



SAS MOUNTAIN & ARCTIC SURVIVAL

Barry Davies, BEM

- Treating Frostbite
- Building a Shelter
- Making a Fire
- Avoiding Wild Animal Attacks
- Trapping and Hunting Food
- And Much More!





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Skyhorse Publishing

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Introduction



As with any hostile environment, mountain and Arctic regions can be dangerous, but the same basic rules of survival apply no matter where you find yourself: blend and integrate with the elements, and resist the urge to fight them.

It is difficult to imagine that anyone would deliberately go unprepared into a mountain or Arctic region. The most serious situations arise when an aircraft crash-lands or some other form of transport breaks down during a deep penetration into the wilderness. In all cases, providing you are uninjured, your chances of survival are good. In both winter and summer the northern Arctic offers an abundant supply of water and food; shelter can be found in the tree line, or created even on the barren ice floes. Provided that you successfully protect yourself against the risk of freezing to death your chances of survival and rescue are good.

Even in the worst cases, when you have been plunged into a survival situation by a plane crash, you should still be able to salvage enough equipment to survive for several months. In wartime, prisoners who have weighed up their chances realistically prior to any escape from, e.g., an Arctic prison camp and who have prepared themselves and their equipment intelligently have found that the Arctic offers survival conditions that most of us can deal with.

Latitudes higher than 66 degrees 33 minutes North define the area known as the Arctic Circle. It covers some 21 million square kilometres (approximately 8 million square miles), of which two-thirds are occupied by the Arctic Ocean. More than half of the ocean is permanently covered with layers of pack ice.

In winter the Arctic temperature can drop as low as -65°C . Winters in the Arctic are long and severe, with the ground frozen much of the time. Summer lasts for around four months during which the ground thaws sufficiently to allow moisture to reach the roots of the trees and plants. The northern landmass changes as you move south, from pack ice to a rich grassy vegetation (the tundra), and on into a wide forest strip; in parts this is up to 1500km (900 miles) deep from North to South. Man and beast have occupied this inhospitable area throughout the history of mankind; depending upon the time of year, it is rich in plant life, fish and

wild animals.

By comparison the Antarctic continent surrounding the South Pole is a forbidding land almost devoid of plant and animal life. Scientists have found a variety of lichens and insect life, but insufficient to sustain life for survival purposes. The landmass is greater than that of Europe, and is entirely covered by a dense sheet of ice which averages over 2000m (7,000ft) thick. The Antarctic is much colder than the northern Arctic, with temperatures falling as low as -89°C (-128°F). Animal life is mainly restricted to birds, seals and penguins, the latter spending most of their life in the water. Winds in the Antarctic can reach speeds of up to 160kmh (100mph), driving snow 30m (100ft) into the air. It is imperative that any survivor takes shelter from such a snow blizzard; apart from the lack of visibility, the wind forces down the air temperature, creating deadly hypothermic conditions. Short-term survival is possible, but would depend upon making early contact with one of the many scientific research stations which are dotted around the outer edge of the Antarctic.

Similar conditions prevail in high mountain areas where, especially during winter months, the harsh environment, changing weather and snow conditions can pose a serious threat to survival. With the right skills and equipment, however, your chances are good.

Arctic Clothing & Equipment



To venture into the Arctic without the proper clothing and equipment is to invite disaster. Man is a tropical animal whose body functions best between 96°F and 102°F; above or below that relatively narrow range the health may start to decline.

The maintenance of body temperature will help prevent cold injury. The main factors to protect against in the Arctic are low temperatures, wind, and ground conduction. Modern clothing materials such as Gore-Tex make ideal outer protective shells, but the inner layers are equally important. Safeguarding heat loss from your head, hands and feet will play a major part in any Arctic survival, and again the layering principle can be employed.

How the Layer System Works

Body heat is produced by activity; the more strenuous that activity the more heat is generated. By using the layer system we can control this heat. For example, blankets on our bed trap our body heat and provide warmth while we sleep; too few blankets and we get cold, too many and we overheat. The same principles apply every time we dress ourselves. However, in the Arctic we will need several layers of the right fabrics to control our body temperature. Removing a layer reduces trapped heat, adding a layer increases it. By doing this we also control sweating, and the damping of clothing next to the skin. The layer system applies to the whole body, overlapping where need be. The inner layers are used to provide insulation while the outer layers provide ventilation.

- Clothing next to the skin should be made of a thin, cotton material, loose-fitting and able to absorb perspiration. This layer must be kept clean.
- The second layer should ideally be made of tightly woven wool with adjustable fastenings at the wrist and neck.

- A third layer should consist of a fleece-lined shirt or jacket with a hood. This layer should be easily removable.
- The final outer layer needs to be both waterproof and windproof, with a large hood. For Arctic temperatures this garment should be filled with a padded insulating material similar to that used in sleeping bags.

Protecting the Head The head accounts for around 47% of heat loss, and its protection is vitally important.

An insulated hat with pull-down earflaps will stop much of your body's heat loss, but make sure it does not fit too tightly. The military use a 30cm (12in) long woollen tube which they call a 'head-over'. This is used under the hood of any outer garment; it slips over the head forming a seal at the neckline. In extreme cold conditions when it is necessary to remove the outer hood, the head-over can be pulled up to protect the ears and head.

Loosening the neck aperture and temporarily removing any head protection is the best way of venting excessive body heat. In extreme cold the face can be shielded by a special face mask.



Protecting the Hands If your hands become too cold you cannot build a shelter or fire; and you cannot walk on numb feet. A thin pair of woollen finger type gloves should be worn under a set of insulated, waterproof mitts of Gore Tex or some similar material. If you must handle metal as part of your daily routine in the Arctic you would be well advised to use special contact gloves.

The loss of a glove in the Arctic can be disastrous; make sure they are securely fastened to your body by a length of cord. Spare socks will

make good mittens in an emergency; they can be protected from the wet by covering them with polythene bags and securing them at the wrist. Muskrats and other similar animals are easy to snare; their hides, if properly removed and turned inside out, make excellent gloves.

Protecting the Feet Boots should be calf-length, watertight, and loose enough to allow the wearing of two pairs of socks – one thin pair under a thick, knee-length woollen pair. As with your upper body, loose, comfortable layers will not restrict the foot's blood supply. To make sure that the circulation in your feet is working properly, keep moving and wiggle your toes every few minutes. Check for any signs of numbness, as this is an indicator that your feet's blood supply is being trapped. Always carry at least one spare pair of socks and if your feet become wet, change them. If you are wearing normal leather boots, cover them with gaiters; the type which covers the whole boot are best in snow. If you intend staying out overnight, or standing around for any length of time, carry a pair of mukluks.

Keep Clothing in Good Repair

- In a survival situation you can seldom replace your clothes – it is important to ensure they last and continue to function properly.
- Dirty or ripped clothing will not insulate or protect you – repair and wash clothing as soon as necessary.
- Layers next to your skin will need frequent washing to remove ingrained sweat and dirt.
- In sub-zero temperatures, wet clothing can be hung up to freeze. The moisture turns into ice particles that can then be beaten out. This works best with tightly woven garments.
- If you are in a static location, building a Yukon stove (see section on fire) inside your shelter will provide the means to safely dry clothes while keeping you warm.

There is little to beat a good mukluk to keep your feet warm during the Arctic winter. The modern day mukluk is a thick felt sock with a wide, flat rubber sole and a waterproof outer. They make walking in snow easier than with normal boots; but their best advantage is their warmth in winter. They also protect against trench foot if travelling during the early spring or late summer.



LIFESAVER

Boots

Boots can be improvised using the hide from large deer or elk. They should be stuffed with insulation made by drying grass or moss by the fire, and should not be fastened so tightly as to interfere with blood circulation.

Gloves

- Without gloves your hands will quickly freeze. Frozen hands are useless – to fasten a jacket, light a fire, or open a food container. With frozen hands you will quickly become helpless; and if you are on your own, you will die. Secure your gloves to your body with cord at all times. Never take off and lay down an unsecured glove while you work. If you do lose a glove, improvising a replacement is your first priority.



Equipment For A Cold Climate

Equipment For A Cold Climate

Escape and survival equipment is issued as a matter of course to military pilots and Special Forces units; but the development of specialist survival equipment for civilian use has also increased dramatically over the past decade. This equipment varies from the basic items for making fire, constructing shelter, and navigation, to those varying items required for survival in specific terrain and climatic conditions.

Travelling in a cold environment should mean that you are already well clothed and equipped. Make sure that your survival kit contains the extra items to cope with cold priorities: warmth and shelter. This means including a good means of fire-starting, several heavy duty polythene bags, and some good fishing equipment. Every item included in a survival kit has to be of real use, and its usefulness must be judged against its size and weight. Ultimately, each item must increase your chances of survival and rescue.

If you find yourself in an Arctic environment due to some unforeseen accident then your equipment priorities will mean salvaging what you can from your aircraft or vehicle.

Fire

Candle A candle will prolong the life of your matches by providing a constant flame (as long as you can protect it from wind and rain); it will help start a fire even when the tinder is damp. Additionally, a simple candle provides light and comfort to your surroundings. Choose a candle made from 100% stearine, or tallow (solidified animal fats) – this is edible and may therefore serve as an emergency food (do not try to eat candles made of paraffin wax).

Flint & Steel Matches, if not protected, are easily rendered useless by wet weather, while a flint and steel will enable you to light countless fires irrespective of the conditions. The flint and steel is a robust and reliable piece of apparatus, but its usefulness is vastly improved when combined with a block of magnesium. Sparks generated by the flint will readily ignite shavings scraped from the magnesium block onto kindling materials.

Matches Ordinary kitchen matches will not be of much use unless they are made waterproof. This can easily be done by covering them completely with melted wax, or coating them with hairspray. Special windproof and waterproof matches can also be purchased; each match is sealed with a protective varnish coating, and manufactured using chemicals which will burn for around 12 seconds in the foulest of weather.

Survival Kit

A survival kit could save your life. Whenever you embark upon any journey or activity where a survival situation might occur, make sure that you have a survival kit with you and, most importantly, that it is on your person.

Each item must be evaluated for its usefulness and, ideally, its adaptability to different uses, make sure that the sole purpose of one item is not duplicated by another. Once you have decided upon your final selection, pack the items neatly in an airtight and waterproof container. Whichever container you choose, once it has been packed with the relevant selection of kit for the particular conditions you face it should not be opened until needed.

The components of your survival kit should not be regarded complacently, as guaranteeing your survival without further initiative. The kit should be seen rather as a catalyst which kicks your personal survival skills into action.

Tampon Due to the fine cotton wool used in its manufacture, the tampon has proven to be the most efficient tinder and fire-lighting aid. It works best if the white surface is blackened with charcoal or dry dirt first, as it accepts the sparks and ignites more readily. British RAF and Special Forces packs contain two tampons as standard issue. The cotton wool can also be used in medical emergencies to clean wounds.

Water

Condoms A non-lubricated, heavy duty condom makes an excellent water carrier when supported in a sock or shirtsleeve. The water must be poured in, rather than the condom being dipped into the water supply; shake the condom to stretch it as it fills up. Used in this way a condom can hold about 1.5 litres (2.6 pints). Condoms will also protect dry tinder in wet weather; and are strong enough to make a small catapult.

Heavy-duty non-lubricated condoms will hold up 1.5 litres of water supported in a sock or shirtsleeve.



Water Purification The means of water purification come in a number of different forms, from tablets to pumping devices. For inclusion in a survival kit you are best advised to choose tablets (about 50), as they are light to carry and quick and convenient to use. One small tablet will purify about one litre (1.75 pints) of water, although it will leave a strong chlorine taste. Tablets cannot clean the water or remove dirt particles, but they do make it safe to drink.



Shelter

Needles & Pins Several different sized safety pins should be included in any survival kit. They make good closures for makeshift clothing, or can be baited as large hooks to catch fish or birds. Large sailmaker's needles, such as a Chenille No 6, have a large eye which makes threading easier, especially if the hands are cold or if you are using thread improvised from sinew. They will also be able to cope with heavier materials such as canvas, shoe leather or rawhide. Another good use for a needle is as a pointer in a makeshift compass, although it will have to be magnetised first.

Parachute Cord Parachute cord is an extremely strong alternative to plain string, having a breaking strain of about 250 kilogrammes (550 pounds). It can be used for lashing shelter frameworks and many other necessities; and the inner strands of thinner cord also make good thread for sewing or fishing lines. A survival kit should contain a minimum of 15 metres (50 feet).

Razor Blades Hard-backed razor blades make useful cutting tools, for gutting fish, cutting sinew, or when making a weapon. If used with care the blade will continue to cut for up to a month.

A stainless steel wire saw will cut through most materials, including steel.



Its life can be prolonged by not trying to cut materials which are obviously beyond its capabilities.

Wire Saw A good saw, similar to those Issued to the military, is made of eight strands of stainless steel wire; it is capable of cutting through wood, bone, plastics, even metal. The saw can even be used as a snare, by passing the smaller ring at one end through the larger ring at the other to form a running noose.

Survival Bag Loss of body heat potentially leading to hypothermia is one of the most commonplace but deadly threats encountered in a survival situation. A simple survival bag made of polythene protects the body from both wind and rain and minimizes the risk. Two bags separated by a layer of moss, bracken, grass, hay, etc, will form a basic sleeping bag. The survival bag also has many other uses, including an improvised rucksack, a waterproof layer when making a shelter, a solar still, and when extracting water from plants.

Survival Bags

One or more strong polythene sheet bags, big enough to climb into wearing your clothing and boots, will provide you with:

- Protection from rain, wind, and hypothermia.

- The basis for an insulated sleeping bag or mattress.
- A shelter roof.
- The means of collecting water.
- The means of distilling water.
- The means to keep your clothing and kit dry when wading rivers.
- If brightly coloured, as ground signal panels to attract SAR aircraft.



Food

Emergency Food Food is not an immediate requirement in a survival situation, as the body can do without solids for several weeks before it starts to deteriorate. However, morale plays an important part in survival, and this can be lifted by maintaining some normality. Having the means to make a hot drink produces this normality. Any food pack should be kept to the minimum: two fuel tablets, two tea or coffee sachets, sugar, *etc.* Meat stock cubes contain salt and flavouring and make excellent hot drinks; they can also be used to flavour plants and food from the wild.

Fishing Equipment A survival fishing kit should consist of the following basic components: five hooks (size 14 or 16), approximately 30m (100ft) of line, 10 iron or brass weights, and swivels. A float can be made from a cork (which when charred will also provide hand and face camouflage). If there is room, include a plastic, luminous lure, and a small fishing net.

Snares Purpose-manufactured snares work best, but if you cannot get these then carry at least 5 metres (16.5 feet) of brass wire from which they can be constructed. Next to a rifle, snares are perhaps the most effective way of catching game. Brass wire can also be used for fishing

traces, and when building shelters, making bindings for snowshoes or improvised packs.

Knife

Along with your survival kit you should select a good knife. For many reasons this may be the most important item you carry; it is therefore essential to choose a knife of high quality which is best suited to your needs.

There are several types of blade to be considered in this context, such as those found on pocket knives and multifunctional tools, and purpose-made survival knives.

Pocket knives These range from the simplest single-bladed type to multi-bladed, multifunction knives. Whichever knife you choose, always carry it on your person as a matter of course. Single-bladed knives offer little more than a simple cutting tool. If you decide on a pocket knife you will be better off with a multifunction, 'Swiss Army' type.

Survival knives Knives designed for survival tend to be much larger than pocket knives and are usually carried in their own sheath. Most of the better knives have a sharpening stone in a pocket on the sheath, and many have a hollow handle or a pouch on the sheath in which a basic survival kit can be carried. A large number of relatively cheap, poor quality survival knives have flooded the market in recent years. These tend to have a weak point where the blade meets the handle, which is likely to fail when the knife is most needed. Check the knife's construction and any attached survival items carefully before purchase.

