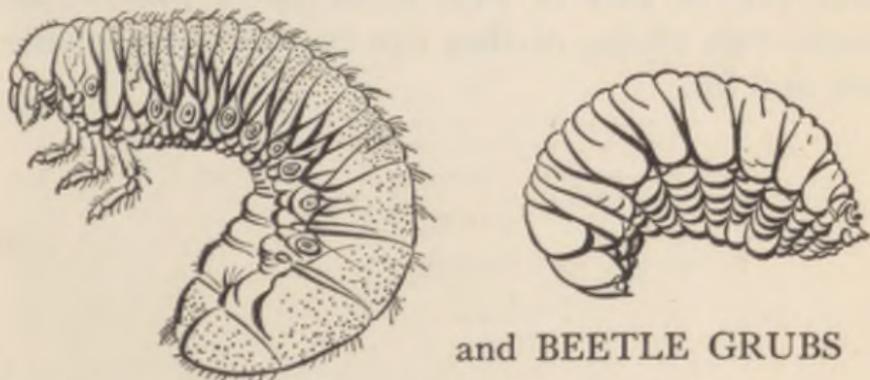
your emergency ration kit will serve nicely. The fat then can be used for preparing starch plants and other foods.

EDIBLE INSECTS

In emergencies, two groups of jungle insects form a nourishing food source—**TERMITES**



After removing the wings, termites can be eaten raw or cooked. Grasshoppers and crickets also can be eaten raw or cooked.



and **BEE TLE GRUBS**

Beetle grubs can be eaten either boiled, fried, or dried. They are generally found inside dead stumps and rotted fallen trees.

In most clearings and grasslands Termites emerge from the ground and can be picked up by the handful after a heavy rain. After removing the wings they can be eaten raw or can be fried in fat. Considered delicacies by jungle natives and many explorers, they not only provide considerable nourishment, but raw or cooked have a taste like roasted chestnuts. Grasshoppers and crickets also can be eaten.

Beetle grubs are also a favorite native food. They can be found easily by hunting out dead stumps and fallen trees and listening for the scratchings of grubs inside the wood. Once grubs are located, split the log with your jungle knife and remove them. Dried in a pan suspended over a fire, they can be eaten as they are, as part of stew made up of one of the starch root plants, or they can be fried with a little salt and fat.

POISONOUS PLANTS

The number of poisonous plants is not great, and few are common in the jungles and forests. Four are shown on the following pages. A safe rule to follow is to eat nothing that a monkey won't eat, and avoid all those that have a milky sap or a disagreeable taste.



POISONOUS

SANDBOX

The tree grows tall and has a trunk covered with spines. The fruit is about four inches in diameter and resembles a small pumpkin, being green when unripe and brown when ripe. The seeds contain an oil that is a violent cathartic.

MANZANILLO

Manzanillo is found near the seacoasts along beaches. The bark is smooth and tan, the leaves are green, and the fruit resembles a small green apple. The fruit is poisonous and even the sap of the tree can cause severe inflammation and irritation.

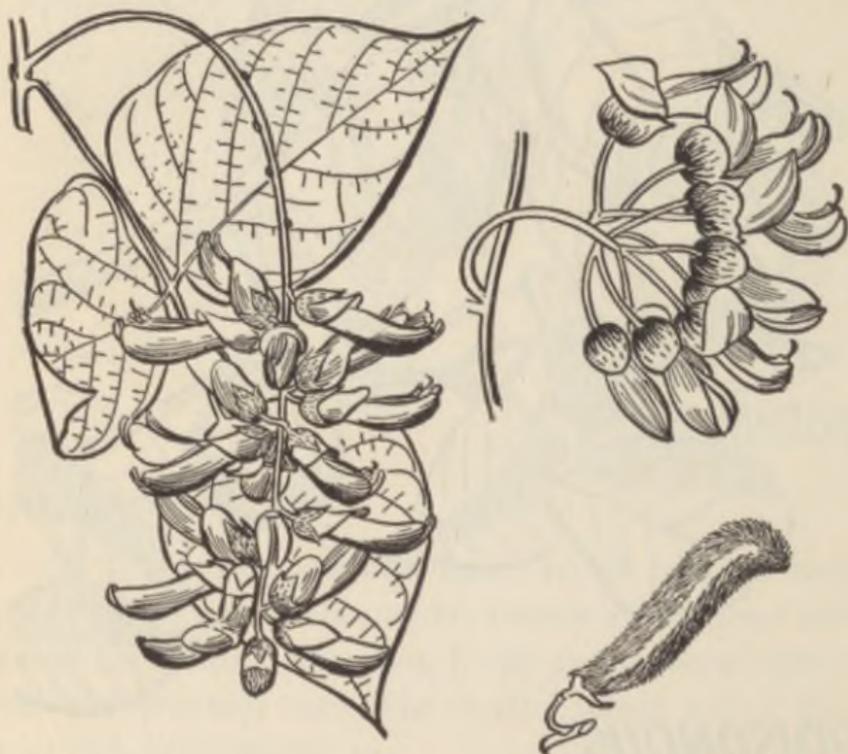


POISONOUS

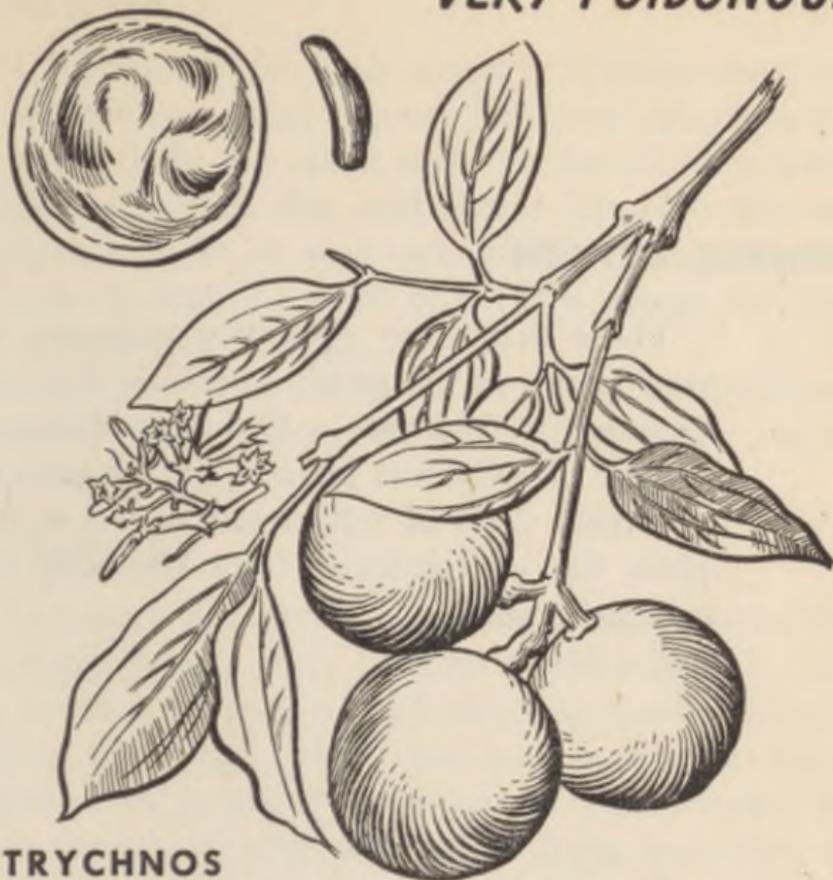
COWITCH

A plant common in thickets. The beanlike pods are not edible and should not be touched. They are covered with short, fine detachable hairs that will stick into your skin, become detached from the pod, and cause severe irritation.

POISONOUS



VERY POISONOUS



STRYCHNOS

A slender, woody vine bearing ball-shaped fruit about two inches in diameter. It contains one of the deadliest poisons known — a small amount in the blood stream being sufficient to paralyze the nerves and cause death. Common in South America, it has been used by natives to poison arrows.

JUNGLE HEALTH

Three things are absolutely necessary to your health in the jungle—periodic doses of Quinine or Atabrine, a Quinine substitute, the use of some sort of mosquito protection, and daily doses of salt or salt tablets to replace the salt removed from the body by excessive sweating.

MALARIA

If you are in malarial country, Atabrine must be taken for protection against the fever symptoms of malaria. Take one tablet each day for six days, skipping the seventh day, and repeat this procedure as long as you are on your own in the jungle and your supply of Atabrine holds out. (This dosage for 1½ grain Atabrine tablets.)

If Quinine is in the jungle kit instead of Atabrine, take two 5 gr. tablets each day, as long as you are in a malarial area.

DYSENTERY

Dysentery is caused by impure drinking water or food and is very likely to occur in the jungle. It can be avoided by purifying all drinking water, and by eating only food which has just been cooked or taken from a sealed container. If you become ill with dysentery, take only liquid foods and stay as quiet as possible until you are well. Add two salt tablets to each canteenful of drinking water.

If your first aid kit contains sulfaguanadine tablets take 4 tablets every 4 hours, day and night, until your bowel movements are normal. If there is no improvement in 4 days, stop taking the tablets.

SNAKE BITE

Snake venom acts rapidly. First-aid must be given quickly to prevent the poison from spreading throughout the body.

Put a tourniquet on at once, placing it between the body and the bite. Apply it above the knee in foot or leg bites, above the elbow in hand and arm bites. A necktie, belt, handkerchief, or bandage can be used as a tourniquet.

THE TOURNIQUET SHOULD BE LOOSENED FOR TEN OR FIFTEEN SECONDS EVERY TWENTY MINUTES.

Apply iodine around the bite, treat your pocket knife blade tip or razor blade with iodine, and make cross incisions $\frac{1}{4}$ -inch long and $\frac{1}{4}$ -inch deep across each fang mark. Then apply suction to the wound for twenty minutes before loosening tourniquet and keep up suction for at least three twenty-minute periods. This can be done by mouth if you have no snake bite kit. Spit fluid out.

After the wound has been sucked for an hour, remove the tourniquet, apply iodine or sulfanilamide powder if you have it, and apply a clean bandage.

JUNGLE PESTS

Mosquitoes as carriers of malaria, yellow fever, dengue (or breakbone fever), and filariasis are not the only jungle insects that should be guarded against. Ticks, fleas, body lice, mites or chiggers, kissing bugs, and botflies are other common jungle pests that carry diseases or cause painful sores. Although not insects, leeches and vampire bats (only in South America) also are dangerous.

REMOVE YOUR CLOTHING TWICE A DAY AND INSPECT IT AND YOUR BODY FOR ANY TRACE OF VERMIN.

TICKS can be identified by their flat oval body, small head, and comparatively large abdomen. They are carriers of relapsing fever and typhus.



Ticks do not always attach themselves immediately after coming in contact with your skin. Even after the biting members are attached, infection usually does not occur until the tick has remained in place for six hours or longer.

Never squash a tick on the skin or attempt to pull it out. Instead, cover it with a good coating of spit. The tick will free itself and be easy to remove. If you try to pull the tick out, his mouth will be left under your skin. Apply iodine to the bite.



FLEAS are small wingless brown or black insects with a flat body, small head, and large legs.

The rat flea found in native villages and storehouses is a carrier of bubonic plague and typhus. Avoid native huts and use your insect repellent.

MITES OR CHIGGERS, very small insects resembling fleas, are common in the American tropics and in parts of West Africa and India. They are carriers of typhus. As with fleas, use repellent and avoid native huts.



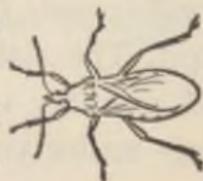
Chiggers bore under the skin. They should be removed with a sterile knife-point. The bite should be treated with iodine.



BODY LICE are small, gray, flattened, six-legged, and wingless. They are carriers of typhus, relapsing fever, and trench fever.

To keep from getting lice, avoid close contact with natives and stay out of native huts. It is easy to kill the lice, but the eggs are more resistant. Steaming of the clothing, especially the seams, generally will be effective.

KISSING BUGS are large, dark brown or black, have a narrow cone-



shaped head, oval body, long legs, and well developed wings. Common in Yucatan and Central America, they are carriers of Chagas' disease. Avoid native huts and abandoned buildings. They usually bite you on the face, so again mosquito netting is an important protection.



BOTFLIES, common in the American and African tropics, are dangerous because of their larvae. The maggot burrows into the skin and causes a painful swelling that looks like a boil. A coating of oil or kerosene placed over the hole every few hours will generally cause the larvae to come to the surface of the skin where it can be expelled by squeezing the skin. Frequent applications of wet tobacco will also kill the larvae which can then be squeezed out.

LEECHES, common to ponds or sluggish streams and the East Indian tropics where they cling to low-lying brush and attach themselves to a passing man or animal, look like thick short worms. Unless removed carefully, their bites can produce painful infections.

Do not try to remove a leech by pulling. Instead apply either a lighted cigaret, iodine,



salt or tobacco juice. It will release its hold and drop off.



VAMPIRE BATS, found in Yucatan and tropical America often bite humans and are carriers of rabies and other animal diseases that infect humans. Im-

mediate first-aid treatment consists of cauterization of the wound and applications of tannic acid ointment and a tight compression bandage.

JUNGLE NATIVES

With the exception of those in New Guinea and in parts of Assam, there are few dangerous jungle natives. When you encounter natives, try to appear confident but not aggressive. *Stay away from the women.* All natives are superstitious and suspicious. Through generations they have learned to trust no one. You can only win their confidence by appearing openhanded.

String tricks—the cat's cradles and spider webs that you did when you were a kid—are an almost universal pastime with jungle natives all over the world. If you remember any of them, pick up a piece of pliable vine and demonstrate them to natives you meet. In most cases it will serve as an immediate

bond between you and them. If you can't do a string trick, go through the motions to arouse their curiosity.

Be particularly careful of your treatment of natives if you are in or near enemy territory. If they want to, they can help you get back to your lines. Don't try to use terrorist methods to get them to work for you or conceal you. Jungle natives move about a great deal, but if they are not threatened or abused they will seldom rush news of your presence to the enemy.

Eat native food only when it has been well and freshly cooked and be sure all water offered you by natives has been boiled. Under no conditions sleep in or near native camps or bathe in nearby streams. Avoid close contact with any native. Don't go around barefoot.

CHAPTER 2 ★ DESERT

**IF YOU ARE
FORCED DOWN IN THE DESERT
DON'T GET PANICKY
YOUR CHANCES OF RESCUE
ARE GOOD**

LAND YOUR PLANE

IF YOU GET LOST over the desert, and your fuel supply is low, don't fly aimlessly in the hope of getting your bearings. Almost any place in the desert provides terrain for a good landing and a landing under full control with fuel in reserve stands every chance of success. A forced landing with a dead stick is just as dangerous in the desert as it is in any other kind of country.

Prevailing ground wind directions generally can be ascertained by studying the formation of the sand dunes as you fly over them. Dunes, like ocean waves, usually run roughly at right angles to the direction of the prevailing wind.