Food

- Except in extreme cold conditions, fit adults can live without solids for weeks.
- Food can add more heavy bulk to survival packs than it is worth.
- For short-term survival conditions, pack only small, high-energy rations.

BUT

- Hot drinks lift morale, and morale affects survival chances.
- Ingredients for hot drinks are light and low-volume, so are worth packing.

Multifunctional tools These have endless applications, from shelter building to making improvised clothing and travel gear. In a survival situation the multifunction tool is likely to prove more productive than an ordinary knife. The better-known names such as Leatherman and Gerber are well made and should last a lifetime. Most types include pliers, wire cutters, cutting blade, saw, screwdrivers and files. Because of its importance the tool should be attached to the body by a length of cord to prevent loss.

The next step from the 'Swiss Army' knife is the multifunction tool such as the Leatherman or Gerber, whose increased size and length gives extra leverage and weight to its applications.



Keeping a Sharp Edge

The knife is a vital survival aid; do not misuse it by throwing it into the ground or at trees. Keep it clean, and know where it is at all times.

A knife with a blunt edge is nothing more than a useless piece of steel. Granite or dark, hard sandstone are best for sharpening a blade. Find a flat piece the size of an open palm, rubbing two rocks together will produce an even surface. Wet the stone surface and work the blade edge over it with a smooth action, always working the blade away from you across the stone. At first use a clockwise circular motion over the surface, then an anticlockwise motion. Learning to sharpen a blade is a skill that can only be achieved through practice.

Grinding the blade at the correct angle will produce a long-lasting cutting edge. If your intended travel will involve a lot of cutting then you will be better off carrying a sharpening stone or steel with you.



Navigation & Signalling

Air Marker Panels Air marker panels can be made from any lightweight fluorescent material, although orange is the standard recognizable colour. It is advisable to carry a sheet two metres (at least six feet) square, which can either be folded into different shapes, or split into three 30cm (12in) wide strips. Do not split the sheet until there is an absolute need to do so – e.g. you have spotted a search aircraft – as the whole sheet is useful for other functions such as a makeshift shelter.

Compass A compass provides the means to establish direction and

position, the two vital elements if you are forced to travel or need to give your co-ordinates during rescue.

The liquid-filled 'Silva'-type compass is more commonly associated with navigation by map, and together these offer the means of precise position-finding.

Flares & Smoke A wide variety of signal flares and smoke canisters are available on the market. If you decide to add them to your survival kit you would do best to choose a standard flare pack containing a launch pistol and nine different coloured flares. When firing the flares take great care that the launch pistol is aimed skywards. In a life-threatening emergency flares can be used to start a fire.

Global Positioning System (GPS) GPS is relatively new to the survival market, but its popularity is growing. This state-of-the-art instrument is a navigational aid capable of plotting your precise position on the surface of the Earth. This is obviously of particular value in the Arctic, where a normal compass can become erratic.

Heliograph Modern heliographs are small, light, and easy to use. They operate by reflecting the sun's rays precisely towards aircraft or other rescuers. On a clear, sunny day their reflection can be spotted up to 30 kilometres (18.5 miles) away. It is a good idea to familiarize yourself with the operating instructions prior to any rescue attempt.

Radar-Reflective Balloon Radar-reflective balloons are not new to survival, but in recent years they have improved dramatically. The principle is to inflate a balloon made from a special foil which can be detected by search-and-rescue radar from ranges of up to 38 kilometres (24 miles). Some are tethered to a length of line and flown like a kite, while others are inflated by gas; the latter will stay aloft for up to five days even in strong winds.

Strobe Designed for military rescue situations, the strobe is a bright blue light which flashes with great intensity and can be seen many miles away. These are perfect for location at night or in the darkness of the Arctic winter. Although the strobe is waterproof, in cold conditions it should be kept close to the body to preserve the battery strength. The strobe should only be operated when the sound of a rescue aircraft is

positively identified.

Personal Locator Radios

- This is the survivor's best friend – but its battery life is limited. The beacon' setting uses least battery power
- Reception and transmission are generally limited to line-of sight – so don't waste the battery by leaving it switched on for long periods when you can't see or hear SAR aircraft.
- Try to use the radio from high ground.
- Transmit an SOS or Mayday at sunrise, noon and sunset. Try to transmit during a consistent time period, *e.g.* from the hour to 20 minutes past the hour.
- Transmit for two minutes each time,- then switch off for one minute. Switch on for three minutes, then off for three minutes. Switch on for ten minutes, then off until the next transmission period. (USAF guidelines for use of standard PRC-90 radio.)



Survival Radio Although there are a vast number of survival radios on the market, some are limited in range and capabilities. If your work or

pastimes often take you into isolated areas then you are well advised to carry a radio telephone which is capable of world-wide communications. In the event of any accident requiring the emergency services your chances of survival will be greatly enhanced. Many surviving parties have been successfully rescued by telephoning the emergency services directly. While most mobile phones will only work where there is an established network, communications are improving all the time as global satellite phones are introduced.

Watch Although not a direct part of your survival kit, a watch can be an excellent navigational aid – providing that it is of the analogue type, *i.e.* not digital.

Whistle Modern survival whistles are compact and can have a range of up to 1000 metres (5/8mile) on a clear day. Its main usefulness is for localized communication, *i.e.* between members of the survival party, or when the weather is so bad that only surface rescue is possible. Every life-vest carries a whistle for location after a disaster at sea. In the same way, an injured and immobile person can signal their location on land.

Surviving Aircraft Emergencies

Most aircraft will have sent out a distress call prior to any crash landing. Most large commercial aircraft are automatically tracked, thus registering their precise position prior to making a forced landing. Aircraft which make emergency wheels-up landings in snow have an excellent chance of survival.

The time of year, weather conditions and location of impact will determine the ice conditions. An aircraft that has landed on summer ice may well sink – this can take anything from a few minutes to several days. If large sections of the aircraft hull are still intact and there is no indication of ice movement in the immediate vicinity, then it should be utilized and improved to make a more permanent shelter.

Certain safeguards should be carried out:

- Evacuate yourself and others at least 100m upwind from the aircraft. Return to the aircraft only under instructions from the

crew, or when considered safe.

- Selected survivors of strong physical build should enter the aircraft first to remove any dead bodies. These should be neatly placed outside the aircraft and covered with a layer of snow. All personal effects should remain with the body for later identification.
- Separate the injured, and divide any survivors into groups depending on age, fitness and ability. Organize on-going care for the injured, children and the elderly.
- Check the aircraft or vehicle for all usable components. Make use of any hot water from storage tanks before it goes cold. Organize forage parties to search the hold baggage for clothing and any other useful items. Remove seats to make beds for the injured and extra sleeping space.

LIFESAVER

It Isn't Only the Crash that Can Kill You

- Get well away from the wreck until sure that there is no further risk of fire or explosion.
- Engines are heavy, fuselage structures light, and wrecks unbalanced. Ensure the wreck has finally come to rest, and will not roll or shift as you move in and out.
- Use great care when draining off oil and aviation fuel – engine parts may remain hot for a long time.
- One person should control all matches and lighters.
- If using a heater inside the fuselage, beware of carbon monoxide build-up.

- Locate any emergency radios or beacons and remove any batteries from their housings. The batteries should be kept warm.

- Every aircraft that flies over water should have a life raft. This in turn will contain most of the items needed for survival. The raft itself will provide an excellent emergency shelter, and the raft case can be turned into a sledge. Most commercial aircraft and vehicles carry a medical pack and a good survival pack.
- Aviation fuel, diesel, petrol and oil all make excellent fuel for your fires. To a lesser degree, duty-free alcohol carried on commercial flights will also burn.
- Any item that stops the wind should be used for constructing shelter – canvas and polythene sheeting, parachutes, passenger blankets, *etc.*
- All cigarettes and lighters should be removed from any survivor and kept for safety in a special container. This is to prevent any accidental fire on board the aircraft, as aviation fuel will have spilled from ruptured tanks. Monitor carbon monoxide if you have an internal heat source.
- Establish emergency procedures. Operate radio and rescue devices and prepare visual location signals. Organize a roster to keep watch for any sign of search and rescue.
- Always keep a detailed log of who has done what. As the days slip by people will become increasingly unwilling to stand outside in the cold – a log will help avoid arguments over the fair division of duties.
- A commercial aircraft carries a great deal of food in foil trays, most of which can be preserved by freezing.

Arctic Medical Hazards

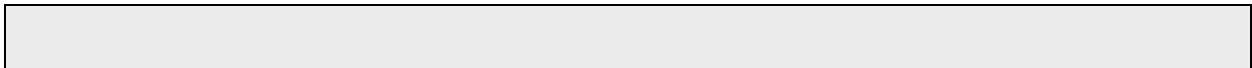


Medical problems almost always accompany an accident, especially an air crash. Victims will require immediate attention (see Medical Priorities). Arctic temperatures present their own additional dangers; frostbite, hypothermia and snow blindness are the main hazards.

Efforts to keep warm and exclude draughts can lead to lack of oxygen and carbon monoxide poisoning. The first two are caused by excessive loss of heat from the body. Wind will accelerate the cooling of the body because its movement decreases air temperatures. Being wet also increases the risk, as water will conduct the heat away from the body; garments that are wet or damp, with either water or sweat, will lose their insulating properties and will begin to actually drain heat from the body.

Hands and Feet Hands and feet are at the extremes of the body's circulation system, and so need extra attention if they are to maintain heat. Make sure that any fastenings at the wrists, ankles, neck and waist are snug enough to prevent heat loss but not so tight that they cut off circulation to the extremities. As much as possible, keep the hands covered. If they become cold, warm them either between the thighs or under the armpits. Moving the feet and wiggling the toes can warm frost-nipped toes, and warming them against a companion's body is also very effective. Pay attention to your footwear and try to keep your feet as dry as possible. If you have a pair of spare socks, keep them close to your body and try to change into a dry pair at least once a day. Over-boots are also a great aid in protecting the feet against the cold and wet. If you do not have any, try to improvise by putting a spare sock over each boot. If you are not moving around, take off your boots and give your feet a good ten-minute rub every few hours.

Frostbite Symptoms When the body becomes cold it puts priority on retaining the core heat rather than warming the extremities; it therefore shuts down the blood vessels in the skin. In extreme cold weather the parts of the body at the limits of the circulation may actually freeze and cause tissue damage. This is the condition known as frostbite. Frostbite can creep up on a person so gradually that they are not aware that they have it until the last minute. You will need to be on guard against this dangerous condition, as if it becomes serious it can lead to gangrene and loss of the affected part. The first symptoms to be noticed will be a feeling of 'pins and needles' in the affected part, which may also become stiff and numb. Later the skin of the area will turn pale, then white, before becoming a mottled blue and eventually black as tissue death occurs.



If you discover frostbite:

- DO NOT rub or massage the affected area (except in the very early stages).
- DO NOT apply snow or ice – this will only serve to make the condition worse.
- DO NOT use direct or strong heat such as hot stones or a fire to warm the area.
- DO NOT give alcohol to drink, as this can lower body temperature further.
- DO NOT allow a casualty with a recently frostbitten foot to walk.
- DO NOT break open any blisters which may occur.

As exposed skin is most prone to frostbite, check uncovered areas frequently – especially the nose, fingers and toes. Other areas which should be checked are the ankles and wrists. If you are with someone else, make sure that you check each other frequently for any warning signs that frostbite is occurring. Any frostbitten areas that are discovered should be slowly *warmed* by *some* natural means. Skin-to-skin contact provides the best method of slow warming. If warm water is available, use that, but make sure that it is not too warm (do a 'baby-bath' test). Any frostbitten casualty should be removed to a shelter as soon as is practicable, and should be insulated against further heat loss with blankets and extra clothing. Hot drinks and food should be given to the casualty as soon as possible.

Hypothermia Hypothermia occurs when the body temperature falls below 35°C and body heat is being lost faster than it can be replaced. At this stage body functions start to slow down, and may stop altogether if the condition is not treated. Exposure to cold, wet weather is a major factor in this condition, as are wet clothing, immersion in cold water, inadequate clothing, exhaustion and shortage of food and drink. It is

important to be aware of the symptoms, especially if you are subject to any of the conditions described above.
The symptoms of hypothermia are:

- Uncontrollable shivering.
- Skin pale, dry and sub-normally cold to the touch.
- Muscular weakness, lethargy, need for sleep.
- Dimming of sight.
- Irrational behaviour.
- Personality changes – an extrovert may become introverted, a quiet person aggressive.
- Slow, weak pulse.
- Slow, shallow breathing.
- Eventual collapse and unconsciousness. Possible cardiac arrest.

As soon as hypothermia is suspected it must be treated by restoring lost body heat. This means getting the casualty out of the wet and cold and into shelter as soon as possible. Use dry clothing/covering to replace any wet clothing. If the victim has been totally submerged in water, remove all clothes – they will reduce body temperature faster than nakedness. If you have a metallized survival blanket, use this to reflect any radiated heat loss back to the body. If the casualty is conscious, hot food and drink are helpful. If another healthy survivor is present he will be able to share his body heat with the casualty.

The casualty may become unconscious with no signs of breathing or pulse; proceed immediately with assisted ventilation and chest compressions. The casualty will still need to be warmed. Even if the casualty's body temperature has fallen to 26°C, do not automatically presume that he is dead. Carry on with resuscitation techniques until he has reached normal body temperature; if he cannot then be revived, death can be assumed.

Sunburn in the arctic

Unlikely as it may sound, prolonged exposure to the ultra-violet rays of the sun is equally hazardous in the Arctic as in the desert. If you find yourself in such conditions, slowly increased exposure and the use of barrier creams will reduce the risk of sunburn.

Remember that if one person is suffering from hypothermia, others may be – check everyone in your party.

Immersion Foot If you are travelling across the Arctic tundra during spring/summer your feet can be immersed in cold water or bog for a long time. If the feet are not adequately protected they will develop a condition termed immersion foot; this can occur even when the temperature is well above freezing. The first symptoms are that the foot becomes white, numb, cold and swollen. If the condition is allowed to progress the skin becomes red, hot, broken, ulcerated and extremely painful. Prevention is better than cure. Keep the feet dry and out of water – if possible wear rubber boots. If you do get water in your boots, take them off, empty them out and wring out your socks, replacing them with a dry pair as soon as possible. Check the feet frequently and rub them for five to ten minutes.

If symptoms appear:

- Gently dry the feet and wriggle the toes.
- If the skin has been broken, apply an antiseptic cream.
- Protect the feet by wrapping them loosely in bandages.
- Allow the feet to warm up slowly and naturally. Do not expose to direct heat.
- Elevate the legs to relieve the swelling and pain.
- Do not walk until your feet have recovered.

Snow Glare/Blindness When crossing snow in bright sunlight the eyes are exposed to reflected rays diffused by snow particles that strike the eyeball from every direction. Snow glare is a painful and watery inflammation of the eyeballs which causes a burning sensation. The first signs are a gritty sensation in the eye, which can proceed to intense pain and loss of vision. Snow blindness can be distressing but it is not a

serious condition. Prevention is the best answer – protect the eyes with sunglasses or snow goggles. If neither are available a strip of cardboard, cloth or bark, with narrow slits cut for vision, will suffice. Use charcoal to blacken beneath the eyes to reduce glare.



Prevent snow blindness by wearing goggles or improvising protection.

Mosquitoes and Midges Mosquitoes are found in most regions of the world including the Arctic and sub-Arctic. They are not generally dangerous but constitute an irritating presence. While summer in the Arctic may seem preferable to winter for the survivor, it brings a number of its own problems. The ground gets very soggy as the snow melts, which also heralds the onslaught of biting insects such as clouds of midges. While small in size these swarm in their millions, making life unbearable; they have literally driven men and animals crazy. The survivor should do all within his power to fend off mosquitoes and midges; covering the whole body and protecting the head with a net is the only real answer, as insect repellent has little effect.

Arctic Hygiene It may seem impractical to remove all your clothes and wash yourself in the Arctic, but if you are to avoid infection and skin

rashes it is vital. Providing you have a fire and shelter you should take a snow bath on a daily basis, preferably before you retire for the night. Take a handful of clean snow and wash yourself with the snowball. Concentrate on the areas of perspiration, under the arms and between the legs. Dry the body if a cloth is available, and get dressed again. Once your body is clean concentrate on your feet. Remove one boot at a time; if no spare socks are available, beat the one you have just removed against a stiff object and allow it to air; dry it by the fire if damp. Give your feet a good scrub with fresh snow, cleaning between the toes and around the heel. Check for any blisters or sore spots, and treat them immediately. Dry and replace the sock. Repeat the process on your other foot, then get into bed.

Medical Priorities

The first task for any survivors is to establish the priorities for treatment of the injured. Casualties are usually sorted into categories. Those who require urgent assistance to prevent immediate death -mainly those suffering from varying asphyxia disorders – must be given priority. Shock caused by major injuries and severe haemorrhaging must be assessed; after a major disaster many may be hopelessly injured and thus cannot qualify for immediate assistance. The task is to identify the injury and establish how long the casualty will live without assistance; and to decide if any assistance that can be given will prove beneficial.

Breathing

Check a casualty's breathing by placing your ear close to the nose and mouth and looking down over the chest and abdomen. If they are breathing you should be able to both feel and hear the flow of air, and to see chest and abdominal movement. If these signs of breathing are absent, immediate action must be taken.

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The human body needs a constant supply of oxygen to function. If we stop breathing even for a few minutes the brain will start to sustain damage; the longer we go without air, the greater the damage. If casualties are unconscious, choking, or having trouble breathing, then they must be treated urgently.

In the case of an unconscious casualty, check for breathing and also for a pulse. If one or both are undetectable then emergency treatment must be given immediately. Urgent assistance must also be given to anyone who is choking or showing other obvious signs of breathing difficulties.



Check that the airway is clear.

First make sure that the airway is clear:

Tilt the casualty's head back gently while lifting the chin with the other hand. Doing this will automatically open the airway, and will also lift the tongue from the back of the throat so that it will not cause an obstruction. Supporting the head in the tilted position with a hand on the forehead, check inside the mouth for any object or substance which may be causing a blockage, e.g. dentures, vomit, etc. If any of these are present gently remove them, without touching the back of the throat, as this may cause a swelling of the throat tissues.

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In many cases these actions alone may be enough to enable the casualty to breathe again. If this is the case, and they also have a pulse, then place them into the recovery position and maintain a periodic check on their condition.

Artificial respiration If the casualty is still not breathing, then extra steps must be taken to ensure that they get some oxygen into their body. This can be achieved through mouth-to-mouth resuscitation, as the air we exhale still contains 75% of the oxygen we inhaled.

With the casualty's head still tilted back so that the airway is clear, pinch his nose to prevent air loss.

Immediate First Aid Checks

- Check for breathing and pulse.
- If no breathing, check if the airway needs clearing.
- If still no breathing, begin mouth-to-mouth respiration.
- After nine breaths, check carotid pulse for heartbeat.
- If certain there is no heartbeat, begin chest compressions.
- Check for a pulse every 15 compressions.
- If alone and casualty displays neither breathing nor pulse, alternate the treatments – two breaths, then 15 compressions, then two breaths, checking breathing and pulse at one-minute intervals.



Mouth-to-mouth resuscitation.

Breathe in deeply, and then seal your lips over the casualty's mouth.

Gently blow into their mouth and watch for the chest to expand. It will take about two seconds for the chest to expand to its maximum capacity. Move your mouth away and wait for the chest to fall fully.

This should be repeated nine times before checking that the casualty's heart is still beating by feeling the carotid pulse point in the neck. It is no use providing the patient with oxygen if their heart is unable to pump blood to the necessary organs. If the heart has stopped, chest compressions (see below) must be administered.

In cases where mouth-to-mouth resuscitation is impossible or undesirable, e.g. when there is a serious lower jaw injury, mouth-to-nose ventilation may be carried out instead, but making sure that the mouth is firmly sealed first.

Artificial respiration should be carried out until the casualty is once more able to breathe unaided. Once the breathing rate is steady, place the casualty in the recovery position and monitor their condition every three minutes.

Chest Compression If the heart has stopped, it must be artificially pumped so that the oxygen carried by the blood can reach the vital organs. To do this a technique called chest compression is used.

Before beginning this procedure it is vital to make sure that a pulse is entirely absent. If the heart is still beating, however weakly, then chest compression will cause damage.

Place the casualty flat on his back on a firm surface. Kneel beside him and locate the bottom of his breastbone – this is found where the bottom two ribs meet. Place the heel of one of your hands about three fingers' width up from this point; place your other hand on top of this, and interlock the fingers.

Artificial respiration when there are two people available.



Lean forward over the casualty, making sure that your elbows are rigid and that your weight is pressing vertically on the casualty's chest. The breastbone should be depressed by about 4-5cm (2 inches). Release the pressure by leaning back, but without removing your hands. Chest compressions should be repeated at a rate of about 80 per minute, pausing for a pulse check every 15 compressions.

Generally, if the heart has stopped then breathing will also have stopped. In order for the casualty to have a chance of survival both artificial ventilation and chest compressions will have to be performed at the same time. If you are on your own, the correct procedure is to first give the casualty two assisted breaths, followed by 15 chest compressions. Continue with this cycle for one minute before checking on heartbeat and breathing.

If neither is present, continue with the alternated breaths/chest compressions until either the casualty's heartbeat is restored, help arrives, or you become too exhausted to continue.

Resuscitation by two people If a second person is present and able to help, one should assist the casualty's breathing while the other manipulates the chest compressions. To begin with, four assisted breaths should be given followed by five chest compressions. Subsequently, the correct procedure is to give one assisted breath for every five chest compressions. There should be no pause between the end of the chest compressions and the beginning of the assisted breath.

After one minute check for pulse and breathing; if neither is present continue the alternating breath/compression cycle and check every three minutes. Continue until either heartbeat and breathing are re-established, help arrives, or both helpers become too exhausted to continue. If heartbeat and breathing do return, check for any other injuries and place the casualty in the recovery position.

While assessing your priorities, keep these rules in mind

- ❶ Do not panic, no matter how serious the situation. Panic means that you will think less clearly. Take several deep breaths to calm yourself.
- ❷ A casualty's injuries will need to be assessed. You will need to use all your senses: ask (if the casualty is conscious); look (and if possible feel over the body for broken bones, blood etc); listen, smell, think – and act.
- ❸ Conscious casualties are an important source of information. Ask them to describe their symptoms and what they feel may be wrong with them.
- ❹ Avoid taking any action that will put you in danger. If you become injured, you will not be able to help anyone else.
- ❺ Boost the morale of your casualties. Offer comfort, reassurance and encouragement, thus building their mental strength and will to live.
- ❻ Get uninjured survivors to help you. Ask (out of earshot of any injured person) if anyone else has any medical experience.
- ❼ Separate those who are saveable from those who are not.

A skull fracture or concussion must be

suspected if any or all of the following symptoms are present:

- ❶ An obvious head wound, a bruise or a soft or depressed area on the scalp
- ❷ Unconsciousness, even for a short period of time.
- ❸ Clear or watery blood coming from the ears or nose.
- ❹ Blood in the white of the eye.
- ❺ The pupils of the eyes are unequal or unresponsive.
- ❻ A steady deterioration in responsiveness to external stimuli.



Attempt to remove any obstruction by slapping between the shoulder blades.

Choking Choking can be recognized by the casualty suddenly being unable to breathe or speak, grabbing at their throat or their skin turning pale blue.

The first priority is to try to remove whatever is causing the blockage in the windpipe. If the casualty is conscious, try to get them to cough it up. If this does not work, make a visual check of the mouth to see if the object can be cleared with a finger. If not, bend the casualty as far forward as

can be cleared that way. If not, lean the casualty as far forward as possible, preferably so that the head is below the level of the lungs. Give five sharp slaps between the shoulder blades with the heel of the hand, and check to see if the obstruction has been dislodged. This is usually enough to remove the object, but if it does not work and choking continues you will have to try to clear it by using abdominal thrusts.

To do this, stand behind the casualty and put your arms around him. Ball one of your fists and lock it in place with the palm of your other hand, making sure that one thumb is pressing into the abdomen. Pull your hands sharply inwards under the casualty's ribs. Repeat up to four more times before checking whether the object has been expelled. If this does not succeed at first, give five more back slaps and then five more abdominal thrusts. Keep trying until the object becomes dislodged. It is very unusual for this procedure to fail.



Aiding a casualty who is choking.

Self-Help

It is possible that you may become injured while you are on your own, and in this case it is sensible to have thought out a self-help routine:

- ❶ Try to rest Lie down somewhere, but preferably out of the wind.

- ② Use direct pressure on your wound to control the bleeding. If possible apply a dressing, sterile or improvised.
- ③ If available, use a bandage to maintain pressure. Tie it firmly but not so tight as to restrict circulation.
- ④ If possible, elevate the injured part and support it.
- ⑤ Pain will be lessened if you try to keep as still as possible.
- ⑥ Try to make sure that you can keep warm.

Choking when unconscious If the choking casualty becomes unconscious, first lie him on his side with his abdomen supported against your knee, and give four to five back slaps. If this does not dislodge the object, turn the casualty onto his back, kneel astride him, and perform the abdominal thrusts described above.

To do this, locate the heel of one hand just below the ribcage and cover it with the other hand. Press sharply inwards and upwards with the heel of the hand, up to five times. Check in the mouth to see if the object has been expelled. Continue alternating back slaps with abdominal thrusts until the obstruction is removed. If the casualty begins to breathe normally, place him in the recovery position and check breathing and pulse rates every three minutes.

If breathing does not recommence and/or there is no pulse, start immediately with assisted breathing and, if necessary, chest compressions.

Self-help when choking If you find that you are alone and choking, find something like the back of a chair or a tree trunk, and push it inwards and upwards into your abdomen to expel the air and, hopefully, the blockage. You could also attempt to use your own hands made into a fist to achieve the same effect.

Pressure Points

Indirect pressure utilizes pressure points. These are found where arteries cross bones near the skin's surface. For survival purposes, concentrate on the four points which flow to each limb.

- ❶ The pressure points in the arm are found down the centre of the inner side of the upper arm, on the brachial arteries.
- ❷ The main pressure point in the leg is on the femoral artery. The pressure point for this artery is in the middle of the groin. It is often easier to locate if the knee is bent so as to create the groin crease. Press firmly at this point against the bones of the pelvis.
- ❸ Locate the pressure point and, placing the thumb or fingers on it, apply enough pressure to flatten the artery against the bone. This should stop the blood flow.
- ❹ Pressure must not be kept on for any longer than ten minutes, or else other healthy tissue will be damaged through lack of blood. While using indirect pressure the wound may be dressed more effectively,- however, do not use a tourniquet, as this may cause tissue damage.

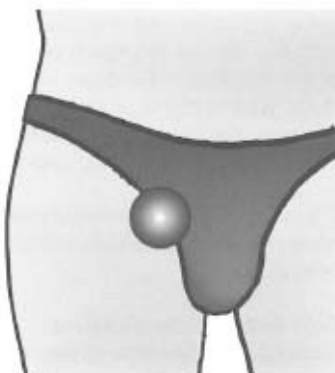
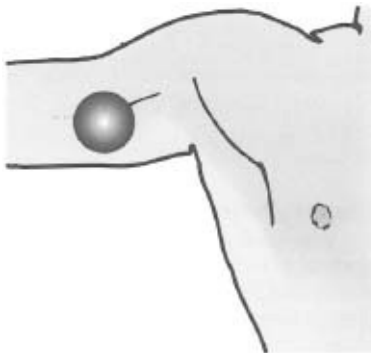
Bleeding

Once breathing and circulation are restored the next priority is bleeding. Bleeding may be external or internal.

Internal bleeding is difficult to treat with first aid, but external bleeding can be controlled.

Wounds present two main problems. Firstly, extensive bleeding can cause shock to develop, and will, if not controlled, lead to death. Secondly, any break in the skin will let infection in, so it is imperative that the wound site be kept as clean as possible. There are three procedures with which to stop the bleeding:

Direct Pressure Use a sterile dressing if you have one; if not, find a clean piece of cloth. Place the dressing on the wound and press on it gently but firmly. If you have no dressing available then you may have to use your hand, but bear in mind the dangers of infecting the wound. Use only dressings that are large enough to cover both the wound and part of the surrounding area. It is possible that the first dressing will become soaked through with blood. If this happens, lay a second dressing over the first and, if necessary, a third over the second.



By tying a bandage around the wound and dressings you will be able to keep the dressings in place with a continued firm pressure. It is important, however, that the bandage is not tied too tight, as this will restrict the flow of blood to the whole area.

Some large wounds will tend to gape. If you have suitable dressings you may use these to bring the edges of the wound together; otherwise you may have to use your hand. Blood flow from a large wound may be stopped by applying firm pressure, preferably with a pad of dressings, to the site of the greatest bleeding.

Using pressure on the wound helps the body's own mechanisms to slow down and finally to stop the bleeding. The damaged ends of blood vessels will shrink and start to retract in order to slow down the blood loss. Clotting agents are released so that the escaped blood eventually begins to thicken, and will eventually form a plug over the wound.

Sometimes these mechanisms will be enough to stop the bleeding on their own. However, the casualty may still be in danger of going into shock. It is therefore vital that they rest; and reassurance, too, is important – if the casualty is anxious it will only serve to raise his heart rate and blood pressure, which is not desirable. An injured limb should be elevated above the level of the heart, as long as it is comfortable for the casualty and not liable to make any other injury worse. This elevation not only reduces the flow of blood to the damaged area, but also helps the veins to drain blood away. This helps reduce blood loss through the wound. The elevated limb should be supported if possible, either by you or by padding.

Indirect Pressure If, due to the severity of the bleeding, the techniques described above do not work, then indirect pressure should be tried. However, this only works on arterial bleeding, so it is important to identify what type of bleed you are dealing with.

Arterial bleeding takes place from vessels which are carrying filtered and oxygenated blood away from the heart and lungs. It has no impurities and is therefore bright red. It will also spurt out of the wound in time with the heartbeat.

Venous bleeding takes place from vessels which are carrying blood full of

impurities away from the tissues towards the heart and lungs to be filtered and re-oxygenated. As venous blood is low in oxygen it is dark red in colour. It runs steadily or gushes from a wound at a steady rate.

Tourniquets The aim of first aid is to save life. If the damage to a limb is so severe that it plainly requires amputation, or if part of the limb is missing, and direct pressure will not stop the bleeding, then you may need to employ the third procedure by applying a tourniquet.

The tourniquet can be made from whatever cloth is at hand, but avoid any thin material that will cut into the flesh. Place it around the extremity, between the wound and the heart, 5 to 10cm (2-4ins) above the wound site.

Never place it directly over the wound or a fracture. Use a stick as a handle to tighten the tourniquet. Tighten it only enough to stop blood flow. Clean and bandage the wound.

The tourniquet must be slowly released every 10-15 minutes for a period of 1-2 minutes. You should continue to apply direct pressure at all times. Applying a tourniquet to prevent blood flow is a dangerous procedure, and should only be attempted when all else has failed.

Applying a Tourniquet



- 1 Use a loop above the wound secured with a square knot.



- 2 Insert a strong stick or similar under the loop to act as a tightening device.



- 3 Twist the stick, tightening sufficiently to stop bleeding.



- 4 Secure the stick to prevent the tourniquet becoming loose.

Fractures

Fractures normally occur during an accident in which a body has stumbled unrestrained or has been hit by a flying object. Not all fractures are readily apparent, but a casualty may have a bone fracture if he has difficulty in moving a particular part of the body normally and a sharp increase in pain when movement of the affected part is attempted.