Desert weather is variable with temperatures ranging from 125 deg. F. midday in the summer to 25 deg. F. in the early morning hours of the winter. Winds seldom if ever reach hurricane velocities, but winds of 35 miles an hour are common and velocities of 50 miles an hour do occur occasionally. Rains are infrequent, but may be of cloudburst intensity when they do occur. Hailstorms are rare. Thin low ground

fogs occur occasionally in the early morning hours, but they almost invariably clear up when the sun rises. In general, desert flying weather is uniformly good.

Sandstorms are a hazard of desert flying, but landings during a sandstorm are no more difficult than landings during a heavy rain. Such landings invariably will be made into the face of a wind with a velocity of 35 miles an hour or greater—a fact that makes landings even in rough desert terrain possible. Your actual landing speed will be low, and your roll after landing will be short.

If you can land your plane, do so. Even a wrecked plane can provide you with a good many things that will make it easier for you to walk your way out if rescue fails.

STAY NEAR YOUR PLANE until nightfall, or longer, if you expect a search to be made for you. If you bailed out, and your wrecked plane is not too far away, make your way to it—the plane will be easier for rescuers to locate than you.

SIGNALS

Most of the signals suggested in the jungle section on page 14 will serve equally well in the desert. An additional groundstrip type of signal can also be used. It consists of scratching shallow trenches in the sand to form large letters, pouring gasoline into the trench, and lighting it when a rescue plane is sighted. The smudge formed will be visible from the air as a message.

If you are equipped with an emergency parachute kit, use the colored signal marker as outlined on page 15. If a plane is heard at night, light your signal fires or flares or fire your signal pistol. If a plane is sighted during the day, signal it with a mirror or any piece of shiny metal. Properly aimed it will be more effective than fires. (See pages 19 and 20.)

GO OVER YOUR PLANE CAREFULLY, there are a number of things that you can take with you to make travel easier.

DON'T FORGET :

ALL WATER AND FOOD . . . and water is more important than food.

SUN GLASSES. They will protect your eyes from the sun and from blowing sand.

SALT TABLETS. Avoid unless sufficient water.

MAPS.

MATCHES.

EMERGENCY KIT.

FIRST-AID KIT.

SIGNAL PISTOL OR FLARES.

WARM CLOTHES OR A BLANKET. In spite of the terrific heat during the day, night temperatures often drop as low as 25 deg. F. in the winter.

SEXTANT AND COMPASS. If the small compass in your kit has been broken or lost, remove the compass from the instrument panel and remove compensating magnets. You will need all the navigation aids available to get where you want to go. Sextant must be handled with care. Keep it clean.

A good tent can be made either by folding your parachute canopy or by cutting a ten-foot square from it. Save the shrouds, they can be used as stake lines, bindings for an improvised knapsack made from your parachute harness, and as a line for bailing water out of Bedouin wells which sometimes are more than 200 feet deep. (See illustration, page 27.)

CLOTHES

Don't let the midday heat of the desert fool you. The desert sun can burn you quickly, and desert nights can be cold. In consequence, wear light clothes that cover your body when it is necessary for you to be out in the sun during the day, and wear something warm at night. Your parachute can serve a double purpose here—as a shelter from the sun during the day and as a shawl for warmth during the night.

One very important piece of clothing is an improvised woolen band that can be worn around your middle and over your stomach to prevent stomach chills. This is particularly important in summer, and the hotter the day the more important it is. The purpose of the band is to absorb your perspiration and prevent any rapid chilling of your stomach due to sudden evaporation.

Take care of your shoes, and wear two pairs of

socks if you have them. The condition of your feet may mean the difference between getting back and not getting back. Keep your shoes free of sand and take them off during the day when you are resting under the shelter so they can dry out.

If your shoes are thin, reinforce them by lacing on an outer sole improvised from the rubber floor matting in the cockpit.

Unless you are wearing boots or high shoes, fashion a pair of gaiters or leggings from strips of fabric torn from your parachute or from your plane. Roll the strips spiral-puttee fashion so they cover an inch or two of the shoe tops and two or three inches



Spiral gaiters of parachute cloth will keep sand out of your shoes



A length of shroud line or fish line can be used to hold it on your head

of your legs. These improvised wrap leggings will keep the sand out of your shoes.

An effective sun hat can be made from a seat cushion. Slit it open between the seams on two adjacent sides. Slit through the stuffing, and mold a hollow for your head in the filling. A piece of shroud line, or a length of fishing line from your emergency kit, can be used as a chin strap to hold it on your head. It may make a funny looking hat, but it will protect your head from the sun when it is necessary for you to be out in the open during the day.

GETTING OUT

When you feel there is no longer any hope of rescue, lay out a plan of travel and then make up your mind to stick to it. Distances in the desert are deceptive. Once you have established your position, consult your maps and plan to make your way toward some known route of travel, a source of water, or an inhabited area. Follow the easiest route possible. Avoid soft sand and rough terrain.

Before you leave your plane, make sure that you have the things you will need. If it is a question of carrying either food or water, **LEAVE THE FOOD AND TAKE THE WATER.** You can live on a minimum of food, but you can't live in the desert without water.

BEFORE LEAVING YOUR PLANE BURN ALL PAPERS, TECHNICAL ORDERS, AND TRIP DATA THAT MIGHT BE RESTRICTED, CONFIDENTIAL, OR CLASSIFIED. SECRET INSTRUMENTS SHOULD BE SMASHED AND THE PARTS BURIED.

IF YOU ARE IN OR NEAR ENEMY TERRITORY BURN THE PLANE.

Do your walking at night and stay out of the sun and rest during the day. Stay under the shelter of your improvised tent, particularly during midday. Conserve your strength. The slightest exertion will increase your sweating and increased sweating will increase your thirst.

If you get caught in a sandstorm, put on your sun glasses, cover your nose and mouth with cloth (a strip of your parachute will do) and try to get in the lee of any shelter that may be available. If you lie down, move about frequently so you won't be buried under the swirling sand.

WATER

Your life in the desert depends on your water supply. Protect it and conserve it. Sip water. Your first cravings can be lessened by merely moistening your mouth and throat at intervals. Take salt tablets only if your water supply is sufficient (one quart per day).

Chewing gum will help decrease your thirst. Remove a button from your shirt, place it in your mouth and suck on it. This will also decrease thirst.

Water from desert water holes and wells should be purified either by boiling for more than three minutes or by dissolving at least one Halazone tablet to each

quart (more than one tablet may be necessary). Iodine also can be used as a purifier if you have no Halazone tablets. (See page 24.)

Arabs own the palms around water holes so don't tamper with the fruit or the tree. Put yourself in his care for food.

FOOD

Food spoils quickly in the desert. Canned emergency rations should be eaten as soon as the cans are opened.

Unfortunately, game is neither abundant nor uniformly distributed in the desert. In the immediate vicinity of a water hole, or where there is a light growth of brush, such game as rabbits, antelope, and birds may be found in limited numbers. However, in localities where there is nothing but drifting sterile sand, not even snakes and lizards can survive.

Palms around water holes do provide a good source of food in the form of the palm cabbage, a tender shoot which extends up from the top of the trunk at the point where the leaves spread out. (See page 51.) It can be eaten raw or cooked.

When you get to a native camp or inhabited area, avoid native foods prepared by natives. Instead buy or barter for raw food and prepare it yourself by

boiling. Almost all native-grown fruits and vegetables are contaminated; boiling will make them safe for eating. Likewise, milk as well as water provided by natives should be boiled before drinking.

DESERT HEALTH

HEATSTROKE, or sunstroke as it is sometimes called, usually is caused by exposure to the direct rays of the hot desert sun, but it can hit a person who has been under cover. The symptoms are headache, dizziness, red and purple spots before the eyes, and very often vomiting and unconsciousness. The skin is hot and dry, and the face is flushed and feverish. Generally, the pupils of the eyes will be smaller than usual.

A heatstroke victim should be placed in the shade and all clothing with the exception of his underwear, should be removed. He should be placed on his back with his shoulders raised and should be cooled by pouring whatever water can be spared over his body and fanning him to increase the evaporation. His arms, legs, thighs, and trunk should be rubbed briskly. When he regains consciousness he should be given cool water containing two salt tablets to a canteenful. If his skin gets hot again, the process should be repeated.

HEAT EXHAUSTION. An all-in feeling, dizziness, nausea, and weakness are the first signs of heat exhaustion. The face is pale and the skin cold. There is severe sweating. Fainting may occur.

A heat-exhaustion victim should be removed to the coolest, shadiest place available, placed on his back, and given from three to five canteensful of cool salt water (two salt tablets to each canteenful) during the next twelve hours.

HEAT CRAMPS. Heat cramps usually occur after a person has been sweating a great deal, especially if extra amounts of salt have not been taken. They bring on shallow breathing, vomiting, severe weakness, and dizziness.

Heat cramps can be prevented by the addition of salt to the diet, especially on days when you have been sweating a great deal. If cramps already have developed, rest in the coolest place you can find and drink from three to five canteensful of salt water (two tablets to every canteenful) during the next twelve hours.

SEE JUNGLE HEALTH (PAGE 70).

CHAPTER 3 ★ ARCTIC

You can beat the ARCTIC

IF YOU . . .

GET PLENTY OF SLEEP AND REST

AVOID TIGHT CLOTHING

EAT PLENTY OF FAT

KEEP DRY AND WARM

THE ARCTIC IN SUMMER

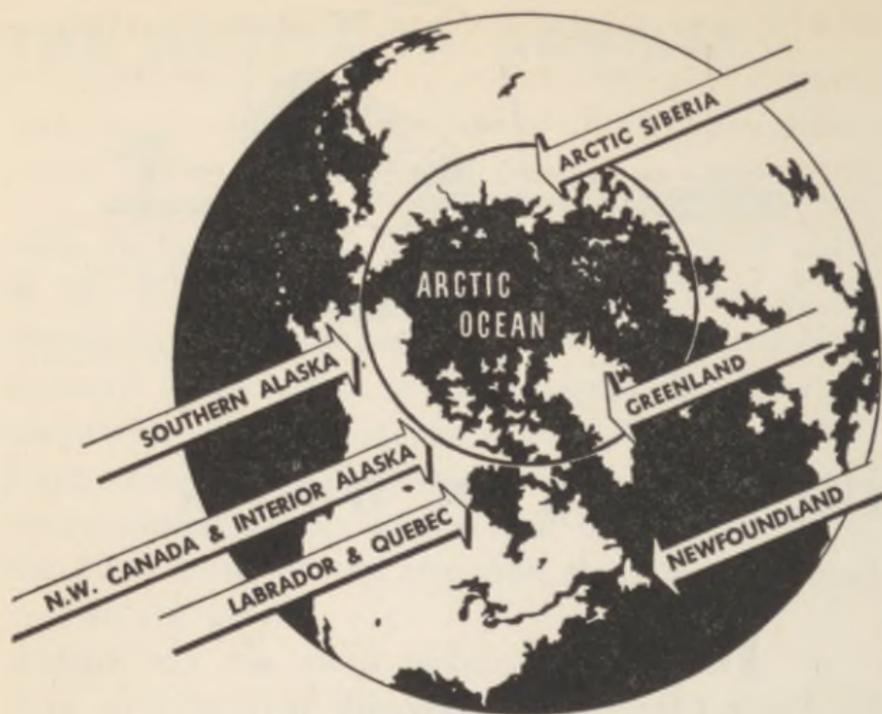
THE Arctic is not always ice, snow, and cold. In late August, 80 per cent of all land north of the Arctic Circle is free of snow. Most of the remaining snow-clad 20 per cent is in Greenland. Summer temperatures in the lowlands, remote from mountains and seacoast, run around 85 to 90 deg. F. From mid-June to September there are 10 times as many mosquitoes per square mile over two-thirds of the land north of the tree line than in any equal area in the tropics.





THE ARCTIC IN WINTER

THE world's coldest spots are not within the Arctic Circle. There probably is no spot on any seacoast within the Arctic Zone that can show a minimum as low as the -90 deg. F. temperatures recorded at Riverside, Wyoming. The lowest temperature recorded at Pt. Barrow, Alaska, is -56 deg. Arctic winter climate on the average is dry. Actually relatively little snow falls. Frequently what appears to be a blizzard is merely old snow being blown from one point to another by a high wind. Annual snowfall added to annual rainfall seldom exceeds 10 inches. Heaviest snows come in the Spring.



NEWFOUNDLAND—Rolling densely forested hills and low mountains with numerous small lakes.

QUEBEC AND LABRADOR—Low rolling hills, mostly forested in the south, with innumerable lakes. Rugged mountains along the coast rising to more than 5,000 feet in the north.

NORTHWEST CANADA AND INTERIOR ALASKA—Mountainous and densely forested country with broad valleys and some flats; few peaks above 8,000 feet. Rivers are abundant and large; travel down any river is likely to lead to habitation. Game and fish abound.

SOUTHERN ALASKA—One of the highest and most rugged mountainous regions in the world, including one peak nearly 20,000 feet high. Large glaciers are numerous.

ARCTIC SIBERIA—The coast of Siberia resembles that of Arctic Alaska. There are no glaciers on the mainland. Some large areas are completely free of persisting snowbanks. Franz Josef Land—a group of islands in the northern and westernmost area—are mainly ice-covered plateaus rarely more than 1,000 feet high.

GREENLAND—An island 1,600 miles long, with lengthwise mountains up to 11,000 feet high. An ice cap 10,000 feet high covers all but the coastal margins of the island.

LAND YOUR PLANE

WHEN an emergency develops over the Arctic, LAND YOUR PLANE if it is at all possible. Crash landings on snow or ice can be executed with safety. Landings in snow should be made "wheels up" to avoid nosing over. Make "wheels down" landings on ice that is free of snow.

Don't wander aimlessly if you are lost. Save enough gasoline for a landing under full control with enough extra for an exploratory approach to your landing spot. Watch for blowing snow, it will indicate the direction of the ground wind.

Don't pick an area of ice or snow that looks patchy from a high altitude. It may be deeply drifted snow or rough crevassed ice. Tightly packed snow drifts, known as sastrugi, look like ocean waves from an altitude. If a landing must be made on such terrain, land parallel to the drifts.

In searching for a good landing spot, make use of the natural "sky map." It will save time. In the Arctic, a uniform overcast with clouds at a high level reflects the terrain below it and gives a fairly

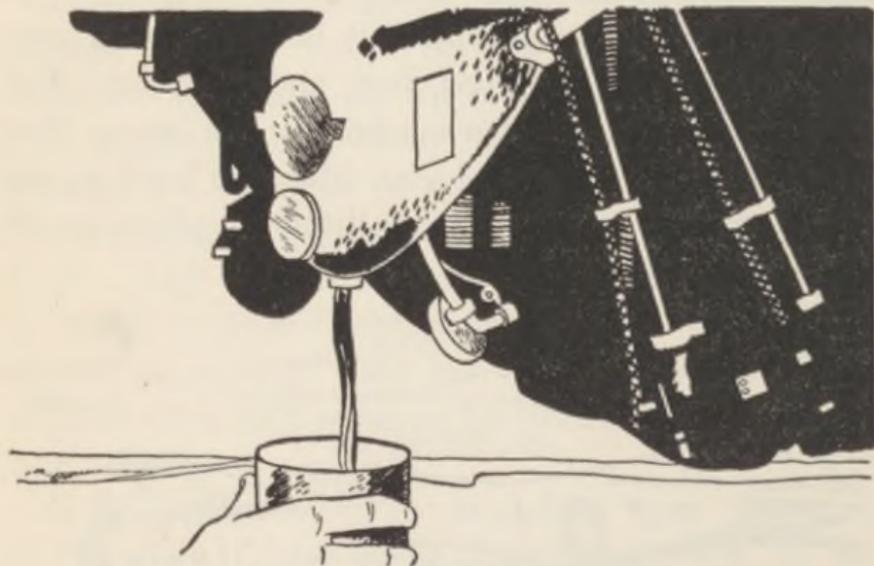
dependable indication of terrain and general ground conditions. A uniform white "sky" for example, indicates a uniform covering of snow. If the "map" is mottled, the region directly below is likely to be pack ice or drifted snow. Blue (new) ice is indicated by grayish patches, and open water, timber, and snow-free ground show up as black areas in the cloud reflection.

Bail out over the Arctic only in an extreme emergency and then stuff your maps, emergency rations, and as much loose equipment as you can in your pockets and inside your flying coat. Landing with your plane is important not only because it will provide you with shelter, food, fuel, and equipment, but because it will serve as a marker for the planes that are sent out in search of you. Men are hard to see on the snow even from a low altitude; a plane stands out against the snow.

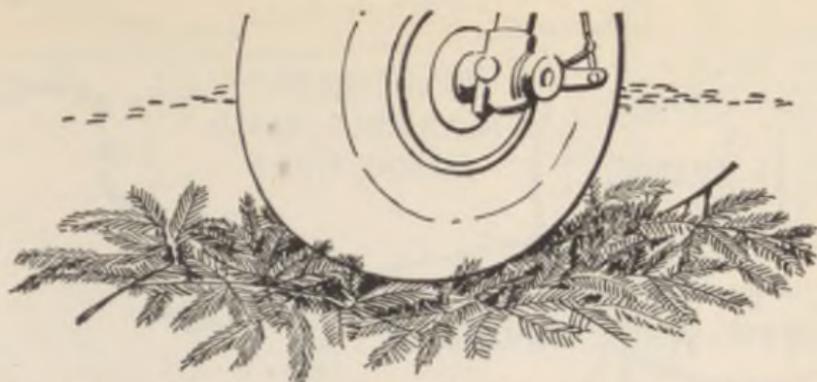


IF YOUR LANDING IS IN SNOW COUNTRY, DO TWO THINGS IMMEDIATELY

ONE—Drain several gallons of lubricating oil from the engine oil sump. In the far north this oil will be your immediate source of fuel for heating and cooking. If you wait too long after landing, the oil will become so stiff that it will be impossible to drain it. A cowl section can be used as a receptacle. Drain a similar quantity of gasoline, but don't spill any on your hands if in winter time — it will freeze them.



Drain residual oil and gasoline—they will be your main source of fuel if you have been forced down in ice country



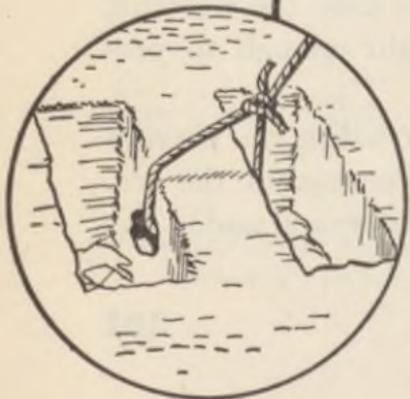
If your plane is still flyable after landing, protect the tires with evergreen boughs. They will freeze to the ice if unprotected two—If conditions allowed you to make a wheels-down landing and your plane is still flyable, drain *all* the lubricating oil (it will be simpler to heat the congealed oil than to heat the engine if a take-off is attempted) and stake your plane to protect it from the wind. In snow country, mooring anchors can be made by burying branches, sacks, boxes, or cans in the snow and pouring water over the spot. On ice, two holes can be dug a foot apart and a hole chopped through the intervening bridge to take the mooring line. Mooring lines should be tight enough to prevent the plane from rocking.

Some measure should also be taken to prevent your landing-wheel tires from freezing to the ice. A padding of boughs, canvas, or straw under the wheels will do the job.

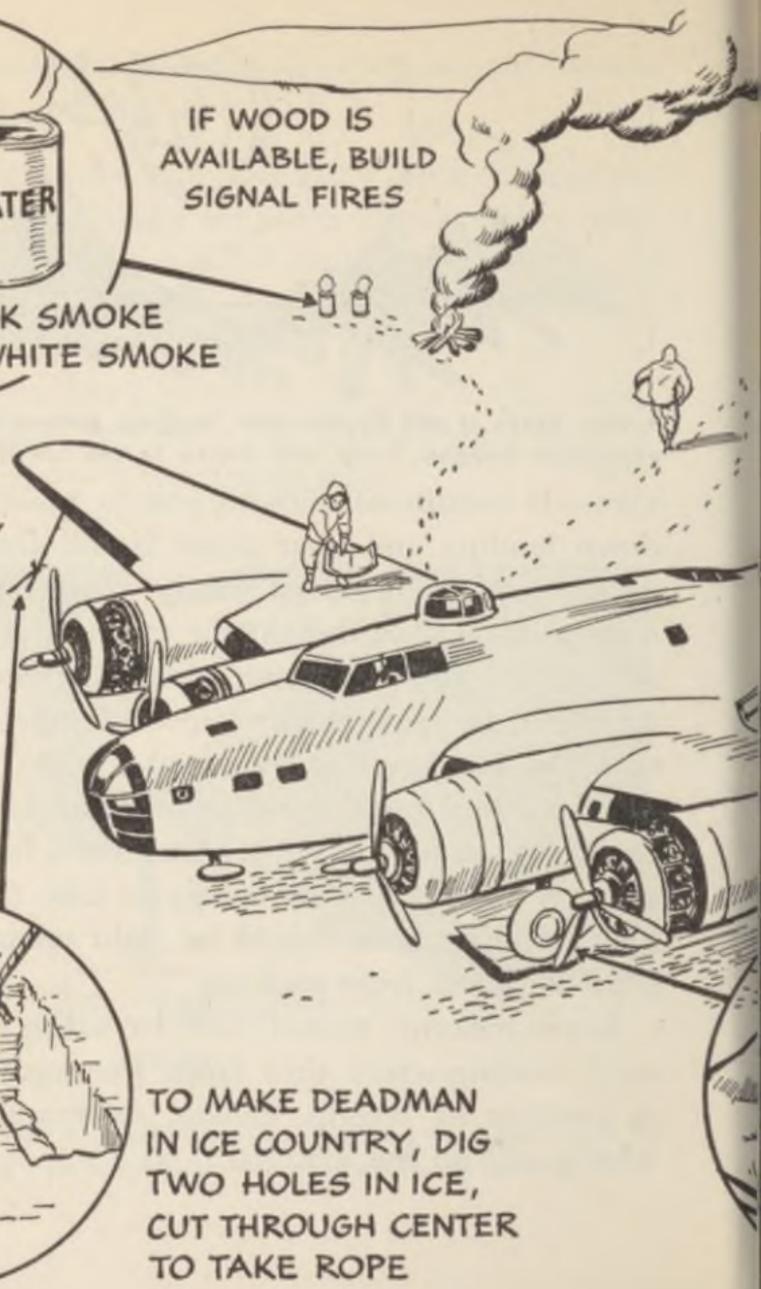


IF WOOD IS
AVAILABLE, BUILD
SIGNAL FIRES

PLACE COWL
SECTIONS - SHINY
SIDE UP - ON
WINGS



TO MAKE DEADMAN
IN ICE COUNTRY, DIG
TWO HOLES IN ICE,
CUT THROUGH CENTER
TO TAKE ROPE





TO MAKE MOORING
DEADMAN IN TREE
COUNTRY, BURY LOG,
FILL HOLE WITH SNOW
AND WATER, AND
LET IT FREEZE

KEEP WINGS AND
FUSELAGE FREE
OF SNOW

TIRES WILL FREEZE
TO ICE - PROTECT
THEM WITH WING OR ENGINE
COVERS OR PINE BOUGHS

SIGNALS

Remove all snow and frost from your plane—it will stand out better against the snow. Remove the cowl panels from your engine (or engines) and place them, unpainted side up, on the wings. They will serve as reflectors. If wood is available, lay up several large signal fires about fifty feet each side of the plane. Lubricating oil thrown on a fire will make a smudge that will be visible for a good many miles. In snow country where there are trees, distress messages can be written in the snow by forming 200-foot-high letters with evergreen boughs. Keep your signal pistol or signal flares where you can get them quickly.

If you are equipped with the basic parachute pack kit, or life raft kit, make use of the blue-and-yellow signal panel. For a description of the universal mirror, panel, and body signals, see pages 15 through 20.

SNOW GOGGLES

As soon as possible after landing check your equipment. Snow goggles should be worn at all times. The snow goggles in your kit will protect your eyes against the glare. If they have been lost or broken, you can fashion a pair of Eskimo-type snow shields from a



Improvised snow goggles can be made by cutting slits in wood

scrap of wood about six inches long and an inch wide by burning holes or slits through it at eye width. The goggles can be held on with a short length of shroud line cut from your parachute.

Don't make your snow goggles out of metal. Metal will freeze to your skin.

As an additional precaution against snow blindness, blacken your cheeks and the bridge of your nose with soot, charcoal, or dirty engine oil. The blackening will help cut down reflection.

SNOWBLINDNESS CAN OCCUR DURING A BRIGHT OVERCAST AS QUICKLY AS DURING SUNNY WEATHER.

CLOTHING

Several layers of light clothing are much warmer than a single layer of heavy clothing. Inner clothing should be fluffy and porous; outer clothing should be windproof.

AVOID TIGHT CLOTHING AND TIGHT SHOES

In winter your clothes should be loose enough to allow a free circulation of air so that your perspiration can evaporate. If it doesn't, it will form frost inside your clothes and you will be well on your way to freezing and frostbite. Keep your clothes and your socks dry. If you must do heavy work, loosen your clothing and remove some of it. Avoid becoming overheated—an excess of perspiration will mean wet clothing and drying them in sub-zero weather is difficult. If you get wet, change to dry clothing as soon as possible. Frost can be removed by turning the garment inside out and beating it with a stick. To dry clothes with the heat from a fire build a rack to hold them. (See page 28.)

Don't wear tight shoes. If the shoes you have on are not big enough to allow you to wear at least two pairs of heavy socks don't use them. Instead, im-

provide a pair of boots by wrapping your feet in strips of canvas cut from your wing covers, motor covers, or any other heavy material that may be aboard your plane. If rescue fails, your feet will be your only means of travel, so take care of them.

Keep your hands and feet warm and dry and you will be fairly comfortable no matter what the temperature.

An improvised warm double sock can be made by putting one pair of wool socks inside another and stuffing a layer of stuffing from a life preserver cushion into the space between the two.



If your shoes are tight, improvise boots from canvas and cord



Double socks filled with cushion stuffing will protect your feet

If you have them, a good combination for keeping your hands warm consists of heavy woolen inner mitts with canvas or other windproof outer mitts.

NEVER TOUCH COLD METAL WITH YOUR BARE HANDS. IT WILL FREEZE TO THE SKIN. If you do touch metal by accident, *thaw* the metal loose from the skin. Don't pull it.

Tight-fitting face masks made of canvas or other cloth should be avoided. They are more of a hazard than a protection. Instead, fasten a piece of cloth across the front of your parka hood just below the

level of your eyes and let it hang down loosely below your collar.

This type of face shield not only protects your face, but allows your moist breath to escape.

DON'T GROW A BEARD if you can help it—moisture from your breath will freeze on your beard and form an ice-mask that may freeze your face.

SHELTER

Shelter can be provided in a number of ways. Hard-packed snow drifts can be hollowed out to provide protection for two or three men. If a semi-



Protect your face with a loose cloth fastened to your parka

permanent type of camp is necessary, build an ice house. The ice or snow can be cut into blocks with a machete or a snow knife or with a large blade improvised from a strip of metal salvaged from your plane.

A good tent can be made out of your parachute—with the shrouds serving as stake lines. When you cut your chute free of its harness, save the harness. It can be used as an improvised pack.

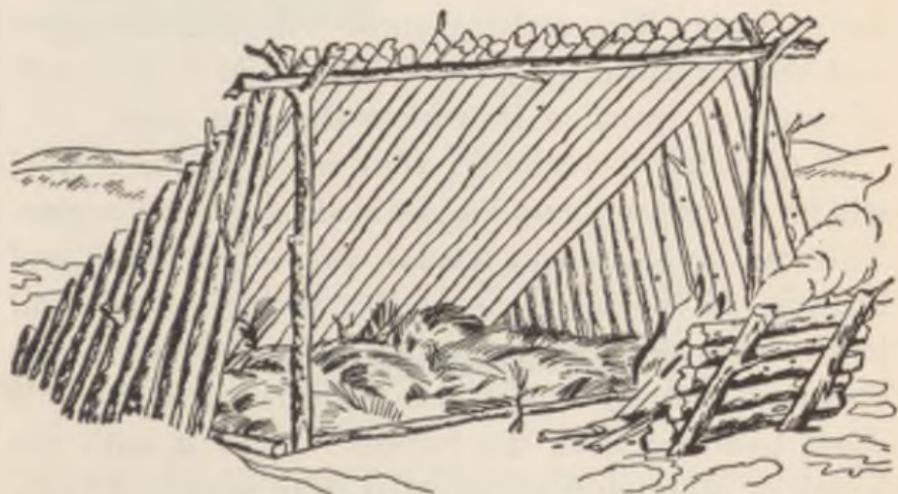
Pitch your tent in a sheltered spot, but not in the lee of a snow bank where it stands any chance of being buried by drifting snow. If no natural wind-break is available, construct one out of snow or ice blocks. The opening to your tent should be away from the direction of the prevailing wind and the floor should be covered with boughs, canvas wing covers, engine covers, or seat cushions.

In tree country, a lean-to shelter can be constructed by arranging a framework of poles and covering it on three sides with a thick layer of ever-green boughs.