Pronounced swelling, bruising, distortion and tenderness at the site of the injury are also good indicators of a fracture. An injured limb may look deformed or shortened, and a distinctive grating sound may be heard while attempting to move the limb. Signs of shock may be evident, especially if the injury is to the ribcage, pelvis or thighbone. The casualty may also have felt or heard the bone break.

In a survival situation the scope for treatment of a fracture is limited to immobilization of the injured part.

Splints should be applied before the casualty is moved unless there is some form of imminent danger which requires immediate evacuation. If conscious, fracture casualties will be experiencing pain, so handle them with the greatest of care so as not to cause increased distress. If the fracture has also caused a wound, this must be treated and stabilized before any splints are fitted.

The Recovery Position

An unconscious casualty with a regular heartbeat and who is breathing normally while showing no sign of serious injury should be placed in the recovery position. In this position the head is slightly lower than the body, thus preventing the tongue from blocking the airway and allowing any liquids such as blood or vomit to drain freely from the mouth.

Kneel to one side of the casualty and turn his head towards you. Straighten the nearest arm alongside the body with the other folded across the chest. Cross the ankles and roll the casualty towards you. Gently bend the upper arm and leg so that they safely maintain the body

Gently bend the upper arm and leg so that they safely maintain the body in the position. Keep the head, neck and back in a straight line.

If the casualty has spinal injuries or wounds the position may have to be slightly modified. In such cases use improvised padding, such as towels or rolled clothing, for extra support.

Splints Suitable splints can be improvised from small branches, sticks, or suitable pieces of equipment; rolled clothing or bedding can also be used in an emergency. Make sure that the splint is padded and that it supports the joints both above and below the fracture. In the case of a leg fracture, if no suitable substitute for a splint can be found in your environment then immobilize the injured leg by tying it to the good leg instead.



Splints can be improvised with composite materials as well as single objects.

Sometimes a fractured limb may become twisted, shortened or bent in such a way that immobilization proves impossible. Gentle traction to realign the limb can be used as long as the casualty can tolerate the pain. Pull gently in a straight line with the bone until the limb has been

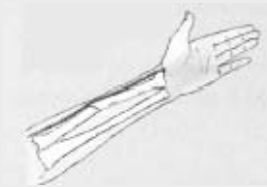
straightened. If this is done properly the casualty may find that the pain and any bleeding at the site of the fracture are significantly reduced.

Once you have done all you can to straighten the limb, apply the splints. If possible, elevate and support the fractured limb as this will help to reduce both any swelling and the danger of the casualty going into shock.

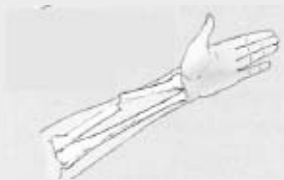
Make sure that the casualty receives plenty of rest.

Fractures

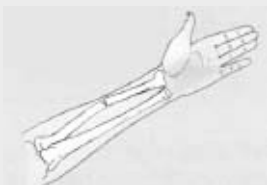
- ❶ Complicated fracture where broken bone has damaged blood vessel.



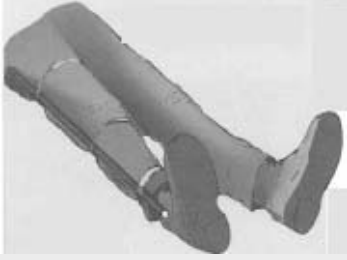
- ❷ Open fracture where bone is exposed.



- ❸ Closed fracture where bone is not exposed.



- ❹ Secure fractured limb above and below the knee 1 at the ankle.



- ⑤ Use padding with foot injuries. Elevating the foot reduces swelling.
- ⑥ Support a broken arm with a splint improvised from rolled up newspaper. Never use metal splints in a cold climate. Immobilize the arm with a sling to speed recovery and avoid further injury

Open Wounds

Cleaning Open Wounds The purpose of washing a wound is to remove as much bacteria as possible, thus giving the body's own defensive system the best chance of finishing the job. All exposed wounds, no matter how small, need to be cleaned. This is best done with water which has been sterilized by boiling, but clean, pure drinking water will suffice.

Deeper wounds can be washed out more efficiently by making some form of irrigation device to deliver a strong jet of water into the wound. A plastic bottle or a polythene bag can be pierced with a pinhole so that the water jets out when it is squeezed.

Adding a very small amount of soap or potassium permanganate to the water will assist in flushing out the wound. The amount of potassium permanganate crystals added should be barely enough to tint a pint of water; similarly, only enough soap should be added to barely cloud the water. If in doubt, err on the side of weakness.

Debris and Foreign Bodies Before starting any cleaning or irrigation, open the wound to its fullest extent and examine for debris – bits of clothing, glass, dirt, or any other foreign body which may have been forced into the wound at the time of injury. If these are small and not deeply impacted, remove them; if no properly sterile instruments are available, wash your hands with soap and water and use your fingers. (Instruments and wound dressings can be sterilized by boiling for five minutes.) Once the wound is open and foreign bodies have been removed, scrub it briskly while irrigating at the same time – this is a job best done by two people. Work quickly, as this will be very painful for the casualty. Apply a clean sterile dressing, and arrest any fresh bleeding by direct pressure. Check the wound on a daily basis.

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No matter what your situation, if you intend to handle open wounds or burns – whether on yourself or other casualties -you should reduce the risk of further infection by sterilizing your hands. Wash them with water, snow, alcohol, or anything that will disinfect them

disinfect them.

Unless they are life-threatening, larger foreign bodies deeply impacted should be left in place, as pulling at them may cause more serious damage. Control the bleeding by direct pressure, squeezing the wound along the line of the foreign body. Next, form a padded ring which will fit neatly over the protruding object, and secure it with a dressing.

Sucking wounds If air is allowed to enter the lungs from puncture wounds to the chest or back then a sucking wound will develop. Always check for sucking wounds if missiles or debris of any form have penetrated deeply, or if a rib is protruding from the chest or back. The lung on the affected side will collapse, and as the casualty breathes in so the sucked air will also impair the efficiency of the good lung. If the condition goes untreated the result will be a lack of oxygen reaching the bloodstream, which could cause asphyxia.

If a sucking wound is suspected, immediately cover the area with your hand. Support the casualty in a lop-sided sitting position with the functioning lung uppermost. Cover the wound with a clean dressing and place a plastic sheet over the top so that the plastic overlaps the dressing and wound; tape it down so as to form an airtight seal. If a foreign body is present in the wound, do not remove it, but pack with a ring as described above and fit an airtight seal.

Dislocations

Dislocations are caused when bone joints become separated and get out of alignment. This can be extremely painful, as the nerves and blood flow are affected. The best way to relieve this pain is to re-align the joint as quickly as possible. Although this is a simple process the joint will be swollen and extremely tender and the limb will suffer from a lack of mobility.

Dislocations are treated by reduction or 'setting' the bones back into their proper position. There are two basic methods available to the survivor, depending upon whether they are alone or not. In either case the appropriate action should be taken as quickly after the dislocation as possible. Both, if successful, will bring about a lessening of pain and restoration of the circulation. Once reduction is completed the limb should be immobilized, using splints if possible, and allowed to recover.

Use a well-padded splint above and below the injury site. Always check the circulation below the dislocation after completing the splint. Remove the splint after a week and start gentle exercises until the limb is fully functional.



Using a weight to assist reduction of a dislocation when there is nobody else

available to help.

Unassisted reduction The lone survivor will need to improvise some form of weight, e.g. a large rock or log, to which they can attach a cord from the limb. The idea is to stretch the limb slightly by countering against the weight, and aligning it back into place.

The procedure requires the body and/or limb to be rotated in order to set the joint while at the same time comparing it to the joint on the opposite side. All movement must be kept to a minimum, yet must be positive rather than hesitant.

The procedure should be performed lying down if possible, as it is extremely painful and the manoeuvre will require a great deal of will-power on the part of the survivor.

Assisted reduction The same basic procedure of stretching and re-aligning the limb is followed, but It has the advantage of being more often successful, since manipulation is usually more positive and precise when the casualty does not have to deliberately inflict pain on himself. Where possible one person should hold the casualty in a comfortable position while a second manipulates the limb into alignment. Again, this procedure is best done with the casualty lying down.

Concussion & Skull Fractures Skull fractures and concussion are also common after major accidents.

Concussion is a temporary disturbance of the brain, normally due to a severe blow or shaking. If conscious, the casualty should be made to lie down with their head and shoulders supported. If unconscious, make sure that they are breathing and have a pulse – if not, carry out artificial ventilation and chest compressions immediately.

If the casualty is unconscious but the breathing and pulse are normal, turn them into the recovery position and maintain a close check on their vital signs.

In either case, make sure that the casualty is kept warm and quiet and handled carefully. Apply a light padding to the injured area and hold it in place with a dressing. If blood is being discharged from an ear, lightly

cover it but do not block it. Concussion is normally only a temporary disturbance from which the chances of recovery are good.

Burns

Naked flames, boiling water, electrical devices, friction, acid, liquid oxygen, freezing metal and the sun all cause skin burns. The severity of the burn and the amount of body area affected will determine the casualty's survival chances.

Cooling Burns caused by naked flame should be cooled immediately to limit the damage caused by heat to the skin tissues. Either pour cold water slowly over the affected part, or immerse it totally in clean cold water.

This should continue for at least ten minutes to stop further tissue damage and to reduce pain and swelling.

Dressing Once the burn has been cooled, a dressing should be applied immediately to limit the possibility of it becoming infected. Do not attempt to remove any charred fibres that have stuck to the burn, but remove any restrictive clothing around the site to prevent further swelling. The dressing should be sterile and made of a non-fluffy material. Avoid adhesive dressings, which will only aggravate the injury and cause more damage.

In a survival situation sterilization of cloths, bandages and dressings can be achieved by scorching the cloth with a candle, as this will kill most bacteria. Do not be tempted to burst any burn blisters which form, as these provide a protective layer. A solution containing tannic acid derived from boiling oak or beech bark can be used to clean the burn; make sure that any such concoction has cooled before using it. If polythene bags are available they can be used to cover the burnt limb and help stop further infection.

Burns

- ① Cool the burnt area by immersion in cold clean water, or fresh snow.
- ② Protect hands and feet from further infection with a sealed polythene bag.
- ③ Do not use adhesive or fluffy dressings.
- ④ Do not break blisters or remove loose skin.
- ⑤ Do not apply ointment, oils or fats to the burn.

To reduce the possibility of shock setting in, lay burn casualties down and keep them warm and comforted. If the casualty is unconscious, turn him over into the recovery position and monitor his breathing and pulse closely.

Fluid loss

Fluids must be replaced using sterile (boiled) water mixed with a little salt. Check medical packs for any electrolyte powders. A juice made from potassium-rich fruit – such as apples and oranges – will help, as will honey if it can be found.

Survival Medical Pack

Knowledge of even basic first aid skills is a useful and valuable accomplishment in everyday life, but in a survival situation these skills take on immeasurable importance. It is important to put together a small emergency medical kit, based on your own personal medical skills. Obviously, if you are not trained as a medic, you should only include basic items, as detailed below.

Antihistamine Cream Antihistamine cream will soothe the severe irritation that insect bites or allergies can cause. Antihistamine tablets can be carried as an alternative, but beware – some cause drowsiness.

Antiseptic Potassium Permanganate crystals (see below) are easy to carry and provide an all round sterilizing agent, antiseptic and anti-fungal agent. A tube of general purpose antiseptic cream is also very handy.

Aspirin Aspirin will relieve mild pain and headaches and reduce a fever. Carry a strip of about a dozen soluble aspirin tablets.

Dressings Include at least one large wound dressing in your medical kit. As any soldier will tell you, always have it ready for immediate use. Note – the inside of a wound dressing contains cotton wool which makes excellent tinder, so make sure to retain all used dressings.

Electrolyte Drinks Most survivors will inevitably suffer from dehydration; this can occur in both hot and cold climates, and is mostly attributed to diarrhoea. While replacing fluid loss is the priority, body salts and minerals can also be replaced by adding an electrolyte drink.

Magnifying Glass In survival situations a magnifying glass is traditionally associated with fire-lighting by focusing the sun's rays on dry tinder; however, it is also useful for finding hard-to-see objects such as splinters and thorns. Short, sharp burns are also effective for removing leeches and ticks from the body.



Mosquito Repellent The chances of contracting malaria and other mosquito-borne diseases can be reduced if the correct precautions are taken. Anti-malarial tablets, as prescribed by a doctor, need to be taken; but it is just as important to deter the insects from biting you in the first place, so it is recommended that you include a mosquito/insect repellent in your kit.

Plasters Carry various sizes and shapes of waterproof plasters. Larger plasters are best, as they can always be cut down if necessary. Keep your plasters together in a waterproof sachet.

Potassium Permanganate A small tube of this crystalline chemical has many uses, and is carried in military survival kits. If mixed with a glycol-based substance such as anti-freeze it can be used to light a fire. A small amount added to water will make a sterilizing mouthwash, and a more concentrated mixture can be used to treat fungal diseases.

Surgical Blades Two surgical blades take up little space and are best left in their protective sterile wrapping. In use they can either be held between the fingers, or a handle can be fashioned from a small stick. Do not discard used surgical blades; sterilize them by boiling, and re-wrap. When a blade is no longer viable for surgery it will still make an excellent arrowhead.

Salt Salt is essential when travelling . Carry a small amount to make sure that the salt balance in the body is maintained. Try to reserve this resource for medical uses only and refrain from using it for culinary purposes. Salt water is also helpful in treating fungal infections.

Suture Plasters If you are unable to administer stitches, butterfly sutures will prove successful in closing small wounds.

High Altitude Sickness

This illness occurs in high mountains as a result of reduced oxygen in the air.

At 5,000 feet air contains only 80% of its oxygen at sea level. Muscles become starved of oxygen and physical demands on the body are increased.

The symptoms can appear within a few hours when working a height of around 7,000 feet or more. The higher and quicker you go, the greater the symptoms. These include nausea, headache, vomiting, and rapid heartbeat. Breathing also becomes more difficult. The age of the individual also makes a difference.

Altitude sickness becomes dangerous if allowed to persist, leading to a worsening of the symptoms and, additionally a loss of balance and difficulty in walking. Above 8,000 feet the lungs can become filled with a frothy fluid – pulmonary edema – resulting in compromised air exchange and shortness of breath.

Altitude sickness can be prevented by acclimatization prior to your excursion -however this can take several weeks. Where acclimatization has not taken place, slowing the rate of ascent will help the body adjust. Diamox can be taken prior to climbing (above 8,000 ft) to prevent altitude sickness but the only real cure is a slow descent to a safe altitude.

Survival Medicine



After the immediate priorities for first aid have been identified and acted upon, survivors in remote and uninhabited regions will face the need to monitor and safeguard their health under challenging conditions, perhaps for quite long periods.

In a survival situation it is obviously important to maintain health while

awaiting rescue – and this is absolutely central to preserving the survivors' option to make an attempt at travelling across country themselves.

Personal Hygiene When ill, weakened, or injured, the first priority is not medicine but a good standard of personal hygiene.

Proper hygiene, care in preparation of food and drink, waste disposal, insect and rodent control (and, of course, prior immunization) will greatly reduce the causes and number of diseases and infestations to which the survivor may fall victim. The importance of prevention of disease during any survival situation cannot be overstated, and physical hygiene is important. If you wish to protect yourself.

If possible, wash daily with warm water and soap. A small amount of water can be used to sponge the face, armpits, crotch and feet at least once a day. Regular washing, especially after defecation, is a necessity no matter how bad you are feeling.

Eat as often as you can to keep up strength, but stick to simple, easily digested and nourishing foods – a vegetable soup is ideal. Make sure that your water is pure and that you wash food before cooking it. Raw food should be avoided as it is not only harder to digest in most cases, it is also a possible source of contamination. Make sure that your liquid intake is sufficient – water or a herbal tea is the best drink for a body in a weakened state.

Immunization

Vaccinations are available against many diseases which may be threats in a survival situation, including typhoid, paratyphoid, yellow fever, typhus, tetanus, cholera and hepatitis. It is essential to obtain as many vaccinations as possible, making sure immunization records are kept up to date. Prior to visiting any foreign country you are advised to seek current medical advice and take extra immunizations and precautions. Make sure that you carry a good supply of anti-malarial tablets where necessary.

Underclothing collects dirt and sweat, so keep it dry and clean, especially if you are unable to change it regularly. If clothing cannot be washed it should be shaken vigorously and exposed to the sun and air at least once a day. The sun is a useful agent against disease, as few bacteria or viruses can survive exposure to ultra violet light.

Lice and Ticks Along with ticks, lice are also carriers of typhus, which is transmitted through their faeces.

Clothing should be checked regularly, and if any of these pests are discovered they should be removed either with a delousing powder if available, or by boiling, or by exposure to direct sunlight for a few hours. Louse bites should not be scratched, no matter how irritating, as this leaves the skin vulnerable to infection with typhus through the louse faeces. Instead, wash the skin with weak antiseptic or a strong soap.

When a tick bites into skin it embeds its head in the flesh. For this reason they should never be simply pulled off, as they may leave the head behind and this will cause an infection. Smothering their bodies in smoke, iodine, paraffin, petrol, etc will only make them vomit -thus, again, causing infection. The best way to remove a tick is to pinch the surrounding skin with tweezers, pulling the tick with the flesh. Apply thumb pressure to the small hole and it will stop bleeding and soon heal.

thumb pressure to the small hole and it will stop bleeding and soon heal.



Keeping the teeth clean reduces the risk of serious stomach upsets

Hair Hair can attract lice, and is best kept short. It is easier if another member of the party does this, using any available scissors rather than a knife. During any long-term survival situation (more than one week) all members of the party should crop their hair. Do not discard any cut hair – it can be used as tinder in fire-making. Shaving should not be encouraged during cold weather survival as it leads to cracked skin.

Teeth Teeth can be cleaned with an improvised toothbrush made by chewing the end of a stick to separate the fibres; use the stick only once, then discard it. Lye slurry, soap, sand and salt can be used instead of toothpaste. The inner strands of paracord or the fine fibres on the inside of tree bark can be used as dental floss. A mouthwash can be made from salt water, or pine needle tea. Painful cavities can be filled with candle wax to help relieve the pain.

Feet Feet require constant maintenance; blisters or ingrown toenails can be extremely painful, and may prevent a survivor from walking. Foot blisters are usually caused by ill-fitting boots, poor quality socks or loose laces, combined with long periods of walking over rough, uneven ground.



If you have to travel across country, how well you take care of your feet may determine whether or not you survive

Stop and treat small blisters immediately by covering them with surgical tape. A severe blister is often filled with fluid, and can be made more comfortable if the fluid is drained. Large blisters which look as if they are about to burst should be punctured with a sterilized needle and thread. Run the needle through the blister from side to side, then clip off the thread leaving a short length hanging out each side of the blister. This will ensure that the fluid drains without creating a large break in the skin. Make sure that the surrounding area is kept thoroughly clean and dry.

Ingrown toenails should be treated as soon as they become apparent. Without removing the nail the best method is to shave the top centre of the nail with a razor blade from your survival kit. Skim the middle third of

the nail, shaving from the bed towards the nail tip. Place a thin piece of plastic under the nail to prevent accidentally cutting the toe. When the nail is thin enough it will buckle into a ridge and relieve the outward pressure. Removing the nail altogether should be avoided, as this will require a dressing and may prevent the patient from walking for several days.

Survival Soap

Good hygiene prevents disease and illness, and is never more important than in a survival situation. Survival soap is easy to make and will help clean wounds and wash clothes.

- ❶ Melt animal fat by cooking it in water while constantly stirring. Drain off the grease into a flat tray to harden (a metal wheel hub is ideal).
- ❷ Take a clean sock or shirt sleeve and fill it with cold, crushed ash from the fire,- soak the whole sock in water, and hang it up so that the water and charcoal drip out – this liquid is potash or lye.
- ❸ Remelt the grease and add the lye, mixing two parts grease to one part lye. Boil the mixture until it thickens to the consistency of porridge, then allow it to cool.
- ❹ It can be used in its liquid form, but is best left to go solid and cut into blocks.



Herbal Medicine

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Herbal medicine has been practised worldwide since before recorded history, and many modern medications are derived from refined herbs. Although many herbal medicines and ancient treatments are effective, they should only be used when medical supplies are not available. The subject of survival medicine would fill many volumes, but a few of the more popular methods and remedies are listed here. Most herbal medicines are mild in their effects and therefore quite slow-working, unlike today's powerful pharmaceutical drugs. They work with the body, encouraging its natural healing processes and strengthening the immune system. Most herbal remedies are safe to use, especially if the casualty is in a weakened physical state, and will not cause side effects. Any allergies to the herb will become apparent before any serious damage occurs. However, do bear in mind that not all plants will have a positive effect; some plants with medical properties, such as foxglove, should never be used by the medically untrained.

Herbal medicines do not need to be complicated mixtures of different plants. Often one plant substance alone will have the desired healing effect. Try using one plant on its own and for a matter of days to register its effects.

Safe Medicinal Plants

As with edible plants, medicinal plants should only be considered if they have first been positively identified.

It is vital to know how to use the plant correctly and for what ailments. If the plant has a medical reputation but is also poisonous, leave it alone. The smallest mistake in dosage could kill or irreversibly damage major organs in the body. Potency will also vary in a plant from one location to another, so a correct dosage of a poisonous plant is almost impossible to judge in its wild state. Plants that have an edible as well as a medicinal use are the best to use.

Making Medicines

Whether for internal or external use, clean fresh herbs and plants are required for medical purposes. Internal use will require the plant being prepared either by infusion, decoction, maceration or powdered. Infusion is simply a matter of pouring boiling water over the plant or plant parts and leaving them for around 5 minutes (a little longer if the plant is tough). Decoction means boiling the plants or plant parts in order to extract the most from the plant. Maceration means crushing the plants or plant parts and leaving them for several days in water. Powder is obtained by drying the plant or plant parts followed by crushing and grinding.

The powder can be used to form a brew by adding water or moistened and rolled into small tablet-sized balls, the latter will be very strong. External use is either via a compress which has been soaked in a decoction or infusion and then applied to the wound, or a poultice made by crushing the plant or plant parts which are applied directly to the wound.

Fennel and Mistletoe To treat toothache, crush together an equal amount of fresh mistletoe leaves and fennel. Cover your finger with the juice and rub onto the gum around the affected tooth. This concoction was used in medieval times and is very effective.

Giant Puff Ball This large fungus should be cut into segments and rubbed into a powder. This can then be used on wet sores and weeping wounds. Cutting the ball into slices 3cm thick will produce a number of wound pads. Two hundred years ago puff balls were often harvested prior to battles purely for the purpose of field dressings.

Willow Willow provides the means to make an effective pain relief. Cut out a large patch of willow bark, making sure that the white inner skin is attached. Remove this skin in strips and boil it in clean water for about an hour. Allow to cool before drinking. Putting more of the inner skin into the concoction or boiling for longer can increase the strength. The stronger the brew, the less you need to take. The process involves trial and error, but this is an extremely effective remedy.

Garlic All members of the garlic family such as garlic mustard, chives,

leeks and hedge garlic etc, can be used to treat a wide variety of ailments. As a general rule of thumb all those plants that smell of garlic when the root is crushed are part of the same family and safe to eat (if unsure carry out the edibility test). Garlic contains an antibiotic called allicine together with concentrates of vitamins A, B and B2. Eating garlic will help protect you against food poisoning, amoebic dysentery and typhoid. The plant root bulbs should be cleaned and the first layer of skin removed, thereafter they can be eaten raw or used to flavour soups and stews.

Remedies

- The bulbs of wild garlic can be crushed and used directly on a wound, or may be boiled to extract the oils and applied as an antiseptic.
- A handful of salt added to a litre of boiling water and allowed to cool will produce a solution that will kill bacteria.
- Sphagnum moss is a natural source of iodine, and makes a useful dressing. It is found in bogs all over the world.
- Remove the paper and tip from a cigarette and chew the tobacco until your mouth has produced enough saliva to allow swallowing. The ingested nicotine will kill most stomach worms. Repeat the process for several days until the infestation has stopped.
- The addition of hot peppers to your food diet will create a parasite-free digestive system.

Remedies

Antiseptics Wounds may become infected quite easily, but luckily there are certain plants which have natural antiseptic properties. If you have time, take the plant material and make an infusion with which the wound can be washed. In an emergency the same plant material can be chewed to make a pulp which can be applied to the affected area. Examples of some plants which may be used in this way are: birch (*betula pendula*); dried burdock (*arctium lappa*), and thyme (*thymus vulgaris*).

Bites and Stings Apart from being irritating, insect bites, in particular, can leave the skin open to infection. Some insects are also the carriers of dangerous and debilitating diseases and parasites. Bee, wasp, hornet, spider and scorpion stings should be removed if visible and the wound dressed with a cold compress of mud. Slow-burning, smoky fires will drive insects away; it is best to light one on the windward side of camp. A ring of ash around your sleeping area or camp site will deter most crawling insects.

Headaches Survivors often suffer from headaches, especially during the first few days of their ordeal. A good remedy is to drink a soothing mint tea while applying crushed mint leaves to the forehead and temples.

Other effective teas can be made from rose hips and/or petals, and feverfew (*chrysanthemum parthenium*).

Mosquitoes As mosquitoes breed in stagnant, sluggish water or swampy ground you would be well advised to avoid camping near any of these, aiming for higher ground where possible. They bite mainly during the late evening and night – although those which carry dengue fever also bite in the daytime. Use any available insect repellent. Make sure that exposed skin is covered as much as possible; tuck trouser legs into socks and sleeves into gloves. Cover your body with mosquito netting, parachute material, handkerchiefs, or anything else that you can improvise. Smearing mud over any exposed areas of skin will reduce the number of bites that you will suffer.

Poisoning If you are forced to live on wild plants your chances of being poisoned are greatly increased.

The danger can be averted by eating only those plants or fungi which are

The danger can be averted by eating only those plants or fungi which are easily recognizable. If poisoning is suspected, the patient must be made to vomit. A glass of water mixed with salt followed rapidly by gagging should produce the desired result. Use your fingers or a smooth cold instrument such as a spoon handle to stimulate the throat. After vomiting is completed give the patient a drink of charcoal slurry, which should help absorb any remaining poison.

Rashes Avoid scratching any rash. As a basic rule of thumb, dry rashes should be kept damp and wet rashes kept dry. A small rendering of boiled animal fat and crushed charcoal rubbed into a dry rash will help prevent the skin cracking and promote healing. Fungal infections are best exposed to direct sunlight whenever possible, and should be kept dry. All skin rashes that become infected should be treated as open wounds and dressed accordingly.

Treatment with Maggots

There has been much speculation about the use of maggots in wound treatment. They do have a value; however, they can be a double-edged weapon, and their use must be carefully monitored. They should only be applied when antibiotics are not available. Despite the hazards involved, maggot therapy should be considered if a wound becomes severely infected and ordinary debridement of rotting tissue is impossible.

❶ Remove any bandages to expose the wound to flies, which will deposit their eggs on the rotting flesh.

Warning; The flies are also likely to introduce bacteria into a wound, causing additional complications. Limit the number of flies accessing the wound – one exposure should ensure enough maggots. Live or hatching maggots will naturally find their way into the wound, at which stage the wound should be covered with a clean dressing.

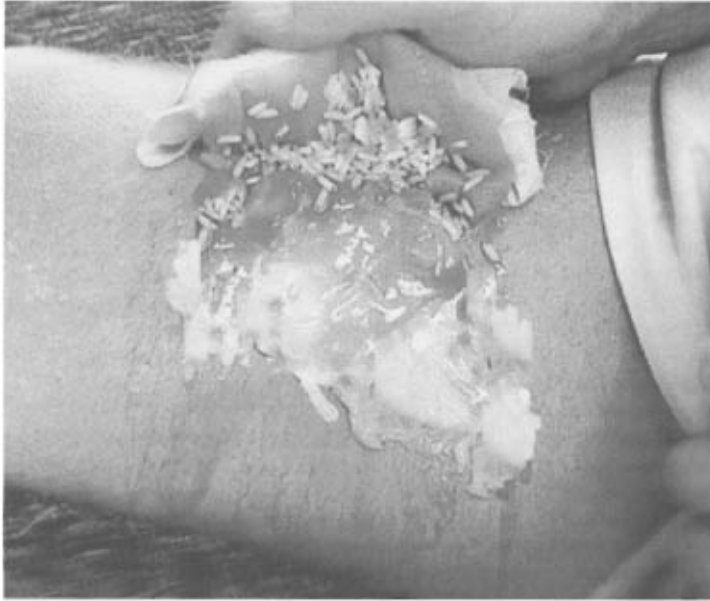
❷ The dressing should be removed daily to check for maggots; if none are found within three days expose the wound to the flies once more. If there are too many maggots, remove the surplus with a sterilized instrument, leaving no more than a hundred in the wound.

❸ Monitor maggot activity very closely each day. The maggots produce a frothy red fluid which must be sponged away with a sterile cloth in order to keep track of the maggots' progress. The time taken by the maggots to clean the putrefying tissue from the wound will depend on several factors: the nature and depth of the wound, the number of maggots present, and the type of fly which laid the eggs.

❹ Many people believe that maggots will only feed on dead tissue, but this is not the case – they also eat living tissue if nothing else is available. Maggots eat at an alarming rate, so the wound should be checked on a regular basis or whenever the patient feels any sharp increase in pain; this, and any fresh blood flow, are good indicators that the maggots have eaten all the dead tissue and have started to invade healthy flesh.

❺ At this stage all the maggots should be removed by flushing the wound with sterile water or fresh urine; it should then be carefully sponged dry.

The wound should be left open, and checked every few hours to ensure that it is completely free of maggots. Once all of the maggots have been removed, bandage the wound and treat as normal.



Maggot activity should be monitored closely.

Shelter in a Cold Climate



In conditions of extreme cold shelter must be the first priority: get out of the wind – you will die if you remain in the open for any length of time. Arctic and mountain storms can last for several days, causing drifting snow to bury your shelter.

Time should only be spent in building if conditions allow or you have no

other choice, *i.e.* you are above the tree line on flat, snow-covered ice. If you have access to an immobilized vehicle or wrecked aircraft, use these rather than looking for any other means of shelter.

Natural building materials In the Arctic vary with latitude and season. On the northern ice floe you will be limited to snow and ice; the tundra has the added benefit of short bushes and moss; while the forest below the mountain tree line offers an abundance of building material. Snow will vary in depth and level of compaction; this will be a deciding factor as to the type of shelter to be built. While some are simple to make, others require a degree of effort and time, especially if they are to be used long term. If building in a forested area, watch out for rotting or falling trees, and beware of heavy snow-laden branches breaking off. In mountainous areas look for caves or overhangs.

As a guide to cold climate shelter, consider the traditional living habits of the Inuit inhabitants of such regions. During the winter most lived in shelters made from sod, constructed before the winter cold set in. In many cases the floor was dug down into the earth, which makes them warmer. The dome-shaped igloo we normally associate with these peoples was used more as a temporary shelter while hunting. Tents made of animal skins were used in the summer; these normally had a frame of whalebone or timber covered with caribou or seal skin. Both summer and winter shelters were fitted with several coverings of animal skin which formed the seating or sleeping areas. Heat and light was supplied from soapstone lamps burning rendered seal oil.