Here again, the floor of your shelter should be lined with boughs, canvas, or seat cushions. If you are using a sleeping bag, air and dry it at least once every three days. Wear as few clothes as possible in your sleeping bag. Excessive body moisture will con-



SAVE YOUR PARACHUTE—the canopy makes up into a good tent



In tree country, a lean-to can be made from evergreen boughs

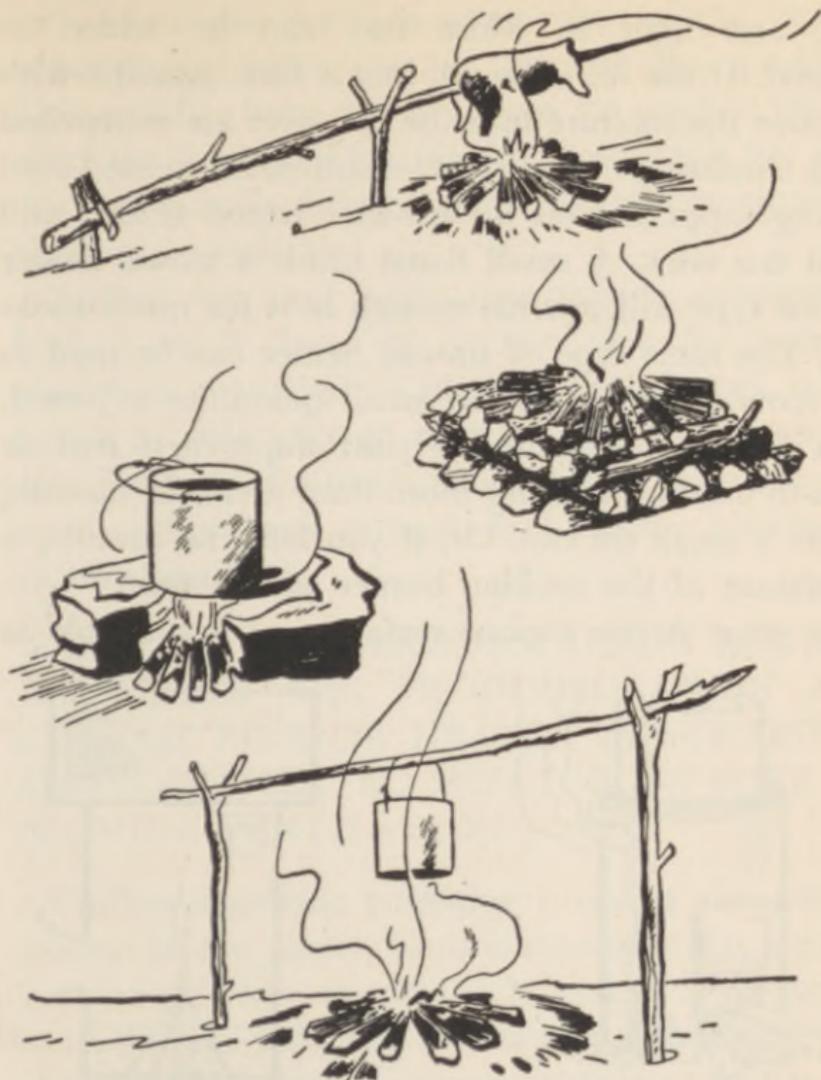
dense and form frost inside the bag. When this happens, turn the bag inside out and beat it with a stick. A damp or frosted sleeping bag is dangerous, keep it dry.

Don't put your sleeping bag directly on the snow or ice. Protect it with a layer of evergreen boughs if they are available or with a wing cover, seat cushions, or engine covers.

HEAT

In tree country, wood for heating and cooking fires is no problem. Various types of fires and fireplaces can be used. Shield your fire from the wind and, in snow country, don't build it directly on the ice or snow. The melting snow will wet the wood and reduce the heat of your fire. Build it on a crib of wood or metal as shown on the next page.

If no wood is available, your main source of fuel will be the oil and gasoline drained from your engine. This can be burned in several ways for cooking and heating. If the oil is congealed, mold it into small balls. Place one of the pieces in the bottom of an open-top can or any other receptacle that has a draft hole cut near the bottom. Cover it with the kapok or other stuffing salvaged from your seat cushions, pour a very small amount of gasoline over the



Build your fire on a platform of logs or metal salvaged from your plane. The platform will prevent the water from melting ice or snow from wetting the fire wood and putting out the fire

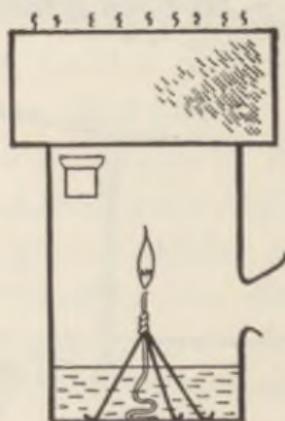
top, and light it. More fuel can be added as desired. If the oil is liquid, mix a little gasoline with it, pour the mixture into the can over an improvised wick consisting of four or five strands of twisted cord or rag supported on a bent-wire tripod frame, and light the wick. A small flame inside a closed heater of this type will provide enough heat for quick cooking. The same type of tin-can heater can be used as an economical burner for small quantities of wood.

A heater for use inside your improvised tent or lean-to need be nothing more than a candle burning inside a small tin can. Or, if you have no candles, a miniature of the cooking burner can be made.

In some Arctic regions surface coal is available as



A tin-can stove. A large can makes a good stove, cut stove-hole and flue



A tin-can heater that burns oil. Wire tripod supports cord wick

fuel. It can be found in some river valleys. On sea beaches, coal often can be found in the windrows. This coal has been scooped from the sea bottom and piled on the beach by the ice. Starting a fire with this coal may be difficult, particularly if no wood for kindling is available.

Animal fats and hides also provide a source of fuel. A small chunk of caribou suet, for instance, placed on a small piece of wood and lighted, is sufficient to cook enough meat to last three men one day. The hide of a musk ox or a grizzly bear will cook three or four pots of food. Seal blubber also makes an excellent fuel.

WARNING: DANGEROUS CARBON MONOXIDE FUMES ARE PRODUCED WHEN ANY KIND OF FIRE OR HEATER IS BURNED IN AN UNVENTILATED SHELTER. BE SURE TO PROVIDE VENTILATION.

Carbon monoxide poisoning is one of the greatest dangers in the Arctic. Carbon monoxide gas is colorless and odorless, so your only means of combating it is through adequate ventilation, particularly at night. A snow drift may cover your tent and reduce the normal ventilation through the fabric of your tent, so provide some other means of ventilation while

your stove or fire is burning. Keep a burner or fire going only long enough to cook your food, then put it out.

FOOD

Eat as much fat as you can. Fat is a heat-producing food and very important to your health in the Arctic.

In the winter months, animals and fish will be about your only source of natural food. The caribou provides the best meat of the land animals and the seal provides the best of the sea animals.

The best parts of the caribou for eating are the head, brisket, ribs, backbone, and pelvis. As for seals, there is little preference between the various parts, although most white people prefer the liver, boiled or even frozen and raw. The heart and the kidneys provide good meat for stews.

Polar bear is very likely to be tough and stringy if cooked. It is more tender if eaten raw and frozen. **AVOID POLAR BEAR LIVERS. THEY ARE POISONOUS.**

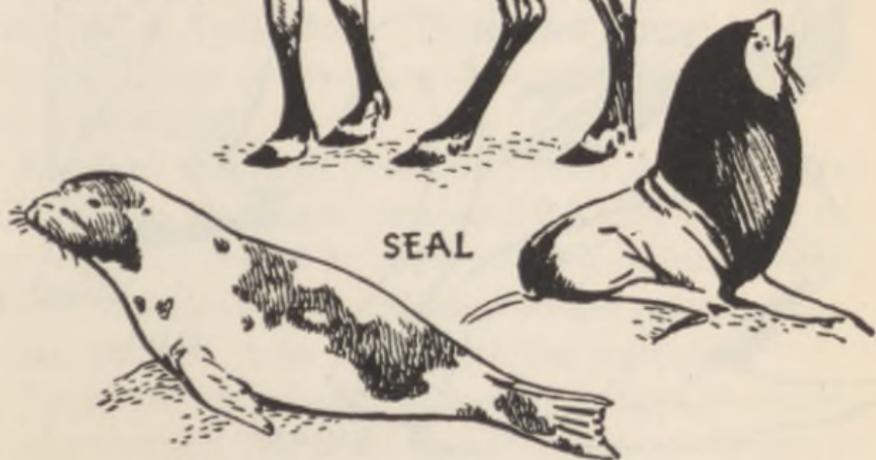
Musk oxen has a strong flavor, but it is rich in fat.

Because of the importance of fats, under no conditions limit yourself to a meat diet of rabbit just because they happen to be plentiful in the region

MUSK OX

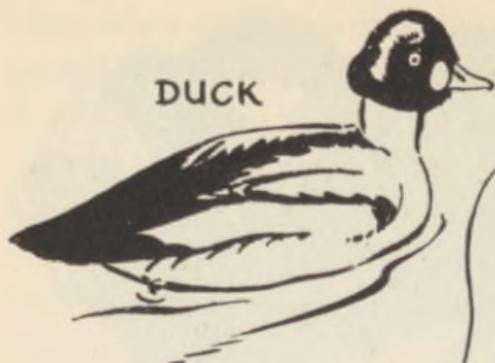


CARIBOU



SEAL

DUCK



PTARMIGAN

GOOSE



RAVEN



OWL



SWAN

where you are forced down. Rabbits are generally so lean that in order to get enough energy out of them you have to eat a little too much for comfort. Try to supplement your diet with other things.

Some Arctic birds are well supplied with fat—notably ducks, geese and swans. These water birds all go through a two or three week flightless period while they are molting in midsummer. The best known winter birds are the ptarmigan, or snow partridge, which is rarely fat; the white owl, which usually is fat and tasty; and the raven, which is tough. Make a point of finding all the gull and tern colonies you can. Here you will be able to get a good supply of eggs and your birds even without a gun. Such colonies are usually on small islands or cliffs.

On the average, all fish have enough fat to make them good Arctic food. The liver of the cod, for example, is an extremely good form of fat and can be eaten boiled.

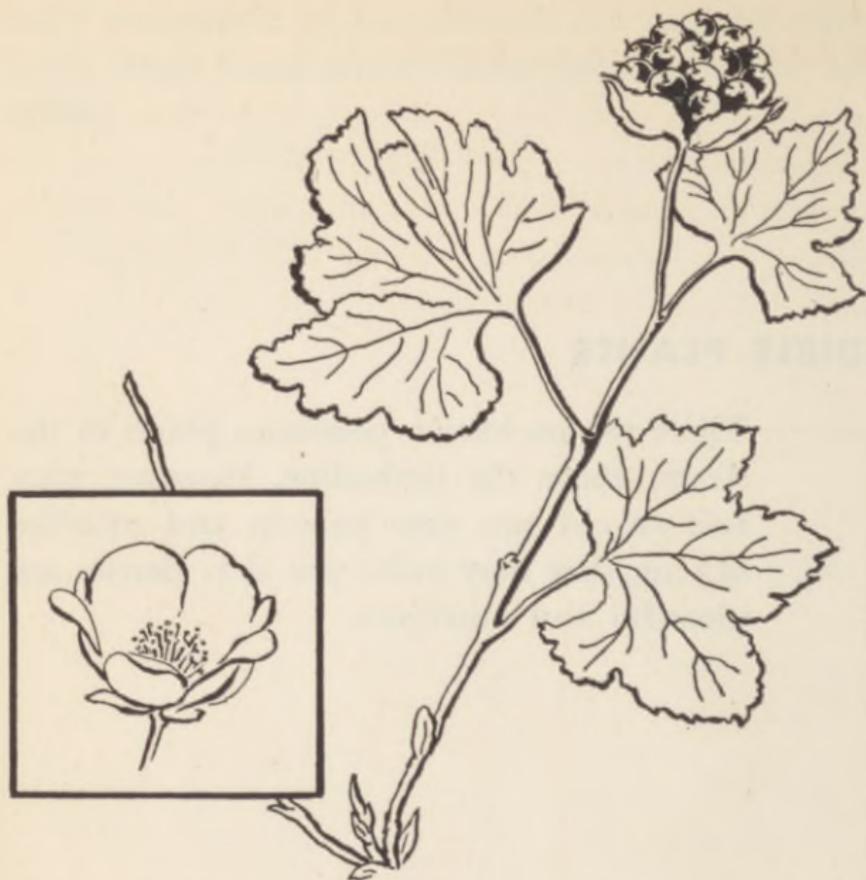
Although complete protection from scurvy can be had from a prolonged meat-and-fat diet, the roughage value of greens is important. In an emergency, almost any local green, pleasant to the taste and succulent enough to be swallowed, can be eaten.

There are no poisonous flowering plants or grasses in the Arctic. The only poisonous Arctic fungus is

easily recognized by its yellowish red cap. All other Arctic fungi found above the northern timberline are edible.

EDIBLE PLANTS

There are no known poisonous plants in the Arctic above the timberline. However, play safe—avoid raw cow parsnip and mosslike lichens, they may make you sick. Berries are plentiful and nutritious.

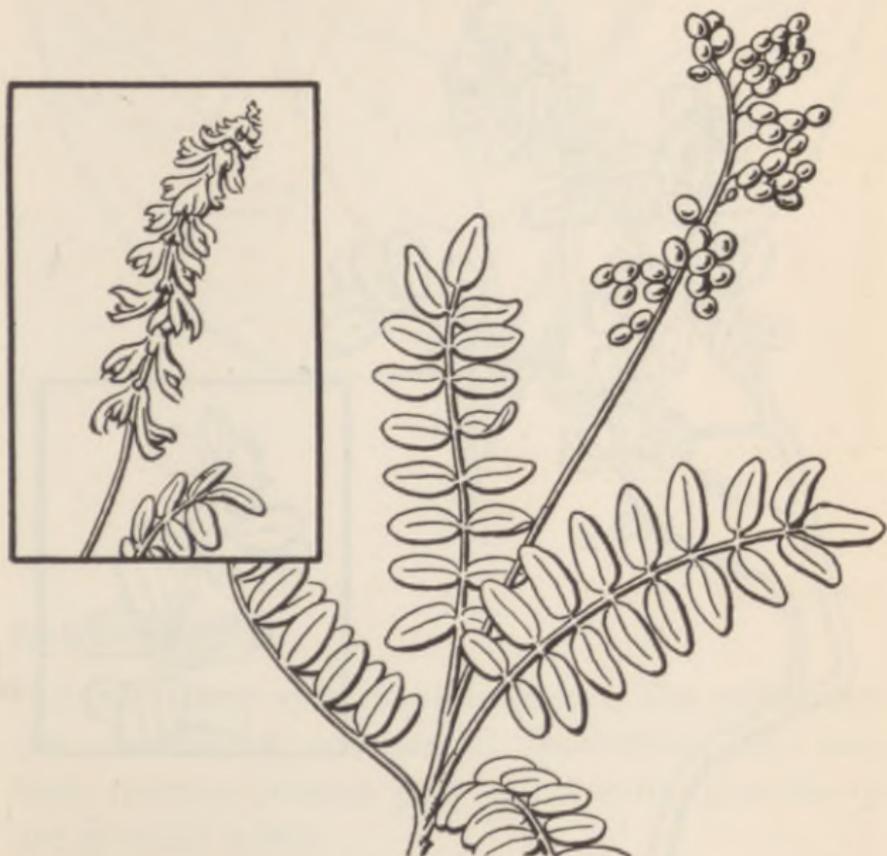


SALMON BERRY (Bake Apple)

A low creeping perennial. The edible berries are reddish, turning to yellow as they ripen. They are juicy, about the size of a large raspberry, and ripen in July and August. Common in the north to the Arctic Ocean.