The type of shelter you build will depend on a number of criteria:

- Where you are and what weather conditions prevail.
- What you need shelter from – wind, snow, rain, cold or insects.
- What materials and tools are available.

Shelter Construction

Aircraft and Vehicles Aircraft and vehicles make excellent shelters in the summer; their major advantage over improvised shelters is that they can be sealed to protect against biting insects. Their use in winter will depend largely on how well you can insulate the interior. Most

commercial aircraft are extremely well insulated and will provide excellent shelter; small outputs of heat from candles or a contained fire will raise the temperature enough for people to survive. Most commercial aircraft which fly over the Arctic carry as part of their survival equipment camping stoves which burn aviation fuel. If proper care is taken they can be used inside the aircraft for both heating and cooking (always check for carbon monoxide poisoning). If the aircraft or vehicle hull is not insulated, you are better off building a snow shelter outside.

Getting Under Cover

- Even the most desolate regions and climates can provide survivors with the means of shelter.
- In Arctic forest, use trees and branches.
- On the tundra, use bushes, moss and earth.
- If nothing else is available, the snow itself can protect you.

Life Rafts Life rafts designed for survival at sea make excellent emergency shelters on land, and will accommodate a large number of people. They are easily inflated, thus providing instant protection against the wind and snow. Some form of insulation will be required if they are placed directly on a cold surface. Care should be taken not to puncture the outer rubber (a repair kit is included), especially if you intend to use the raft on water at a later date. All life rafts come complete with survival and medical packs, including food and water. Most models are packed in a plastic outer case which, if straps are attached, can be pulled along as easily as any sledge. One-man preparation time: 5 minutes. Location: anywhere.

Building Materials

Foliage Foliage, particularly if it is large-leafed, will make an excellent

waterproof covering for a shelter, and should prove quite durable. Branches, bark, large-leaved plants, straw, moss and grass can all be used as a covering, while thin trees and saplings make excellent frameworks.

Turf Trees and shrubs may be in short supply. Turf can be used to construct shelters and to roof them over. The local populations of many countries use turf as a roofing material.

Rocks and Stones Rocks and stones provide very acceptable building material in places where the ground is too hard to dig or where a more permanent shelter is required.

Snow Snow blocks can be cut and formed into a number of different shelters.

Sheeting Plastic or canvas sheeting of any kind can be used in the construction of a shelter – ground sheets, parachutes, plastic sacks, jute sacking, tarpaulins and blankets can all be used in some way.

Finding and Making Cord All survival kits should include a length of parachute cord; but many survival situations will also reveal several ways in which cordage can be produced. Parachutes contain at least 100 metres of excellent cord, from which the thin, inner strands can be extracted. Electric cable and control lines are also a valuable source of material for making lashings. Many military combat belts are made up of a series of strong cotton strips, and the material can be unravelled to make cordage.

LIFESAVER

Building a snow shelter even in temperatures of -30° C will cause you to perspire. Remove an inner garment (retain any waterproof outer) before you start building, replacing it the moment you are snugly inside your shelter. Whatever form of shelter you build you must have ventilation, especially if burning a fire inside your shelter.

These two elements are vital to your survival.



Any-type of forest area will provide the material to make a good shelter

Natural materials such as animal sinew and gut make ideal cordage. These are best dried and separated into the required thickness. Wetting them before use will allow for easy manipulation, while their hardening when dry will hold any knot firmly in place. The bark of some trees can be used, either in its natural state or split into stringy fibres.

Knots Knots and lashing are best kept simple, and require little or no explanation. If the survivor is unable to tie a secure knot then his chances of survival are fairly limited. It should also be remembered that any knot or lashing is only as strong as the material used in its construction. Knots and ropes are used in climbing, shelter construction, and a whole host of survival applications. A knot can join one or more ropes together, either permanently or for quick release depending on the requirement.

Types of Shelter

Quick Snow Shelter In flat, snow-covered areas above the tree line it is possible to make a quick snow shelter by simply forming a mound and covering it with a sheet of some kind. Snow is heaped on top of the sheet and compressed firmly; this layer should be about 30cm (12ins) thick. Your mound can be based upon anything from your rucksack to foliage, wreckage, or – if you have nothing else – simply snow. It is vital that you

have some form of covering over most of your mound, as this enables you to remove the contents after the compressed snow has frozen to form a sufficiently hard outer shell. Cut a hole on the leeward side of the snow dome large enough to recover your rucksack or other contents of your mound. If you are forced to use snow to form your inner mound then scoop this out; once you have removed about half the snow the rest can be pulled clear by removing covering. Don't worry if small parts cave-in – these can easily be repaired. Leave a small hole in the roof to breathe through. When you enter your shelter for the night close the entrance with your rucksack, or a giant snowball. One-man construction time: 30 minutes. Location: ice pack, tundra.

The Snow Hive



Where the snow is not suitable to construct an igloo, a snow hive can be built.



Pack snow on top of a dome made from foliage or other material, covered with some sheeting.

Build up the snow to a thickness of about 30 cm.

Carefully remove the foliage and sheeting from inside the dome.

By blocking the entrance you will create a good shelter that will stand for up to seven days.

Simple Snow Trench The simplest form of protection is to dig a trench or tunnel-type shelter in the snow.

This tends to be a temporary or emergency measure used when hit by a snowstorm or unable to travel due to injury. It has only one purpose: to keep out the wind. A roof can be added; this can be made of snow blocks, if it is packed hard enough. Otherwise use branches, or some form of sheeting such as a poncho. These shelters can be built completely into the snow, partially sunken, or on the surface, depending on snow conditions and thickness. One-man construction time: 10 minutes. Location: ice pack, tundra.

A simple snow trench



Fir Tree Den



Dig the snow out from around the base of the tree.

Pile the snow up around the edges to form a wall.

Light a fire in a position that will not melt snow on overhanging branches.

Fir Tree Den In wooded areas a large fir tree forms an excellent basis for a winter shelter. Natural hollows in the snow can usually be found around the base of the trunk, especially on the lee side, and these will provide a good starting place for your shelter. Dig out the rest of the snow in the hollow and pile it up on the sides of your shelter area to give you greater protection from the elements. Roofing and bedding material can be made from the lower branches cut from the other side of the same tree. A fire can be lit, but make sure that it is a little further around the trunk away from your shelter – the heat from the fire will melt the snow from the overhead branches. One-man construction time: 30 minutes. Location: tree line.

LIFESAVER

Overnight Tips

- ❶ Wet clothes can be left to freeze, at which stage the ice can be removed by beating and shaking vigorously.
- ❷ Wet boots can be dried by placing a warm stone from around the fire inside (use a couple of sticks to lift it). Check that the exhaust emitting from the boot is steam and not smoke. Several smaller stones are better than one large one. In some terrain hot

sand from around your fire can be used in the same way.

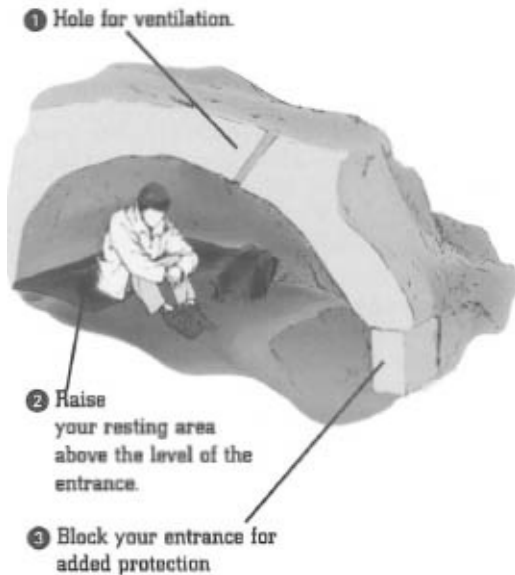
③ If you have a survival gun or other metal weapon it is best left outside your shelter, thus maintaining a constant temperature and avoiding condensation. Cover the weapon with cloth to protect against the snow and frost.

④ By contrast, ammunition is best kept in your pocket.

Snow Shelters

- Whatever form of refuge you build, you must have ventilation, especially if burning a fire inside your shelter.
- Always take your digging tools inside the shelter -you may have to dig yourself out again.
- Mark the exit to the shelter – since you may need to find it in a hurry
- Once inside, remove loose snow from clothing before it melts.
- If you have a cooker, don't boil water for too long – it causes a lot of condensation.

Drift Cave



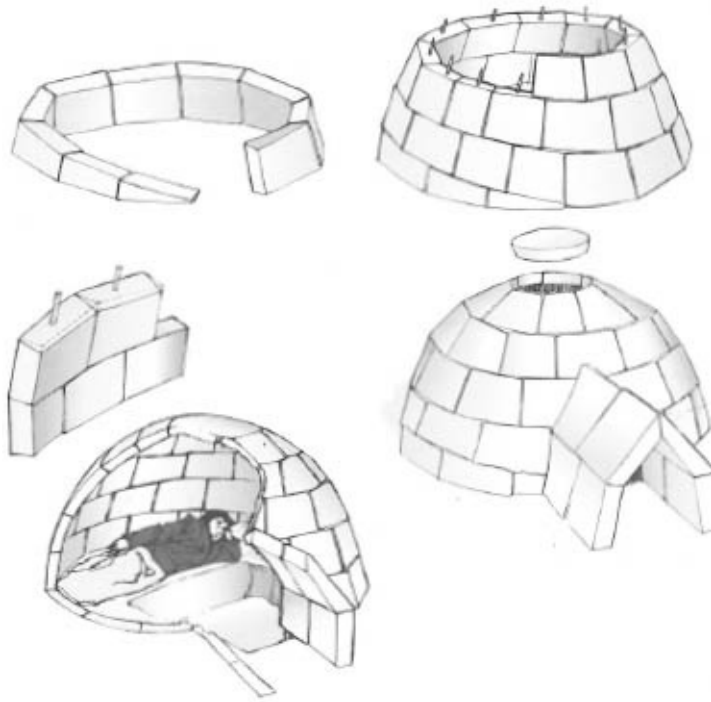
Snow Frame The snow frame is ideal in Arctic tundra areas and where the vegetation is reduced to short scrub, (if time and materials allow, this type of shelter can be made to provide a comfortable home for any number of survivors. Select an area where the short brush is thickest, and outline your shelter by stamping down the snow. Cut/break and remove any vegetation within the shelter perimeter. Carefully (they will break when frozen) bend over saplings on either side and interlace to form an arch. A side weave of saplings will help support the frame and give it strength. In winter the frame can be covered with a combination of piled branches if available, or tundra moss on top of which snow can be packed. Use a rucksack or giant snowball to block the door, and vent the shelter by making a hole in the roof. One-man construction time: 2 hours. Location: tree line, tundra.

Drift Cave To make a drift cave shelter the snow will need to be at least 2m (6.5ft) or more in depth -a snowdrift or cornice is ideal. The inside of the roof should always be dome-shaped – anything else will probably fall on your head by morning. Packed snow is often hard to cut through, and this type of shelter may require much effort and time on the part of the survivor. It will also require the use of some digging tools. One-man construction time: 1 hour. Location: pack ice, mountains.

Snow Igloo A snow igloo requires real effort and should only be built if time and tools are available. The igloo is a semi-permanent shelter, designed to withstand strong winds on an exposed treeless expanse. The

tools needed for its construction are a saw or flat spade, and a long-bladed knife. Although a lone survivor could build an igloo, the work will be much easier and quicker with two or three. The other essential ingredient is cold, compacted snow.

The Snow Igloo



- ❶ Blocks should be laid in a rising spiral.
- ❷ Small sticks will hold blocks in place until they freeze together.
- ❸ The final block should be tapered like a plug.
- ❹ Building a tunnel entrance helps to keep out the wind.

First, the snow of the area where the igloo is to be built will need to be stamped down flat. Then the snow blocks should be cut: 80-90cm long, 50cm wide, and 10-15 cm thick (32-35ins x 20ins x 4-6 inches). The blocks are built upwards from a circular base in a spiral form which is angled both upwards and inwards. Cut the blocks uniformly and place them carefully. Use a knife to chip away any uneven surface when laying one block on top of another. Dig or build an entrance tunnel on the leeward side of the igloo. Igloos retain any heat generated inside – even

a single candle placed in the middle will produce an amazing amount of warmth. One-man construction time: 2-3 hours. Location: ice pack, barren areas.

One-Pole Snow Tepee The snow tepee is used mainly while travelling or where time does not allow the building of a proper shelter. Whenever travelling in the Arctic you should equip yourself with a sturdy 4m (13ft) pole. Apart from helping with navigation and when crossing ice, such a pole will also form the framework of your tepee. Stamp down the snow and drive your pole (tip towards the wind) into the ground at a 30° angle. Next drape over your covering – you will need something at least the size of a military poncho – and secure it. Some form of ground insulation and a fire will improve the tepee. One-man construction time: 5-10 minutes. Location: anywhere.

Forested areas provide many opportunities to make a shelter. Fallen logs offer the means to fashion an especially simple type. Move two fallen logs until they are close to one another and parallel; then dig a trough between them. Roof the area between the tops of the logs with branches and foliage. If there is only one log to hand, a low earth wall can always be thrown up to provide the second side of the shelter, or else it could be used as the basis for a small lean-to.

Lean-to The lean-to pattern of shelter is the most commonly built, and one of the simplest to construct.

The only important thing to remember is to build it so that the roof slopes down into the prevailing wind. The frame itself could be covered by any material that is available – plastic sheeting, foliage, a groundsheet, wreckage panels, *etc.* Turf blocks or layer of firm, dried mud on top of foliage provides an excellent cover -it is both waterproof and windproof, and will not blow away. Once the roof has been established, the sides can also be filled in using a similar mud, foliage or turf fabrication. Construction time: 1 hour.

Double Lean-to If you are surviving in the winter tree line and there are several people in your party, then you might consider building a double lean-to. This is basically the same as a normal lean-to except that two open sides face one another with a fire in between. This has the

advantage of reducing the amount of fuel needed. The windward side needs to be completely blocked; and the sloping sides need to be at least a metre apart at the apex in order to vent the fire properly.

Sleeping in the Arctic

- Make sure your shelter is windproof.
- Sleep on a good bed of insulating material.
- Have a plentiful supply of fuel handy.
- Eat your main meal just before you go to bed.
- Exercise to warm your muscles, but do not perspire.
- Strip and rub your body with a dry towel.
- Put on extra clothes and socks.
- Wear a hat to bed.
- Visit the latrine trench just before you go to sleep.
- Four hours' sleep before midnight is better than four after.
- If you cannot sleep, plan what you will do the next day.

If you have a good supply of cord in your equipment, you could consider building another variation on the basic lean-to. This version is especially suited to areas with short, shrubby vegetation. First, cut four or five very long, pliable stakes, and push their ends into the ground in a circular pattern so that they will stand firm.

Bend the tops inwards at an angle of 45 degrees, and tie them together. If there are any suitable saplings growing in the immediate area, consider saving yourself some time and energy by incorporating them into the design as they stand – they will also give much more strength and stability to the shelter.