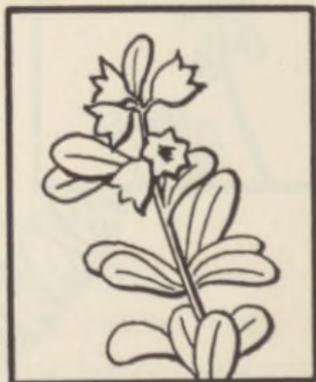
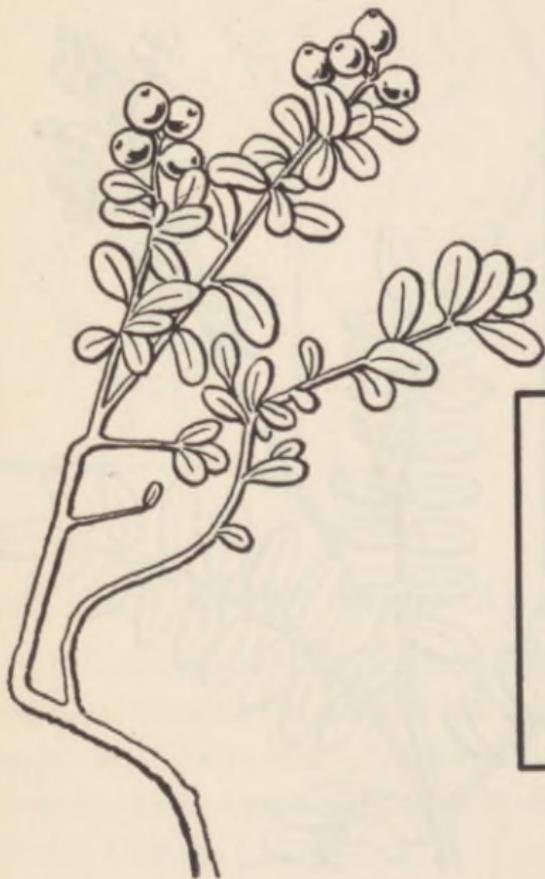
MASU (Liquorice-Root)

A non-climbing perennial herb of the pea family. Grows about 1 to 2 feet high. Pink flowers and flat seed pods. The root is edible and when cooked has a taste not unlike carrots. It matures in August and can be gathered until late fall.



MOUNTAIN CRANBERRY

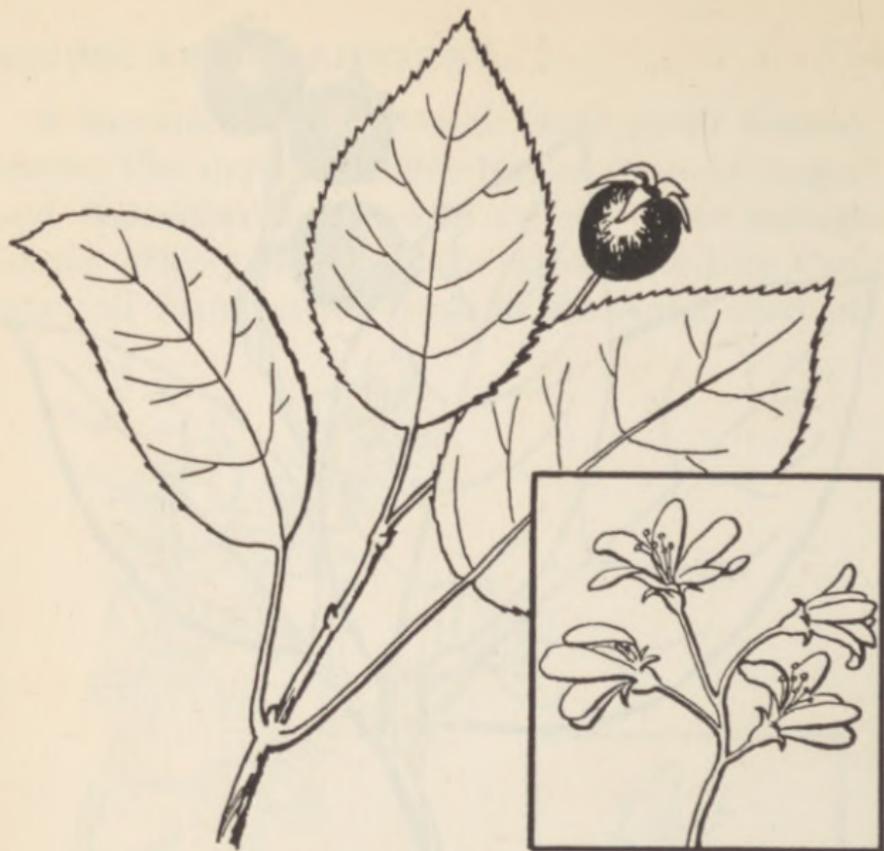
A low-creeping shrub with dark green leathery leaves. The dark red edible berries ripen in August and September and remain on the vines through winter. Widely distributed throughout northern Canada and found as far north as the Arctic seacoast.





BLUEBERRY

A low shrub with many branches. The edible berries, resembling commercial blueberries, are deep blue, ripening around July and August. The flowers are greenish white.



JUNEBERRY

A low tree or shrub with bronzy-green foliage. The purplish-black berries ripen in early summer. Found in damp woods and near swamps.

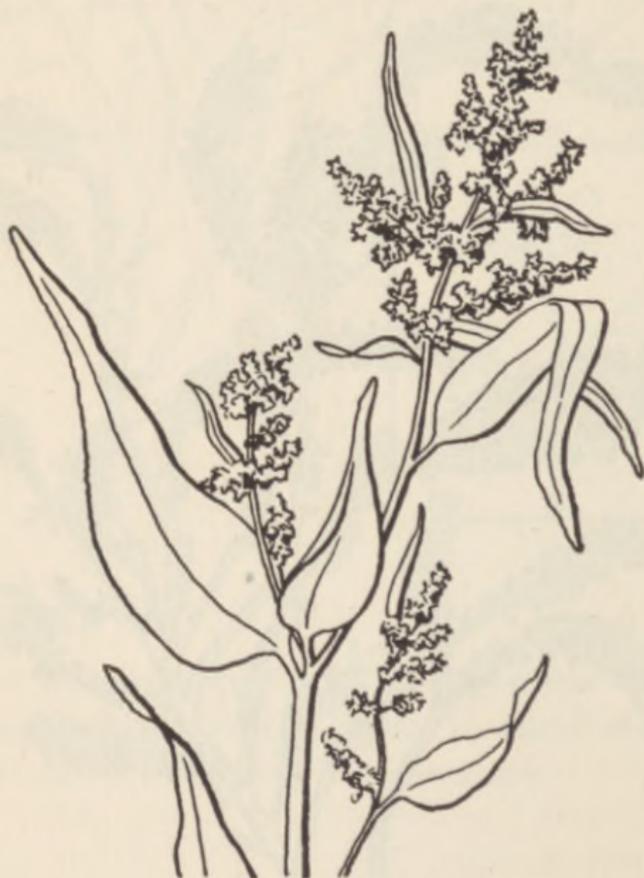
BLACK CROWBERRY

An evergreen shrub, freely branching. The black, shiny berries are juicy and sweet. Found throughout northern Canada and even on some Arctic islands. Often they can be gathered from under the snow. The berries keep well when frozen.



WILD RHUBARB

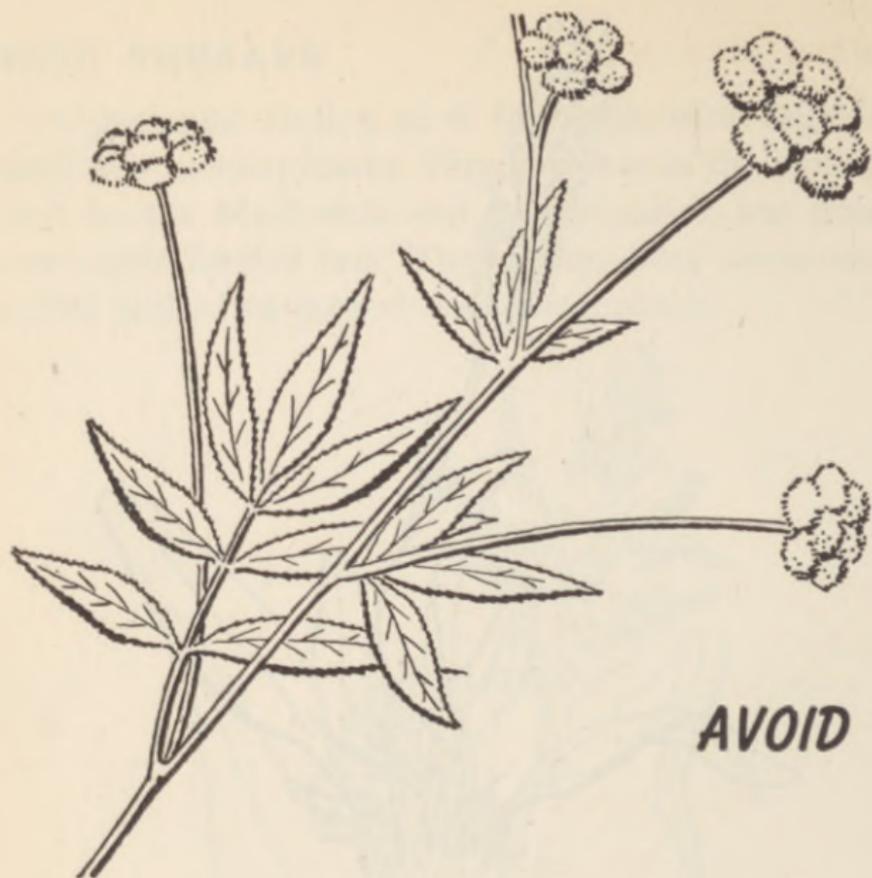
A perennial herb 3 to 6 feet high with reddish stem and pointed leaves. Very common in the Yukon and on the Mackenzie and its tributaries, but does not occur farther east. The young, juicy stems are edible and when cooked resemble rhubarb.





BISTORTA

A low-growing herb 5 to 10 inches high. The flowers are white or pink in the form of spikes. The root, about the size of a pecan, is edible and best when cooked. Common in dry country, chiefly north of the tree limit.



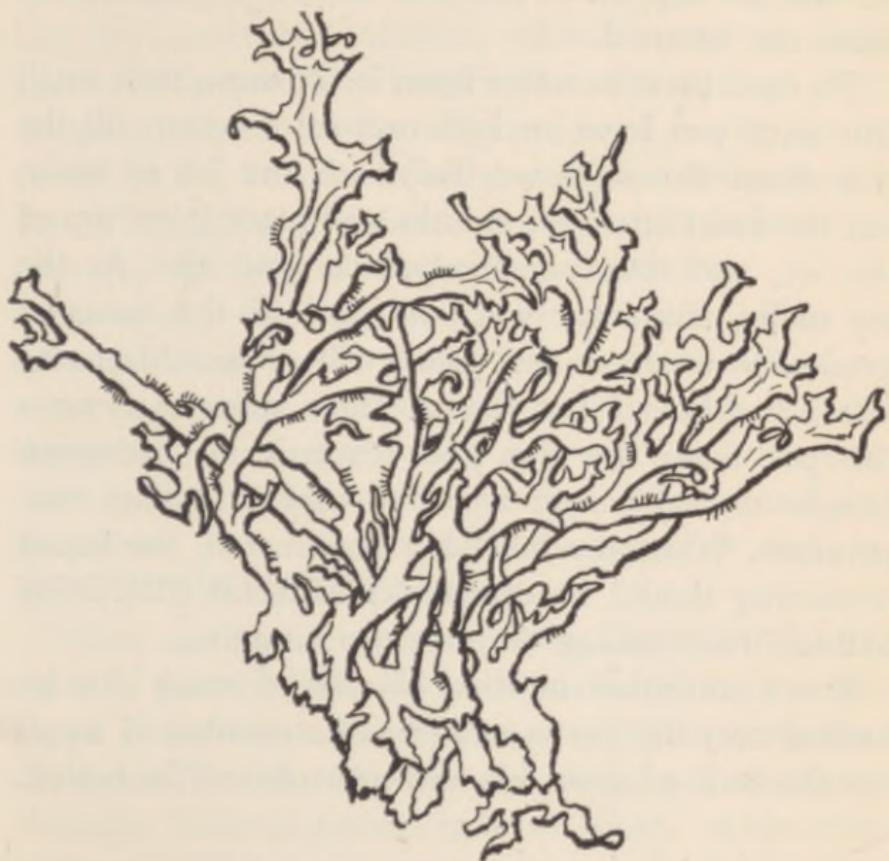
AVOID

PARSNIP

Parsnip root should be avoided. Although not poisonous, it may make you ill. Usually has a disagreeable taste. If peeled, stems and leaf stalks can be eaten cooked in the spring.

REINDEER MOSS

A low, bushy, coral-like lichen that grows on the ground. Common throughout northern Canada. This and other similar lichens must be thoroughly boiled or soaked in water for several hours before being eaten.



COOKING

In the Arctic, boiling is the easiest and best method of cooking. Boiling not only conserves fuel, but preserves the essential elements of the food. In summer and autumn, fresh water will be available excepting on the ice cap or on the sea. In the winter, ice or snow can be used.

To cook meat in water from ice or snow, melt small bits until you have an inch or two of water, fill the pot about three-quarters full with the ice or snow, cut the meat into inch chunks and place it on top of the ice, and then put the pot on your fire. As the ice melts, the meat will sink and as the water is gradually warmed the meat will thaw. After the water has boiled for two or three minutes remove the pot from the fire and place it on evergreen boughs or a piece of wood to cool to eating temperature. When the meat has been eaten, the liquid remaining should be drunk. NEVER OVERCOOK MEAT, overcooking destroys the vitamins.

For a variation in diet, chunks of meat can be broiled over the fire in any one of a number of ways, but the bulk of your fish and meat should be boiled.

WATER

AT SEA, ice that is a year or more old can be used for drinking or cooking water. Old ice can be distinguished from the current year's ice by its rounded corners and by its bluish color in contrast to the milkish grayishness of salt ice. Ice a year old rarely has any noticeable saltiness, while ice two or three years old is generally fresher than the average river or spring water. In the summer, fresh water can be found in the hollows in old ice. Water fresh enough for drinking can be found even in the hollows on new ice, which itself is salty in midsummer.