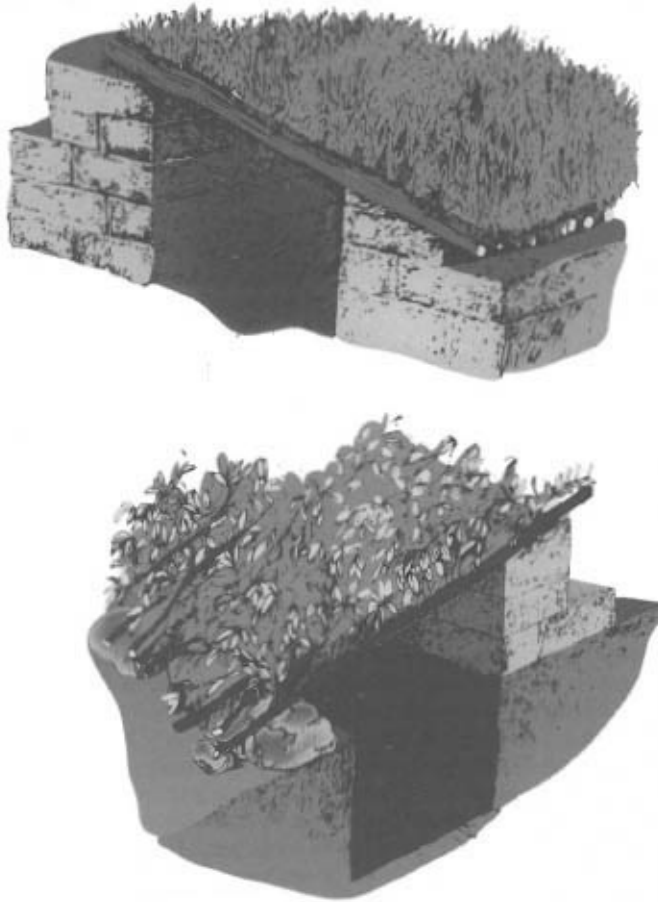
stability to the shelter.

Once the basic framework is in place, weave twigs, branches and foliage between the struts to form a rigid structure. Add more foliage until it is totally covered, and finally complete the roof with a layer of firm mud or light turf.

Construction time: 1 hour 30 minutes.

Quick Tree Shelter Any small tree can form the basis of a quick and simple shelter. After selecting the tree, cut or saw part way through the trunk at about shoulder-height. Once you have cut most of the way through, push on the upper portion so that it falls and rests on the ground while still being supported by the intact part of the trunk. Break the up-standing branches on the outside of the trunk so that they hang down and form the sides of the shelter. Cut out the branches from the underside to make room for you to get underneath, and weave them into the shelter's structure. Construction time: 30 minutes.

Turf Shelters



- ❶ Turf shelter built with two walls of blocks of different heights, to provide the roof with a run-off slope.
- ❷ Even simpler shelter made from single wall of turf blocks and a lower earth wall.

Turf Shelter 1 If trees are in short supply or entirely absent and you are on grassland, it is still possible to build a shelter from cut Turf bricks. Once the sides are built to the desired height try to find material to make 'rafters' to support a Turf roofing layer, small sticks or boughs are ideal for this if any are available.

Otherwise, use any sheet material that you have in your equipment, anchoring it at the sides with Turf blocks.

If none of these are available, make the shelter small and narrow enough to roof it over with long Turf strips; use them in pairs so that they support each other. Whatever roofing method you use, try to give the roof a pitch of anything up to a 45-degree angle so that rain will run off it better.

Construction time: 1 to 2 hours.



Snow used to anchor the edges of a shelter

Turf Shelter 2 Soft ground (but not wet) will provide the opportunity for a slight variation on the design of the above shelter. Build the wall up along the edge of the slit trench produced by the digging or cutting of the Turf pieces. This not only saves effort by combining the digging and the building, but will also increase the height of your windbreak. If you do decide to adopt this method, ensure that the slope of the land and the shelter will drain rain water away from the trench and not into it.

Construction time: 1 hour.

Parachute Tent A parachute, if you are lucky enough to have one, will be a valuable asset in building a shelter, as it can easily be made into a bell tent. First, the paracord rigging lines should be removed; keep the cord, which is extremely valuable in a survival situation. Take hold of the centre of the parachute and tie a long length of cord to it. At the other end of the cord tie a heavy stone or log, and throw it over a suitable tree branch. Pull on the cord to raise the parachute to its full height, and then secure it to the trunk of the tree. Then spread out the skirt of the parachute into a circle, and peg it into the ground. This should provide you with a shelter that is windproof and rainproof (as long as the material is not touched); however, the fabric is not robust enough to keep out very

heavy rain.

Construction time: 20 minutes.

Tepee If desired, the parachute can be used to form the covering of a more traditional tepee. This will require a minimum of five thin poles which are at least 4 metres in length. Lay the poles side by side on the ground *and* lash them together at one end. Drape the parachute over the poles, passing the hole in the apex over the lashed-together pole tips and tying it securely to them. Get underneath the canopy and lift all the poles together until they are standing vertical. Splay the poles out in a circle until it becomes self-supporting.

Gather the surplus material at the skirt of the parachute and fold it up around the legs until you have formed a tepee. Cut a 'door' into the lee side of the tent in such a way that it can be fastened closed if necessary.



Foliage used to provide additional insulation to a shelter

Secure the parachute skirt with stones to prevent draughts. Construction time: 1 hour.

Shelter Location

Do not waste time and energy in building a shelter or windbreak if naturally occurring protection can be found nearby. Look at the

naturally occurring protection can be found nearby. Look at the possibilities afforded by trees, bushes or natural hollows. Caves and rock overhangs will also give shelter – but check for signs of dangerous rock falls from above.

The type of shelter you build, and where it is sited, will depend very much upon the terrain, climate and your personal situation. Nevertheless, there are general guidelines which can be applied in any situation, and these should be carefully considered before you start to construct your shelter:

If there is no natural cover and you have to construct one from scratch, build it so that its entrance or open side is on the leeward side (i.e. facing away from the wind). A shelter on a hillside may be warmer than one on a valley floor, where colder air tends to sink; but a hillside location may also prove too exposed. The ideal shelter should be built close to a source of firewood and building materials. In a wooded area, near a fast-flowing stream which contains fish.

Camp Life

If you are part of a group then leadership will normally fall to the captain, pilot or senior crew member, although this authority may be bestowed on a more qualified person. Always work in pairs so that you can watch each other's faces for signs of frostbite. Everyone should be allocated work in order to occupy their time; those who are not seriously injured but immobile can still tend fires, watch and listen for rescue, keep a written log, and make emergency tools.



Digging out a drift cave

Ensure a Good Night's Sleep

We normally spend one-third of our day sleeping. In a survival situation, particularly in the Arctic, this can increase to as much as 12 to 14 hours while waiting to be rescued. Provided that you are warm this can be beneficial, as it prevents fatigue and exhaustion. Sleeping in the cold can be made easier by lying on some form of insulation mat – this can be either animal skin, foam or even cardboard. If you have them, life jackets provide good insulation and extra comfort. Protection from the wind can be achieved by simply covering the body with a plastic survival bag. Sharing body heat with other survivors is comforting – forget the inhibitions and huddle together. Place older people and children in the middle.

If conditions allow and there are no limiting factors, daily exercise in the form of hunting and foraging for fuel will also help ensure a good night's sleep.

Fur Blanket or Poncho If you manage to catch several large animals you are best advised to use their skins to make a blanket or poncho. It needs to be around 1.5m wide and 4m long (5ft x 13 ft). Even in long term survival situations, forget about any stitching or sewing: simply tie the ends together with dried animal gut.

This makes an excellent poncho by day or sleeping bag and insulator by night. A warm hat can be fashioned out of a smaller animal such as an Arctic hare.

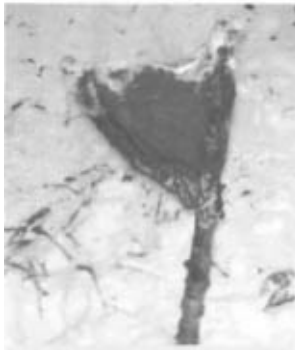
Utensils

Billy Can A 'billy can' is perhaps the most important utensil for the survivor – a container which can be used to collect water and plants, and also for cooking. Any metal container, such as a commercial-sized baked bean can, makes one of the best, with a wire handle attached for carrying.

Birch Bark Containers Containers made from birch or cherry bark will not burn through when heated over a moderate fire, provided that you fill them with sufficient water. Cooking on a fire of glowing embers produces a much better meal and extends the life of the bark container. Shoes can

also be produced from such bark.

Eating Utensils If you have a penknife, you can construct a simple spoon from a flat piece of wood. Mugs can be made from a section of bamboo, a carved-out piece of wood, or a folded piece of birch bark. Many naturally occurring items can be fashioned into simple but adequate eating and drinking utensils with a little ingenuity and experimentation.



A digging tool can be improvised from cloth and a branch

Tyres In survival situations brought about by vehicle accidents the survivor may well have access to tyres, which are a valuable resource. Tyre rubber can be cut up to make shoes and belts, and the reinforcing wire can be stripped out for traps and snares. Burning tyres create large amounts of black, acrid smoke which is excellent for signalling; for this reason they should normally be kept for use in rescue beacons rather than used for everyday fuel. (However, they could be used in an emergency when fire was a question of life or death, after e.g. falling through ice.) A tyre set in the middle of a three-pole frame makes a comfortable toilet seat; its value to morale should not be dismissed, particularly where survivors are suffering from digestive disorders.

Improvised Digging Tool If no purpose-made tool or more obvious materials are available, then improvise in the following way. Use any spare clothing such as a teeshirt, and place it over a forked branch leaving a long enough stem to act as a handle. Wet the fabric -urine will do if nothing else is available – and allow the whole lot to freeze. The end product will be a very effective snow-digging tool.

Fire

Warning: Believe it or not, the most common cause of accidental death in the Arctic is not freezing but fire.

However, fire remains the single most important element in survival under Arctic conditions. If you are leaving your shelter for any length of time always make sure there is a fire laid ready with a reasonable supply of fuel. Even if you are travelling and it is not your intention to return, unforeseeable circumstances may force you to do so, and finding a fire ready to light at once could make the difference between life and death.

Lamps and Heaters

Oils and fats from many sources and at various stages of refinement can be used to make a simple oil lamp or heater. You will need a receptacle to hold your fat or oil, and a small length of cord or cloth to act as a wick – most porous materials will burn when soaked or immersed in oil or fat. The wick should be well immersed in oil or rubbed with the fat, ensuring complete saturation. If using oil, a float of some sort may be required to keep the burning end of the wick above the surface of the oil.

Fire



In every extreme survival situation, fire is essential. Therefore the ability to light a fire, even in difficult conditions, is an invaluable skill that needs to be learnt and cultivated.

Practical and Morale Value

Practical and Moral Value

Fire has many obvious practical uses. Heat sustains well-being and life itself in cold or wet environments. Fire can be used to cook food, to dry clothes, to purify water and sterilize medical instruments, and to signal your rescuers. Waterborne diseases are one of the greatest dangers to survival (see Water section), but boiling will kill most harmful organisms. Hot drinks provide a vital source of body heat. Cooking food not only makes it more palatable, but also destroys many harmful organisms in animal products and neutralizes the toxins found in many plants.

Fire also plays an important psychological role in survival. Being able to build a fire proves to the survivor that he can control at least some elements of his situation and provide himself with the comfort of warmth and light. He will feel that he has achieved something positive by bringing back a hint of normality to his life.

To make a successful fire you need three elements: heat, oxygen, and fuel. If any element is missing your fire will not burn. However, before you even start to build any fire consider the following questions:

- Does the time you intend staying in your present location justify a fire?
- Do you really need a fire?
- Is there enough fuel nearby to sustain a fire?
- Are you in an area where fire could easily spread out of control?

Fire-starting Materials

Building a fire calls for an understanding of the dynamics involved. When any fuel is burned, part of the heat from that combustion will go on to ignite the next piece of fuel. The hotter a fire the better it will burn.

You do not need a great deal of heat for the initial ignition - a match is usually enough. However, because the first heat source is so small and lasts for only a short time, the material you apply it to must ignite very easily. This material we call tinder.

'Feathered' sticks make excellent kindling.



Tinder Whatever its source, tinder must fulfil certain criteria if it is to ignite readily. It must be bone dry and small in size, and must readily accept flame. Ideally the tinder should burn quickly, producing maximum heat. Included with tinder are certain combustible fuels; these may be in liquid, gel or solid form and are mostly man-made. Using ammunition or flares to start a fire can only be justified after carefully weighing the value of saving them for their original purpose.

Tinder Sources

Manmade:

- Petrol, paraffin or aviation fuel.
- Oil (needs heating first).
- Cooker gel or solid fuel blacks.
- Propellant explosive from ammunition (obtainable, with care, by prying bullet/shot out of cartridge case).
- Pyrotechnics - flares, ate.
- Tampons (check with any female survivors).

- Cotton wool (check any injured survivors for useful dressings).
- Lint from twine, canvas, bandages, etc
- Scorched or charred cloth, especially linen.
- Charred rope.
- Some photographic film.

Natural:

- Decayed or powdered dry wood and pulverized bark.
- Catface (the resinous scab found on damaged evergreen trees).
- Coconut palm frond (the fabric-like material at the base needs to be sun-dried).
- Dried Arctic cotton grass or moss
- Termite nest material.
- Birds, rats or mice nests



A successful fire is best started when shielded from the elements with fuel added gradually.

Kindling Kindling consists of material larger in size than tinder but smaller than the main fuel to be used on the fire. Ideal candidates for kindling are small dry twigs, or shavings made from dry sticks, a process

known as 'feathering'. Once your kindling takes hold, the fire should burn long enough to deal with small logs, *i.e.* the main fuel. Starter wood for fires needs to be dead and dry.

Fuel Your fuel should be graded and stacked ready before you start, with dry, dead material separated from green wood. A hot fire will be able to cope with green logs, as the flames will boil the sap away and dry the wood before it burns. However, green logs will not catch on a fire that is not well-established and hot.

Heaping the fuel on too quickly will kill a fire. Build your fire with care, adding more fuel only when the previous fuel is burning well. Do not stifle the fire by depriving it of the oxygen it needs - make sure it is well ventilated.

In principle, the harder the wood the longer it will burn. Try to use fuel that is close at hand, still standing, and does not require chopping. If a log is too large, drag it into the fire and let it burn through the middle. Fuel taken from the forest floor will burn if stacked above ground for a few days, or placed around the edge of the fire to dry.

LIFESAVER

Carbon monoxide poisoning occurs when incomplete combustion of fuel takes place. In an unventilated enclosure it can quickly become lethal, especially when refined fuel such as petrol or aviation fuel is used. The following rules should be taken into account:

- ① Always ensure good ventilation if using an oil burning stove.
- ② Check any manufactured stove, and maintain its clean running.
- ③ Always turn off or extinguish any petrol or aviation type stove before going to sleep.

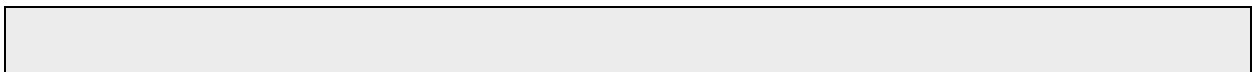
- Birch burns best.
- Both oak and ash burn well and give off good heat.
- Fruit trees such as apple and cherry give off scented smoke.
- Lighter woods such as larch and pine will spit sparks.

Oil, Aviation Fuel and Petrol It is assumed that no one finds themselves surviving on the ice pack without arriving in some form of transport. As soon after an accident or crash as it is judged safe to return to the aircraft or other vehicle, drain off any available oil from the engine before it thickens with the cold. High octane fuel can be left in the tanks, as it will only freeze in extreme temperatures. An emergency fire can be lighted quickly by mixing the oil with one-fifth aviation fuel. This should be done in a metal container, no larger than 5 litres (say 1 gallon) in size, and well away from the aircraft. Give it a good stir; then, from a distance, use a rag soaked in the fuel on the end of a pole to light the fire. Once burning it is safe to approach. The aviation fuel will quickly burn off, but in doing so it will warm the oil enough for it to sustain itself. Draining a vehicle sump and mixing it in the same proportion with petrol will achieve the same effect.

Warning: Mixing any combustible fuel is dangerous, and should only be done in extreme conditions such as the Arctic.

An emergency fire can be built by pouring petrol or aviation fuel onto most consumable materials; even snow can be set alight. Be careful where you place your fire, making sure it is far enough away from the main fuel supply. If you build your fire on a sheet of aircraft aluminium remember that this too may ignite.