ON LAND, drinking and cooking water offers no great problem. In the winter it is perfectly safe to eat snow or cracked ice in small quantities during the day when you are traveling and don't want to take the time necessary to melt it down. Eaten in large quantities, however, it chills the stomach and reduces your body temperature.

When melting down snow or ice, don't fill the pot at once. If you do, the snow on top will soak up the first water like a blotter and leave a cavity directly over the heated bottom of the pot and the pot may burn through. This is particularly so when, as the case probably will be, you are using tin cans for cooking

containers. When possible, always melt ice for water, it requires less heat and takes less time.

In summer there are innumerable sources of fresh water. Lakes and streams are seldom more than a mile or so apart in the land north of the Arctic circle.



Melt ice instead of snow for drinking water, it takes less heat

ARCTIC TRAVEL

If you were on your flight course when you were forced down, stay with your plane. Rescue planes will be out looking for you and will find you, but remember—any search takes time. Don't give up

hope of rescue too quickly. The men who are out looking for you are trained in their jobs and if it is humanly possible to find you and get you out they will do it. You can help them by staying with your plane. If they cannot land and bring you out by airplane, they will drop you the necessary equipment and supplies to help you trek out. Travel in the Arctic is difficult. You will need every aid in the way of clothing and equipment that can be made available to you.

If rescue fails and you decide to walk your way out, lay your plans carefully and then stick to them. What course you decide to follow should be determined largely by your location and the terrain.

In mountainous or wooded areas, your best course, unless you know exactly where you are and have some definite destination, will be to FOLLOW STREAMS AND RIVERS DOWNSTREAM. They will lead you eventually either to some post of civilization or to the coast where your chances of finding food and a native village will be good. There is just one exception to this rule—in Siberia rivers and streams should be FOLLOWED UPSTREAM. The rivers in Siberia flow north, while civilization is to the south.

DON'T WANDER AIMLESSLY. Use your compass to maintain a general direction, but don't try to travel

in a straight line. Follow the contour of the land for the easiest going in the general direction that you want to go. If you have no pocket compass, remove the compass from your plane.

WHEN YOU CAMP, camp on the mountains and not in the valleys. Slopes and ridges in the Arctic are always warmer than the valleys.

In thick woods, blaze a trail on the trees as you go, just in case you have to double back on your course. (For illustration of trail markings, see p. 22.)

PLENTY OF FOOD AND REST is the secret of Arctic travel, particularly in the winter. Don't rush, cook at least one hot meal a day, and be sure to get adequate sleep. You can survive many days without food if you will relax and avoid exhaustion. DON'T WORRY ABOUT FREEZING TO DEATH WHILE YOU SLEEP. Unless you are exhausted you will wake up before you freeze.

Before you leave your plane make sure that you are taking everything that will help you make your way back to civilization. Snowshoes, sledges, and shelters can be made out of various parts of the plane. Cabin doors, main landing wheel doors, and bomb-bay doors make good sledges. Skis and snowshoes can be made by removing inspection panels, the cover strips over wing-root joints, or tail-wheel doors, and

lashing them to your feet with thongs or parachute shrouds. A section of engine cowl can be used as a container for melting water or for cooking, as a head shelter and windbreak for use with a sleeping bag, or as a fire shield for reflecting the heat of your fire into your lean-to or tent.

In the case of a forced landing made wheels down on an ice floe when no rubber boat is available, an improvised raft can be made by removing the tires from your plane and lashing them together with wire and control cables. The wheels can be removed by stacking ice blocks under the wings so they will support the airplane and permit partial retraction of the landing gear. If there is sufficient time, fuel tanks also can be removed and used as floats. Such improvised rafts will help you to cross open leads and short stretches of sea, PROVIDING THE WATER IS CALM.

BEFORE LEAVING YOUR PLANE BURN ALL PAPERS, TECHNICAL ORDERS, AND TRIP DATA THAT MIGHT BE RESTRICTED, CONFIDENTIAL OR SECRET. SECRET INSTRUMENTS SHOULD BE SMASHED AND THE PARTS BURIED OR THROWN INTO THE SEA.

ARCTIC HEALTH

FROSTBITE, or local freezing, is a constant danger to anyone exposed to the sub-zero temperatures of an Arctic winter. Strictly speaking, frostbite cannot be prevented, but the risk can be minimized. To neglect a frostbitten spot is to invite gangrene.

There is no particular pain with frostbite. Quite to the contrary, there is an absence of sensation, a numbness. Frostbite can occur without a person knowing it, so examine your face, hands, and feet frequently. The symptoms are stiffness and a grayish or whitish color of the part affected.

If you are frostbitten, **DON'T APPLY SNOW OR ICE.** There is no fact in the old recommended cold treatment. Instead, warm the affected part gradually. Don't rub the spot. Even the gentlest massage can do a great deal of harm. If frostbite appears on your face, warm it by pressing your warm fingers against it. If a wrist is frozen, warm it by grasping it with the other hand. Frozen hands and fingers can be thawed by holding them against your chest or under your armpits inside your clothes.

Frozen feet are particularly serious. Try to keep

your feet from freezing, but should they get frost-bitten, take care of them immediately. Change to a warmer footgear if you can, or wrap them in cloth or fur until they thaw. Warm them, but don't put them close to a heater or fire. Warm them gradually.

A burning sensation follows the warming and thawing of a frozen part. The actual thawing may be extremely painful. After frostbite there may be blistering and peeling just as in sunburn.

SNOWBLINDNESS is caused by the brilliant reflection or glare from the surface of snow. Avoid it like the plague, for once you have had one case, reoccurrences are likely to follow. Wear your goggles, either your flying goggles or your homemade wooden sun shields, at all times during the daylight. Don't be fooled by an overcast day, and on a bright day remember that merely lifting your goggles a half dozen times may bring on snowblindness.

The first warning of snowblindness comes when you can no longer detect variations in the levels of ground. Later, your eyes will begin to burn, they will become inflamed and increasingly sensitive. They will pain when exposed even to a weak light.

The best medicine for snowblindness is COMPLETE DARKNESS. During the long periods of daylight this will mean some sort of dark bandage to exclude all

light. An ice compress or cold-water compress will bring some relief providing there is no danger of freezing.

In most cases, snowblindness will disappear in two or three days under care. When first used again, the eyes see two of everything, but normal focus soon returns.

CARBON MONOXIDE POISONING. Among all the dangers of the Arctic, the danger of suffocation by carbon monoxide is one of the greatest. Particularly for one who has never been subjected to extreme cold for extended periods, the desire to get warm and stay warm often overrules a man's better judgment and common sense. You must depend on your clothing to keep you warm. In temporary shelters, stoves, fires, and heaters should be used only for cooking and then put out. A stove burning for a half-hour in a poorly ventilated shelter can produce a dangerous amount of carbon monoxide fumes. Carbon monoxide is odorless and can overcome a sleeping person without warning.

The treatment is fresh air. If you are in a shelter and begin to feel drowsy, watch out for carbon monoxide poisoning. Go outdoors, moving slowly; crawl if necessary. Breathe evenly and don't move about. Cover yourself with robes and blankets to prevent

freezing. ABOVE ALL, REMOVE THE SOURCE OF THE CARBON MONOXIDE.

GENERAL. When an accident happens in the cold, shock is very likely to take place, especially if there is pain or bleeding. An injured person should be covered immediately with blankets, a tarpaulin, extra clothes, or a sleeping bag. Keep the head and upper parts of the body lower than the legs and lower parts. Administer warm, non-alcoholic drinks and apply heat if possible to the chest, stomach, and thighs.

If it is necessary to use a tourniquet, don't apply pressure too long at a stretch, as freezing may result. Even tight bandages can dangerously reduce blood circulation. If a tourniquet is necessary, keep the part beyond the tourniquet warm, but do not heat it above body temperature.

ARCTIC PESTS

From the middle of June to about the middle of September when the first of the heavy frosts come, THE WORST ARCTIC PEST IS THE MOSQUITO. During those months there are ten times as many mosquitoes per square mile over two-thirds of the land north of the tree line than the average over the same area in the tropics. Fortunately, Arctic mosquitoes are not disease carriers, but they are bothersome and during

the mosquito season head nets, leggings, and gloves will be important parts of your clothing.

SANDFLIES, found in large numbers on the mainland, are most bothersome in the early afternoon, decreasing their activity as the evening cools. Known as punkies, midges, and "no-see-ums," they are persistent blood-suckers small enough to go through the usual netting or head net.

BULLDOGS, sometimes called mooseflies, deerflies, or horseflies, look like overgrown house flies. Their bite is like the cut of a scalpel, drawing blood in a trickle. Bulldogs are most annoying on hot days. A head net, leggings, and gloves offer the best protection.

BLACKFLIES are bad pests in certain Arctic areas, particularly in the forests during the summer months. Their bite causes severe swelling. Protection against them is the same as for mosquitoes and sandflies.



Sandfly



Deerfly



Blackfly

ESKIMO WORDS AND PHRASES

Syllables spelled like familiar English words
are to be pronounced just that way.

Syllables printed in heavier type are to be
accented.



WESTERN ESKIMO

I am hungry **Kish-tu-ah** (the *i* long, as in *mice*)

Our food is all gone . **Neck-out-voot nahng-ock**

Water Meck (fresh); Mahk (salt)

I am thirsty Meck-**soosh-too-ah**

Give me a drink of tea . **Shy-oo-mick merry-sing-a**

I am cold **Crow-too-ah**

My boots are wet . . . **Comic-sig-kah maht-soong-uk**

My clothing is wet . . . **Aht-ko-kah maht-soong-uk**

- Bring a dog-sled . . . lck-**calm**-erak ahk-fah-**loo**-kick
- Yes Ahng
- No **Khang**-ah
- Look! (at my frostbitten
wrist, etc.) Tahng!
- I don't understand . . . Ah-yo-koo-**chett**-oo-a
- I need food **Neck**-a-mick pee-**yoosh**-tu-ah
- Bring men (to help) . . . Ahng-**oh**-tit **tide**-loo-kay
- How far is it to the trad-
ing post? **Kite**-loon yock-**shig**-ta kip-oosy-**vlg**-a-moon
- Matches; fire **Spitz**-cot; **Keen**-er-it
- Native stove (seal-oil
lamp) Kah-**minny**-ock; **Keen**-o-gak
- Come quickly! Pah-**tah**-gah-mick **tight**-ah
- Gun **Noo**-tick
- To the right! (dog driver's
term) Jeel
- To the left! (dog driver's
term) Haw!
- Which way? Nah-**goon**?
- Tobacco To-**bak**-u-mick; Chew-**yah**-mik
- Where is there a white
man? **Nah**-ne kah-sah **tahng**-tah

EASTERN ESKIMO

- I am hungry **Kah-poong-ah**
- Our food is all gone . . . **Ner-key-voot peeto-hung-i-tu-goot**
- Water **Ee-mick (fresh); Ee-mock (salt)**
- I am thirsty; I need fresh
water **Kee-poong-ah; Ee-mick pee-yuma-voong-ah**
- Give me a drink of tea!
(literally, I need tea!) . **Tee-mick pee-yuma-voong-ah**
- I am cold **Oo-voong-ah ick-key**
- My boots are wet **Kah-mig-ga cow-shook-toot**
- My clothing is wet **Ah-no-wog-ga cow-shook-toot**
- Bring a dog-sled! **Comma-tee-nick eye-shook-too**
- Yes **Ee-mah; Ah-high; Ah-high-la**
- No **Nowk; Nah-ga; Ah-guy**
- Look! (at my frostbitten
wrist, etc.) **Tah-koo!**
- I don't understand (refer-
ring to what has been
said) **Two-key-siggy-lahng-ah**
- I need food **Ner-key pee-yuma-voong-ah**
- Bring men to help **Ahng-oo-tee-nick ky-ko-see-geet**
- How far is it to the trad-
ing post? **Kah-bloona-tah-lick conn-oak oo-ah-sick-pa?**
- Matches, or fire **Ee-koo-mock**

Native stove or seal-oil

lamp **Koo-di-lick**

Come quickly! **Kigh-geet or Kigh-sa-geet**

Gun **Cook-e-oo**

To the right! (dog driver's

term) **Owk! or Howk!**

To the left! (dog driver's

term) **Owk-a! or Ow-hal Huh-dal**

Which way? Now koot?

Tobacco Tobacco-mik

Where is there a white

man? Kah-**bloon-ah** nowk?

PRINCIPAL EMERGENCY KITS

Alaskan Emergency Parachute Kit (Type B-1)—Compass, matches, emergency rations, gloves, mosquito headnet, cooking kit, iodine, three-bladed knife, fish line and hooks, camphor gum, insect repellent, and bouillon cubes.

Jungle Emergency Parachute Kit (Type B-2)—Compass, emergency rations, matches, iodine, quinine, signal flare, gloves, mosquito headnet, machete, sharpening stone, fish line and hooks, insect repellent, and first-aid kit.

Emergency Sustenance Kit (Rations) Type E-1—This kit is intended to supply the necessary rations for operations in northern climates. One kit for every two men. The components include: U. S. Army Mountain Rations, drinking water in cans, matches, hunting knife, mess kit, mosquito headnet, gloves, fork and spoon, muckluks, ice creepers, solid fuel, grill, and sewing kit.

Emergency Sustenance Kit (Implements) Type E-2—This kit is intended to supply the necessary implements for use in northern climates. One kit for each large airplane. The components include: Combination .22-caliber and .410-gage shot-gun, ammunition,

matches, camphor cubes, flashlight, candles, fry-pan, stew pan, large spoon, butcher knife, cooking oil, machete, fishing kit, and signal flares.

Emergency Sustenance Kit (Type E-5) (Over Water)
—This kit is intended for carrying in large airplanes operating mainly over water. One kit per large airplane. The components include: Field Ration K, drinking water in cans, flashlight, bailing bucket, compass, matches, knife, hand axe, mirror, candles, fishing kit, flares, paulin, sea markers, and tomato juice. This kit is used in addition to the kit supplied in the life raft.

OTHER KITS ARE IN THE PROCESS OF DEVELOPMENT. ON ALL FLIGHTS WHERE EMERGENCY KITS MIGHT BE OF USE, IT IS ADVISABLE TO CHECK WITH THE SUPPLY OFFICER. DETERMINE BEFOREHAND WHAT IS AVAILABLE FOR THE LOCALE OVER WHICH THE FLIGHT IS TO TAKE PLACE.

CHAPTER 4 ★ OCEAN

**KEEP YOUR SHIRT ON—
FIGURATIVELY AND LITERALLY**

**THERE ARE THREE IMPORTANT AIDS
TO SURVIVAL THAT YOU WON'T FIND
IN YOUR KIT — DETERMINATION TO
GET ASHORE, CALMNESS AND COM-
MON SENSE.**

BEFORE DITCHING

"**A**N ounce of prevention is worth a pound of cure."

This axiom applies to ditching your plane on the ocean as well as in the Jungle, Desert, or in the Arctic.

You can insure your life and the lives of your crew if you will take a few simple precautions before any long overwater mission.

First, ditching drill should be conducted now so that each member of the crew will know the duties he will be expected to perform when forced down.

Second, equipment — life rafts and their contents and extra emergency rations and radio — should be thoroughly checked before long overwater missions. The inspector should make sure that all necessary equipment is contained in the kits, that it operates properly, and that CO₂ bottles on the life rafts are filled and that the releases are in good order.

Third, crew members should eat heartily and drink as much water as possible before taking off and during the overwater hop. By so doing, they can store up a sufficient supply to carry them safely through the first days in a raft when rations must be conserved.

Fourth, your Mae West (life vest) is the most important piece of equipment you possess and should

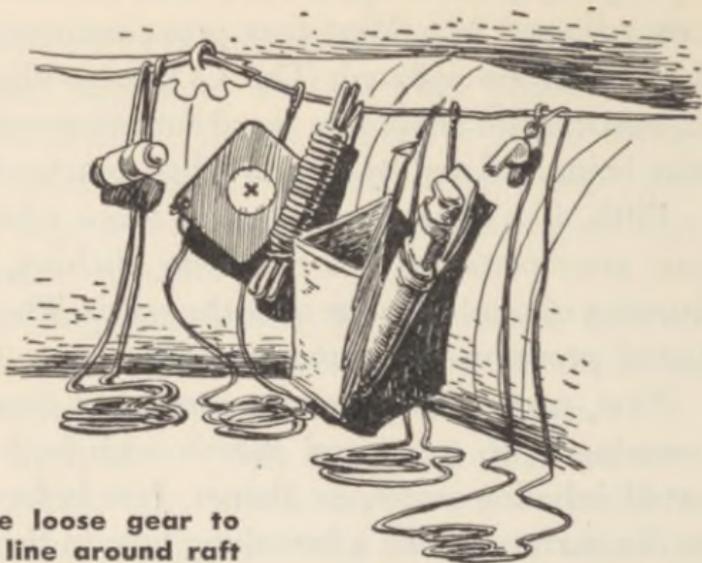
be kept in good condition. Best results may be obtained by inflating the vest when it is first issued to you and by adjusting the straps while it is inflated. An improperly adjusted Mae West may prove extremely uncomfortable when inflated. The CO₂ cartridges used to inflate the vest should be saved for emergency use, the vest being inflated by mouth when practicable.

Fifth, it is important that you know what to do in case your plane catches fire upon ditching, scattering burning oil and gasoline over the water. The following tested procedure is recommended:

First, take a deep breath, jump feet first, upwind, covering eyes, nose, and mouth with both hands to avoid inhaling smoke or flames. Just before you bob to the surface, make a breathing hole in the flames by swinging your arms overhead. This motion splashes the flames away from your head, face, and arms, allowing you to take another deep breath.

Always swim into the wind, using the breast stroke. Splash water ahead and to the sides before taking each stroke. Keep your head cool by ducking under the water every third or fourth stroke. If the flames are too high or too hot to swim through them, swim under them. Sink beneath the surface, feet first, then swim upwind, bobbing to the surface now and then with the overhead splashing motion to clear a breathing hole.

AFTER DITCHING



Secure loose gear to hand line around raft

ONCE you have ditched and you and your crew are safely in your life raft, do the following things immediately and do them in the following order:

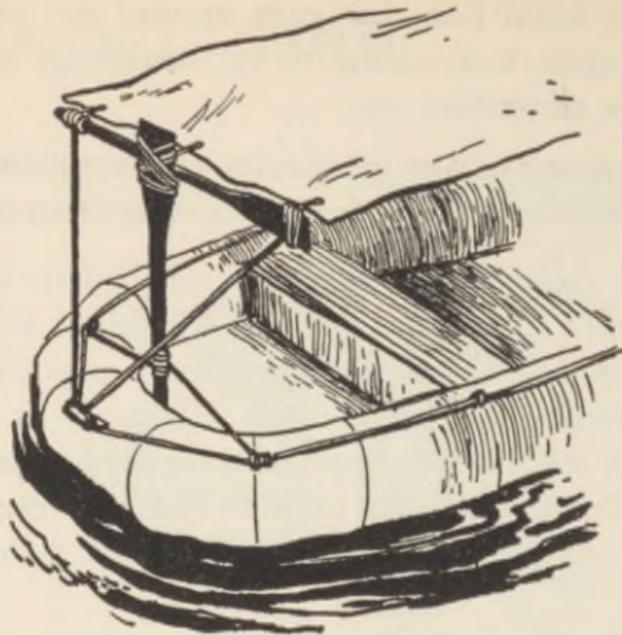
1. If it is not already in place, fasten your life-raft kit to the floor of the raft with the tie strings provided. Lash all loose gear — knives, bailing buckets, etc. —

to the hand line that runs around the raft. Any equipment not lashed down stands an excellent chance of getting lost.

2. If there are two or more rafts, connect them with a line to prevent them from becoming separated.
3. If the gas cartridge failed to fully inflate the raft, "top-off" the main buoyancy chambers with your hand pump. During hot weather — particularly in the tropics — valve off some of the air in the raft during the day to compensate for expansion, which may burst seams. At night, when it is cooler, the hand pump should be used to "top-off" the raft.



**Tie life-raft kit
to floor with
strings provided**



Tarpaulin may be rigged as protection against sun

4. Rig the tarpaulin or a sail, yellow side up, as a canopy to protect you from the sun. Good use can also be made of your parachute for this purpose.

PROTECTION FROM THE SUN IS PARTICULARLY IMPORTANT IN THE TROPICS

because hot tropical sun will not only cause painful burns but will increase your thirst.

5. Take stock of provisions, water and equipment and store where they will be safe. Plans for rationing

food and water should be made, but crew members should refrain from eating or drinking during the first 24 hours.

6. Stow your signalling equipment — signalling mirror, sea marker dye, flares, and signalling pistol — where you can get at it quickly. Even on a clear day you will have only a few minutes for signalling a rescue plane from the time you first see it on the horizon until it is out of sight.
7. You should know your position upon ditching, so lay out a course to some definite objective and try to stick to it. Rafts can be sailed.
8. If the water is calm enough to launch the antenna kite or balloon, get your emergency radio into operation.

Stay near your plane as long as it remains afloat. Rescuers will be searching for you along the line of your known route. The silhouette of your plane will help them find you. If at night, leave the plane lights on — someone else in the formation from which you were forced down may spot your plane and be able to get a *fix* for you.

Don't get excited and don't rush. Seconds and minutes are of little importance on a life raft except in an

emergency. Time is one thing you won't be lacking. Do things deliberately and slowly — you'll not only save valuable energy, which in turn will help to conserve your body fluids, but you will save yourself unnecessary dunkings. Life rafts tip over easily. Don't shout. Don't talk unnecessarily. Save your energy.

SAVE YOUR CLOTHES

You may find it pretty hot during your first day on your life raft. If you do, don't follow the natural urge to strip off all your clothes and toss them overboard. Your clothes are important parts of your equipment—they will protect you from the sun during the day and the cold during the night, and, by wetting them periodically during a particularly hot day, you can cut down perspiration. Remember, every time you perspire you lose valuable body moisture that can be replaced only by drinking more liquids.

Stay under the shade of your canopy and keep your arms, head, and legs covered. This will help to keep your thirst to a minimum and your mental and physical efficiency at a maximum. Sunburn and dehydration can kill a man.

If you have a hat — any kind of a hat — wear it. If



Keep out of the sun, sleeves rolled down

you have sun glasses, wear them. Keep your socks on and make sure that they always cover the open space between the bottom of your pant legs and the tops of your shoes. If possible, pin your socks to the bottoms of your trousers' legs. If your life-raft kit contains sun-burn lotion or cream, use it.

WATER AND FOOD

THIRST will be your biggest problem. A man in good physical condition can live for twenty or thirty days without food. Without water, he can live only about a week and a half at the most.

Do without both food and water for the first twenty-four hours, and, if you can, stretch your fasting period into the third or fourth day. After that, ration both your food and the canned water in the kit. Don't eat much — food increases your thirst — and when you drink, make the most of your water by keeping it in your mouth as long as you can. Swish it around your tongue, gargle it, and moisten your lips before swallowing. Always save enough of your day's ration for a sip just before you try to settle down for the night.

When it rains, arrange your tarpaulin and your sail to collect it in large puddles, after the first few minutes, dump the first water that has collected—it will probably be brackish from the coating of salt on the cloth — and start collecting more. Before filling whatever containers you have, drink all you can comfortably hold. Your body *can* store water, and it makes a

far better container than a bailing bucket or a tin can. Store the rest, preferably in the regulation water cans which you have already emptied. Some of the water taken in large quantities when you are dehydrated is lost through perspiration or excessive urination. However, each quart of water in your body is worth several stored where they may be lost if the raft tips over, or spoiled by sea spray and salt.



Another use for your sail or tarpaulin

DON'T DRINK SEA WATER

No matter what your urge may be, don't drink sea water if you want to live to reach shore. The salt in the water literally saps body moisture. Instead of quenching your thirst, it will make you thirstier.

PERIODIC DUNKINGS

They will help to reduce your thirst. Go over the side slowly to keep the salt water out of your mouth. Don't dive. There's just one dunking precaution — in the tropics you can get a sunburn even though your body is under water.

DON'T DRINK URINE!

It is poisonous and will only decrease your resistance and increase your thirst.

DON'T DRINK LIQUOR!

It will nauseate you.

DON'T EAT IF YOU HAVE NO WATER

Digestion uses up your body fluids.

DON'T OVER-EXERT

Exertion causes you to perspire.

CHEW GUM

It will help to keep your mouth moist. If you have no gum, suck on a piece of cloth or a button clipped from your shirt.

FOOD

Aside from the regular rations in your kit, fish and birds will be your main food source. The life-raft kit contains a complete and practical assortment of fishing equipment, consisting of lines and hooks, dehydrated pork rind for bait, a hook-sharpening stone, a jig, a small hand net, a feathered lure, a harpoon which can be fastened on the end of an oar, a knife, extra hook and sinkers, and fishing instructions.

When you start fishing, use the small lines and hooks baited with the pork rind first. When you catch a small fish, part of it can be used to bait the larger hooks and lines for larger fish. If you can't get live bait and the pork rind fails to do the trick, bait your hook with a piece of colored cloth, a piece of bright tin can, or even a button from your shirt. Try any-

thing and everything. Be satisfied with small fish. Big fish will break your lines, swim off with your hooks and bait, and may capsize the raft.

Keep your bait moving continually to give it the appearance of being alive.

Never tie your fishing line to any part of your body or to any part of the raft. Instead, let one of the other members of the crew hold the spool end of the line while you do the actual fishing.

When you catch a fish, lift him into the boat carefully, catching him in your hand net and transferring him to your rubber bailing bucket where he can be grasped without touching him with your hands. The cotton gloves in your kit should be used. A good crack on the back of the head with the handle end of an oar will stop his wriggling.

Be particularly careful not to puncture the raft with hooks, knife, harpoon, or the sharp point of a fish's fin.

Take good care of your fishing kit. Before your trip is over it may be the only thing that stands between you and hunger. Dry the hooks and the lines before stowing them away.

Raw fish is neither salty nor unpleasant to the taste. Clean your fish just as soon as you catch it. Wash the

meat free of blood. Save the entrails, except the liver, for bait. If the liver is pink it may be eaten. If it is dark, don't eat it.

If you have more raw fish than you can eat, cut it into narrow strips and place it along the top of the buoyancy chamber in the sun to dry. Dried fish will keep for several days.

Don't eat shark unless you have an ample supply of water. The same holds for skates, rays, seaweed, and crabs. **JELLYFISH, SEA SNAKES, PARROT FISH, AND PUFFER FISH ARE POISONOUS** to humans, but they can be used as bait. Most fish found in mid-ocean are safe to eat. Poisonous fish are found usually near the coast, coral reefs and along mud and sand banks. Just because a fish glows green at night, don't throw it away and give up a good meal. Phosphorescent fish are safe to eat.

Turtles also are good eating and can be killed by a sharp blow on the head. Practically everything about a turtle can be eaten except the shell, the stomach, and the kidneys. Eat the liver immediately after killing. Blood from the breast should be drained and drunk immediately, allowing no time for the blood to coagulate. The fat may be saved to eat with fish. A word of caution, however — when cutting off the

turtle's head, the jaws may snap shut and the claws may scratch.

At night, you can attract fish by shining a light on the water or hanging your signalling mirror on the edge of the raft so that it reflects the moonlight. If there are any small fish in the neighborhood, they will see the light and rise to the surface where they can be speared or scooped up in your hand net. This method is particularly good for attracting flying fish. Skimming across the water, they will be attracted by the light, bang against the side of the raft, and fall into the water where they will lie momentarily blinded on the surface.

Birds make good food, but they are scarce and difficult to catch.

SEAMANSHIP

Rafts can either be paddled or sailed, or you can depend on the natural currents. Even if you have no sail, your raft because of its flat bottom, shallow draft, and relatively high freeboards will sail itself.

Your sea anchor, however, is just as important as your sail. In a storm, it will keep you headed into the wind, and when the wind is in the wrong direction it will check your drift. If you have no sea anchor, or



Never secure both corners of sail

lose it, a piece of driftwood, a life preserver, or your bailing bucket securely tied to the end of the line will serve.

When fastening lines, securing equipment, or rigging a sail or canopy, make sure that the knots are tight and tied so that they can be untied easily. The best all-around knot for this purpose is the square knot.

When using a sail, never secure both corners of the foot, or lower edge. Instead hold the line attached to one corner in your hand. Then, if a storm comes up or there is a sudden gust of wind there will be no danger of ripping the sail, breaking the mast, or capsizing the raft.



One man always on alert tied to raft

If there is more than one man on the raft, a routine of watches should be established so that at least one member of the crew will be on the alert at all times. As a precaution against losing the raft if it should overturn at night, the man on watch should be attached to the raft by means of a line at least ten feet long.

Don't allow your hands or feet to trail in the water. Trailing objects attract fish and you may suffer a painful bite or even loss of a hand or foot.

RAFT HEALTH

A raft ailment that can become serious unless the proper precautions are taken is a condition known as

“Immersion Foot”. Continued exposure to cool or cold sea water plus the cramped positions that necessarily must be assumed in a raft tend to cut down circulation in the legs and feet. This in turn produces swelling, sores, and a feeling of numbness which if allowed to continue may cause serious complications. To guard against it, keep your feet as dry as possible. If your socks and shoes get wet, remove the socks, wring them out and put them back on again. Move your feet around and wriggle your toes to encourage circulation. If your feet do become swollen and sore, don't rub them; you may bruise the flesh and hasten infection. If open sores exist, sprinkle them with sulfanilimide powder.

Continued exposure to salt water also may cause saltwater burns or boils. Cover large boils with sulfanilimide ointment and then bandage. Don't prick or squeeze the boils to get the matter out.

Boric acid ointment from the first aid kit can be used to treat cracked or parched lips, cracked skin, or inflammation of the eyelids. Painful and bloodshot eyes should be covered with a light cloth or bandage.

You can't expect a bowel movement when you are taking little or no food; so don't worry about it if you have none. Don't attempt to give yourself a saltwater enema, and don't take a strong laxative even if one

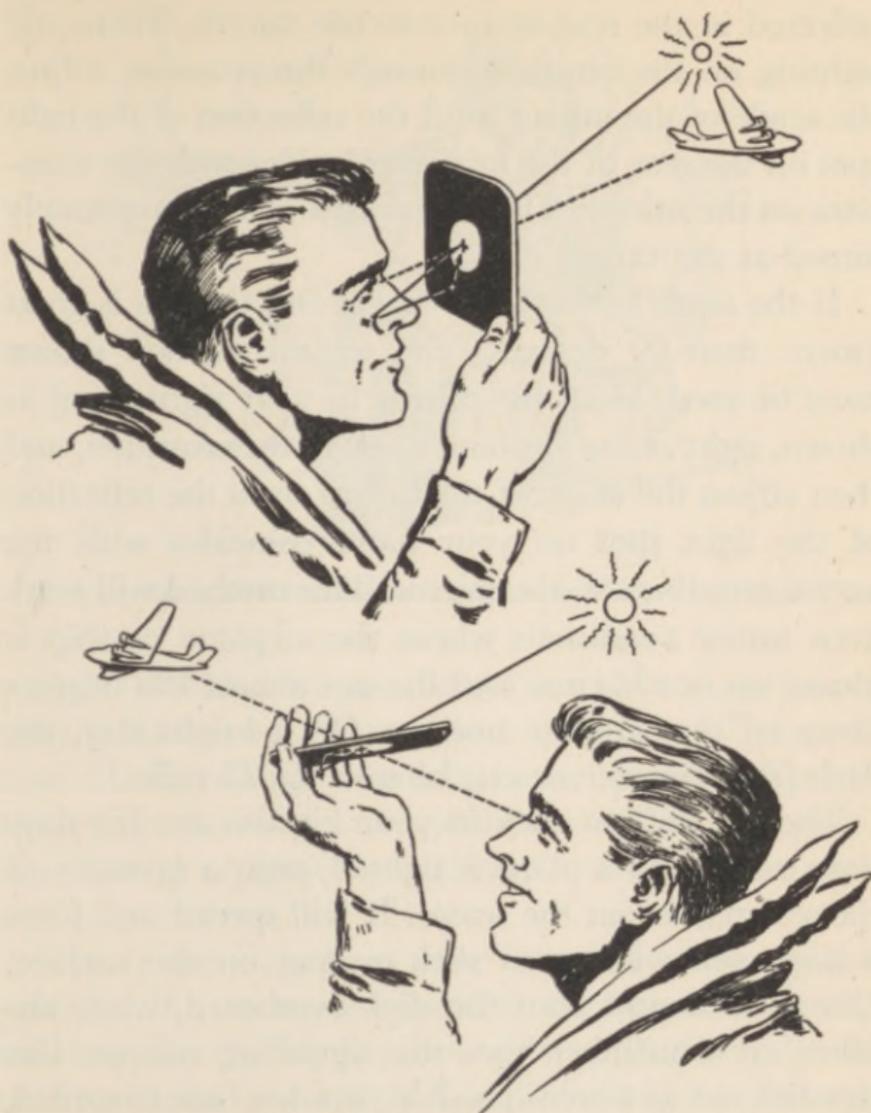
is available. Also, because of the rationing of water, there may be some difficulty in passing urine. This is to be expected and is no cause for alarm.

SIGNALLING

Your life-raft kit contains a good assortment of signalling devices—flares, Very pistol and cartridges, mirror, whistle, radio, colored tarpaulin, and sea marker slick—take care of them as well as you take care of your rations and water.

If you see an airplane or a surface ship during the day, when the sun is shining, your best signalling device will be your signalling mirror. Most emergency kits now are fitted with a special signalling mirror, which is a double-faced mirror (i. e., mirrored on both sides) provided with a crossline sighting or aiming hole. If you have one, it can be used in either of the two ways illustrated. (Mirrors are now being obtained for all kits. If not in your kit, ask for one.)

If the angle of the sun and the airplane or surface ships is not too great (90 degrees maximum) you can hold the mirror about three inches away from your face and sight at the plane through the crosslines. The light from the sun shining through the crosslines will form a cross of light on your face and this cross will be



Flash from this mirror visible for 15 miles

reflected in the rear surface of the mirror. Then, still sighting on the airplane through the crossline, adjust the angle of the mirror until the reflection of the light spot on the rear of the mirror coincides with the crosslines on the mirror. The mirror then will be accurately aimed at the target.

If the angle between the target and the sun is great (more than 90 degrees) the second method shown must be used. Hold the mirror in your right hand as shown, sight at the airplane through the crosslines, and then adjust the angle of the mirror until the reflection of the light spot on your hand coincides with the actual crosslines on the mirror. This method will work even under conditions where the airplane or ship is almost on one horizon and the sun almost 180 degrees away on the opposite horizon. On a bright day, the flash from the mirror can be seen for 15 miles.

The cans of sea slick in your kit also are for daytime use. When a plane is sighted, pour a quantity of the sea marker on the water. It will spread and form a large yellowish-green slick or spot on the surface. One man should pour the slick overboard, while another crew member uses the signalling mirror. Get the slick out as soon as possible ; it takes time to spread.

If a plane comes close by, don't shout. Use the



Your best bet for attracting rescue planes or ships

whistle provided in your kit. Your shouts can't possibly be heard by the men in the airplane. The shrill note of the whistle stands a better chance of penetrating the droning sound of the motors. In any event, concentrate on your signalling mirror. It will be your best daytime bet.

During the day, keep your tarpaulin cover yellow side up. If you are using either the tarpaulin or the sail as a canopy, rig it yellow side up. Rafts with colored canopies are visible a considerably farther distance than rafts without canopies.

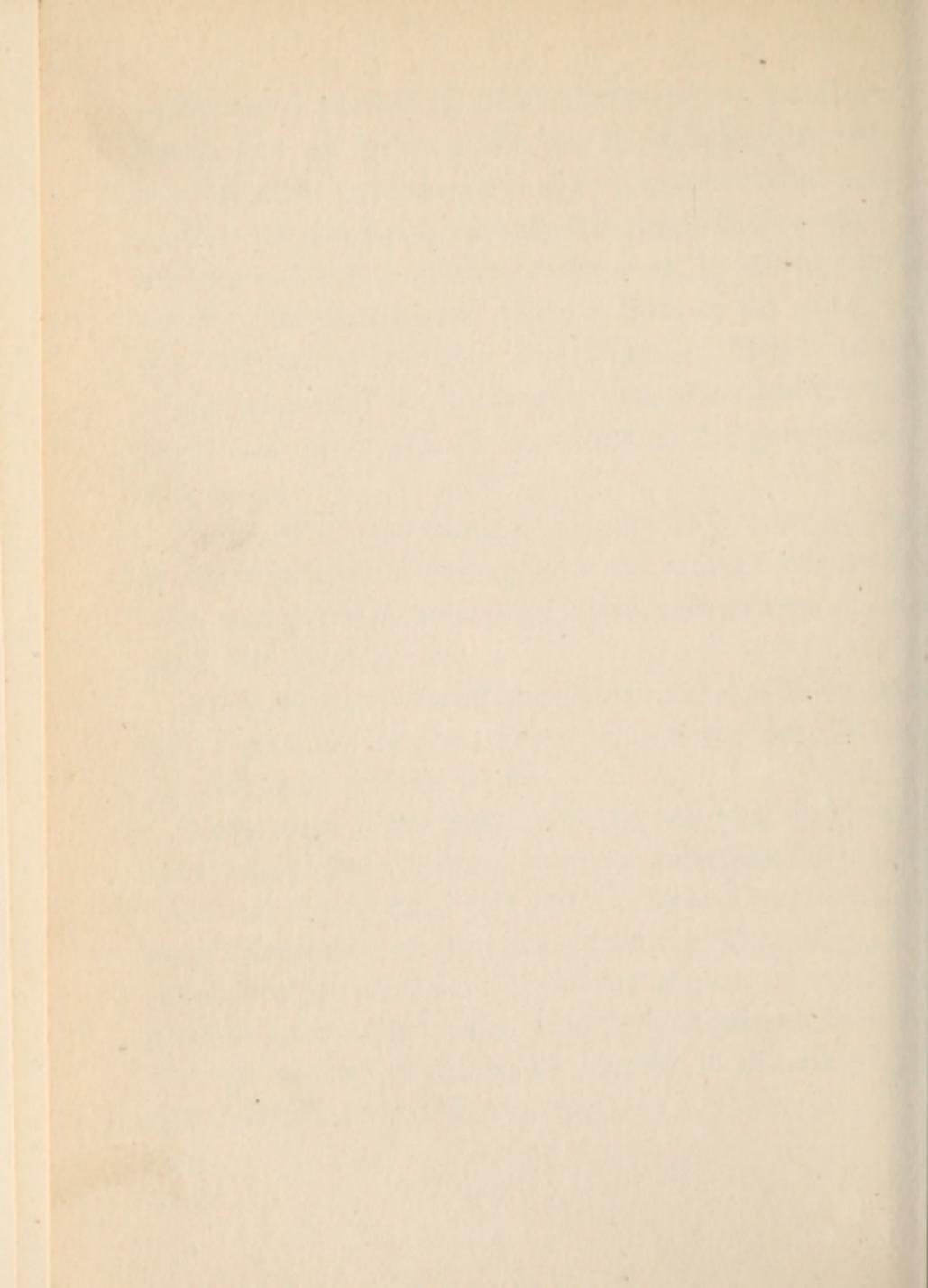
When the weather permits, operate your emergency

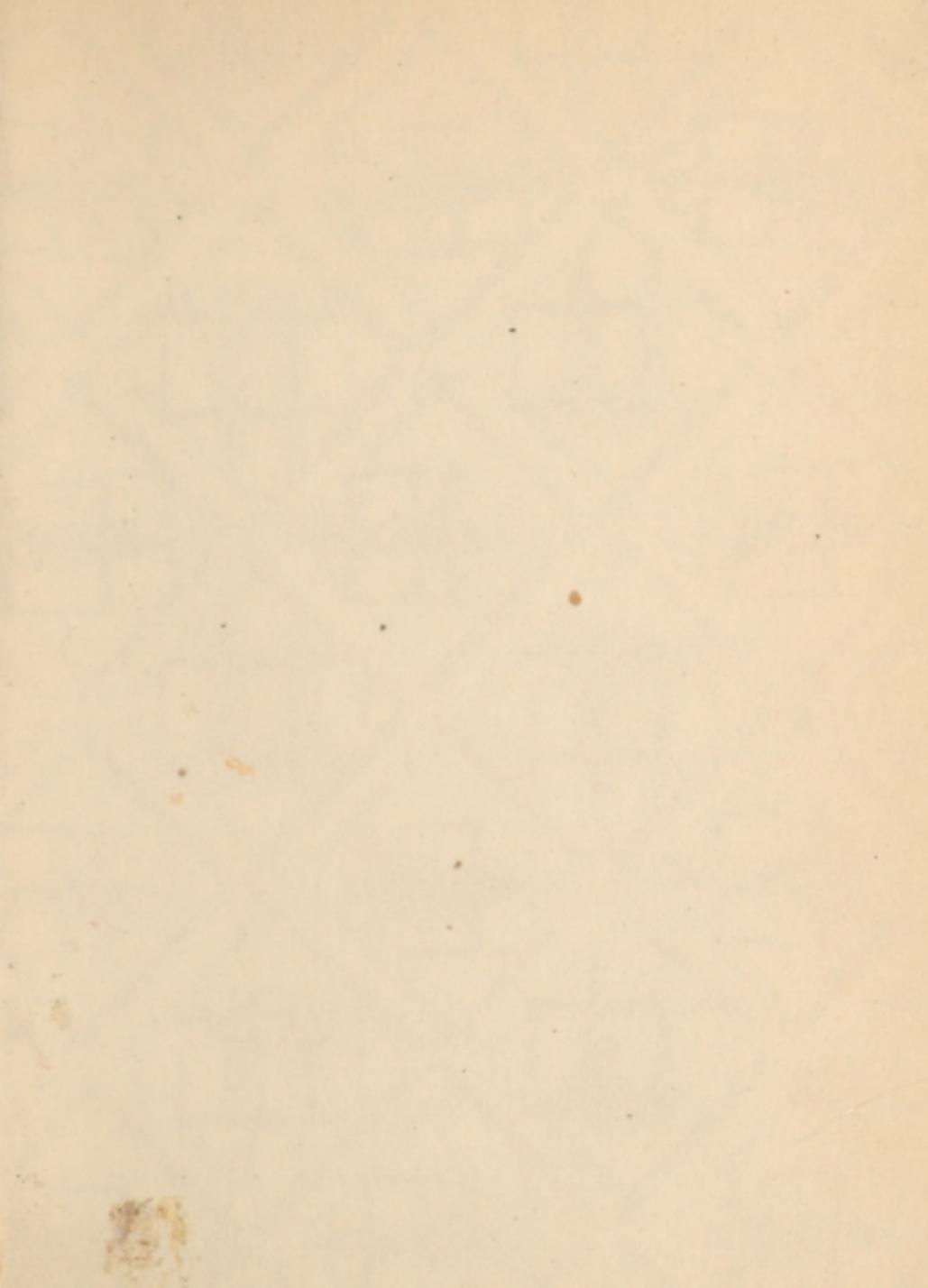
radio for a period of fifteen minutes at least every hour. Try to operate the set to include the three-minute silent periods starting at a quarter after and a quarter of the hour, Greenwich time. Follow the instructions printed on the radio's case. In strong winds use the kite antenna. If there is little or no wind, use the hydrogen balloon. *WARNING*: Don't smoke when operating the hydrogen generator for the balloon, and don't spill the contents of the generator, it will burn.

At night if you think a friendly ship is near, plug in the signal lamp and operate the transmitter manually, using the Continental code printed on a card near the crank socket.

At night your flares and Very pistol will be your best signalling devices. Keep your flares dry. If they get wet they will be useless.

Keep your Very pistol dry. It will rust easily and after prolonged exposure may not function. Save your Very cartridges until you actually hear a rescue plane. Don't fire them on a chance that they'll be seen, and when you do discharge them fire almost vertically to get the maximum height. The flare should be fired far enough ahead of the plane so that it will be within the visibility range of the pilot.









TL 553 U58jo 1944

13821040R



NLM 05097050 0

NATIONAL LIBRARY OF MEDICINE