Seal Fire It is impossible without inflammable fuel to start a fire on snow or ice. A base must first be established; this can either be aircraft wreckage, rotting timbers, or a thick layer of animal fat. The base should be large enough to support your fire; small fires serve little purpose as they provide very little heat, so you should only attempt to light a fire in the Arctic when a good supply of fuel and shielding is available.



LIFESAVER

Highly Inflammable Materials

Highly inflammable materials make very effective tinder, and if near a vehicle or aircraft always check to see if any are available. Sumps, fuel tanks, lubricants, alcohol, the propellant explosive from cartridges and pyrotechnics all burn.

- Handle them all with great care.
- Metal pots or implements should never be used when mixing chemicals.
- Many such substances will give off toxic gases when they burn.
- Remember that many chemicals which simply burn when loose are highly explosive when compressed or confined.

On the ice pack the only natural fuel is that derived from seal fat and bone. It is not a good combination, being difficult to light and burning with little heat; the flame is also easily extinguished. However, in an emergency and with nothing else to hand it is worth trying.

Moss Arctic moss can be found in abundance and has several major uses to any survivor. In all cases the moss is best dried by placing it loosely around a fire, or by spreading it out on a flat metal surface which can be placed over the fire. In either case care should be taken not to let the moss burn, converting it to charcoal dust.

- Dried moss makes an excellent tinder for lighting fires, especially when in a hurry.
- It can be used to pack around your glowing embers in a fire-carrying container.
- Boots and mukluks can be insulated with a layer of dried moss.

Hot sand Any survivor who finds a deposit of river-washed sand is advised to collect one or two kilos (2-4lbs), carefully removing any small stones. Sand can be heated either by using it as a base for your fire, or by placing it in a container. Its great advantage is that it retains the heat

for a long time, and this can be extremely useful in Arctic conditions.

- Hot sand can be used to dry out wet boots.



- A small can full carried while travelling will provide an excellent hand-warmer.

Drift Wood Drift wood can be found along some Arctic coastlines. Pieces that have been out of the water for some time will burn best. Remember that wood, wreckage and flotsam can drift for thousands of miles.

Scrub and stunted willow trees grow well above the tree line, extending well into the tundra. Many of the evergreens are so rich in resin that they will burn even when wet. The lower forests of the Arctic are rich in white birch trees; in earlier times their bark was used by the inhabitants to build canoes, make houses and provide torches.

Setting a Fire

The site for your fire must be chosen carefully, especially if you plan on building a shelter or if a strong wind is blowing. The heat should provide warmth for your shelter, but in such a way that the smoke does not envelope you (though if biting insects are a problem, a little smoke will help drive them off).

Constructing a windshield will prevent the wind from blowing out the first fledgling flames. It will also cut down the amount of fuel consumed, and reflect extra heat into your shelter.

The ground below your fire should be dry and clear of vegetation to stop the fire spreading.

If stones are available, build a circle around the fire once it is well alight.

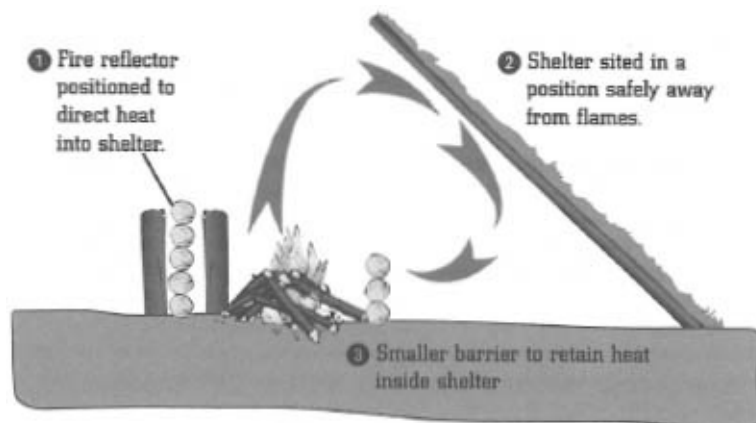
This reduces any danger of the fire setting your shelter or surroundings alight; it also defines the fire's size and fuel consumption.

If not maintained, such as overnight or while away hunting, a fire may well go out. Most fires can be relit by placing a small amount of tinder on top of the old embers and blowing. The earth below an old fire site will stay warm for many hours; this will help generate a new fire quickly.

Fire on Wet Ground To build a fire in swampy conditions the base must be raised above the water. In some cases this may mean building a platform of old logs or stones on which the fire will rest.

Fire in the Wind If the weather is extremely windy, a fire-shield will do little to stop the flames from getting out of control or being extinguished. In such conditions the only answer is to build your fire well below ground level, by either digging a trench or finding a natural ground hollow.

Heat Reflection





A pit as above often the best protection for a fire in a high wind.

Ember Pit No matter what type of open fire you make, they are all difficult to cook on. Either they will burn the meat, or you will get burnt trying to rescue *your* supper. Metal cans become hot and the danger of scalding is inevitable. Rather than struggling with an open fire it is a good idea to make a small ember pit for cooking. This is simply a matter of cutting out a section of turf 20cm long by 10cm wide and 10cm deep (8ins x 4ins x 4ins). Once your fire is well established, use a stick to rake glowing embers into your pit. These will supply a manageable source of heat for cooking.

Types of Fire

Once you have a fire, you need to make sure that it is suitable for your needs. If you are alone you will only need a small fire for warmth. Small fires need less fuel to keep them going, and can be controlled more easily.

If it is snowing or raining - and if you have the means - you should

consider taking your fire inside your shelter; and the best way to do this is to improvise a stove. You can also build a fire that will cook your food while you are hunting, and warm your bed on a cold night.

Star Fire This is a simple and easily controlled fire. Once the fire is established, place logs so that they can be fed inwards, increasing the flames. If less heat is required the logs can be pulled outwards. You can leave this fire for several hours while you go hunting. The flames will eventually die down, leaving the hot embers in the middle; these can be protected from wet weather by placing a large stone over the inward ends of the logs. When you return, carefully remove the warm stone and use it as a seat. To rekindle the fire simply push the logs closer together and gently fan or blow on the embers.

Lumberman's Fire A lumberman's fire is built using two long logs - the larger branches from fallen trees are ideal. The purpose is to build a normal fire between the logs until the fire has reached the point where the logs themselves will burn. If the timing is right you should be able to cook your food on the small fire in between before rolling the logs together. You will then be able to stretch out for the night along the length of the burning logs, and have a good sleep. Separating the logs in the morning and adding a few twigs will quickly rekindle the fire for breakfast.



An improvised tin stove.



A pyramid fire.

Pyramid Fire Building a pyramid fire is simply a matter of placing logs in a pattern to create a pyramid-shaped stack. Smaller and drier twigs and sticks can be placed inside the fire or threaded between the layers.

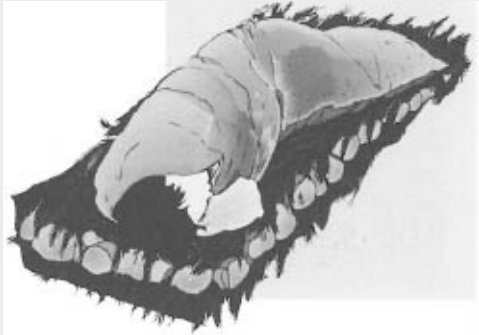
This type of fire, once lit, will burn quickly and provide plenty of heat. It can also form the basis of a signal fire.

Improvised Stove Constructing a stove from any available metal drum is a vast improvement on a simple open fire. A stove will save fuel, as it is 50% more economical than an open fire. With care, it can be used inside a shelter, with the outer metal radiating enough heat to dry wet clothing while the stove provides light. If not too large it can be carried with you, complete with hot or burning embers.

Hot bed

One way to reflect the heat from your fire is to stack large stones around the back of the fire. The advantage of this

method is that the hot stones can then be taken into your shelter at night and carefully placed beneath your bed space. There they will radiate heat throughout the night hours.



Benghazi Stove If liquid fuel is available then a simple stove can be constructed by simply filling a large can half full of sand. The fuel is added until the sand is completely saturated. It is best to burn a small amount of tinder on top of the sand; this preheats the fuel and ignites the sandy surface, which provides a good slow-burning flame. Peat or fine gravel can be used if sand is not available. A fuel candle can be produced in the same way by using a smaller can and a strip of old cloth.

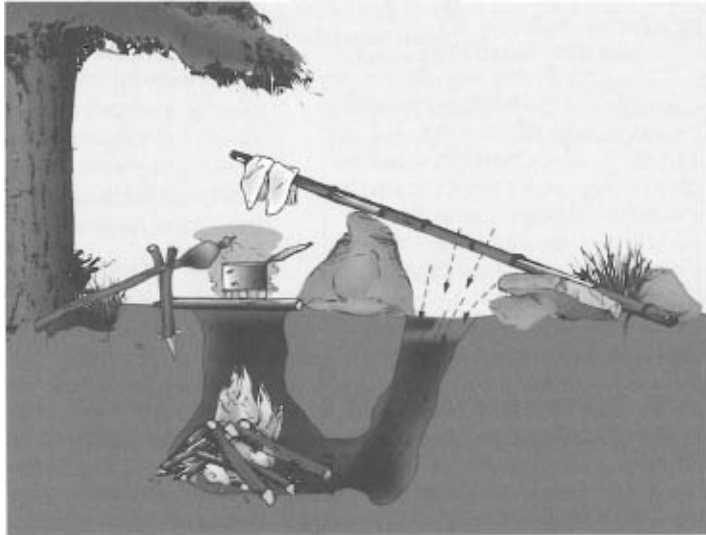
Lighting a Fire at Night and in Bad Weather Lighting a fire in the Arctic is extremely difficult. For many months of the year these regions are shrouded in darkness and buffeted by strong winds and snowstorms. Under such conditions you will need some form of wind break and a permanent flame in order to achieve any success with fire lighting. While aviation fuel and petrol will burn, the wind and snow will douse it if it is not properly shielded. It is best to use a candle in a tin, in such a way that it is easy to light, easy to get a light from, and provides light so that you can see what you are doing. Place a small amount of combustible material over the can and let the candle heat it until it catches fire.

The governing factor here is heat, as the fire will not burn unless you can build its heat to a degree higher than the prevailing temperature.

When travelling, hot coals can be carried; however, in the Arctic they need to be well insulated with a slow-burning material. The advantage of

this method is to guarantee a fire at the end of your daily journey. Semi-burnt charcoal from the outer edges of the previous night's fire is best, but Arctic moss and birch twigs will prove equally successful.

The Dakota Hole



A Dakota fire is not easy to construct but essential if you wish to keep your presence unknown.

Oil and Water Mixing oil and water will produce a flammable mixture that provides a very hot fire. Place the two fluids in their own separate containers, into which a long stick-like plug has been inserted near the bottom. This plug is to control the amounts of oil and water in the mixture: 2 drops of water to 1 drop of oil.

The mixture should run on to a platform (although it is possible to drip it onto dry earth) where it can be ignited. The oil will not ignite even if heated by the fire's radiation, but as a matter of caution it is best to leave a distance between the dripping containers and the burning platform.

Yukon Stove Constructing a Yukon Stove should be a serious consideration if you are planning to stay in one place for longer than 24 hours, and given that the materials are available. It is one of the best ways to use fire for cooking and other purposes. It is also fairly safe, and can withstand a certain amount of bad weather.

Its advantages over an open fire are that it will burn unattended; its heat

is retained; and fuel consumption can be controlled. Importantly, it can also be constructed inside a large shelter to provide safe heat and to dry clothing.

Carrying Fire

One sure method of making a quick fire especially in the cold and wet is to carry embers from your previous fire. Many early hunters transported fire around in a cow or buffalo horn.

This method can still be used simply using a perforated beer or coke can as a fire carrier. The skill remains in packing the embers from last night's fire onto a bed of dry, slow burning material, and covering them with the same. The secret lies in the ability to maintain the correct amount of oxygen being fed to the embers. If they are wrapped too tightly, they will be starved of air, if too loose there is a danger that the embers will ignite the surrounding material.



The stove is made from rocks, stones and mud, in the shape of a tortoise shell. A hole is left on the windward side (best offset a little in the Arctic) for fuel and ventilation, and there is also a hole at the top acting as a chimney. If you have a metal box or can available, this can be built into the back wall to make an oven.

Before any food can be cooked in it, however, a layer of twigs must be put down first, otherwise the food will burn on the hot metal. These twigs will eventually turn into charcoal, which can be saved and used to deodorize purified water and for medicinal uses. A large flat rock should

cover half the chimney outlet for use as a griddle. If you wish to use your Yukon Stove inside your shelter, make sure that you have adequate ventilation, as the stove will produce carbon monoxide gas.



Wind and waterproof matches.

Lighting your Fire

The initial heat source for a fire can be produced in any number of ways. Matches or lighters provide the easiest option, but these will not last forever. Tinder can also be ignited by sparks from a flint-and-steel set, or from an electrical source such as a car battery. Heat from the sun can also be concentrated and focused by a magnifying glass or a parabolic reflector.

Matches Matches are the most convenient and obvious way of initiating a flame, and it is a matter of common sense that they should be carried as a matter of course on all outdoor trips. Ordinary matches do not work when damp, however, and can be quickly extinguished if unprotected from a strong wind. This fault can be remedied by dipping each match halfway into some molten wax. To protect the outside of the box, spray it with hair lacquer. Specially made survival matches are protected by a waterproof container, and when lit they will burn for up to 12 seconds in just about any weather conditions.

Lighters In any group of people several will probably be carrying

cigarette lighters. These make an excellent survival aid, but must be used wisely and economically. Once the lighter fuel is exhausted do not just throw the lighter away - its flint will go on making sparks for a long time.



A flint and steel, man's basic fire-lighting tool for thousands of years.

Burning Glass Using a burning glass will require strong sunlight, but it is an effective way to light a fire. For the glass you could use a magnifying glass, or a lens from a camera, binoculars, spectacles or a compass. An ideal size would be 5cm (2ins) or more in diameter. Sunlight focused through the glass will ignite dry tinder, although you may need to fan it lightly as it smoulders.

Flint and Magnesium Fire Starter The specially manufactured flint is embedded into a small block of aluminium and magnesium metal which has a serrated steel striker attached. Shavings from the block can be scraped off and mixed in with any tinder. When the steel blade is struck sharply against the flint, sparks are produced which ignite the tinder. Magnesium burns in excess of 5,000° F, which is hot enough to ignite any tinder even when damp. In an emergency, scraping aluminium shavings from the frame of a crashed aircraft will produce very similar results.

Batteries If you have access to a large capacity battery from a vehicle, even if the vehicle has broken down or crashed, you may be able to start a fire by electrical means. Use a thin wire to connect the negative and positive terminals on the battery; this will short circuit the battery and cause the connecting wire to spark.

If very thin wire can be found, roll this into a ball and touch either end with both terminals; this will cause a flash bulb effect.

Chemicals Propellant explosives can be extracted from small arms ammunition or shotgun cartridges. It is best used by sprinkling it over dry tinder and applying a spark (beware - even small concentrations of such chemicals are potentially dangerous). Simple gunpowder - 'black powder' - is not found in modern cartridges; but it is mixed from equal amounts of potassium nitrate, sulphur and charcoal. Another mixture with a high output of heat is sugar and sodium chlorate (found in some commercial weedkillers) mixed in equal parts. This will be hot enough to light a fire even from damp tinder.

One Match, One Fire



You can save on matches and lighter fuel by lighting a candle with them immediately. This candle can then be used to provide a constant flame to ignite tinder, even when it is still a little damp. Like most naked flames, the candle should be protected from the wind by a shelter. Either dig a hole into the ground or build a small stone wall around it. Place the tinder over the flame, either by piling it on top of the shelter or building a small wigwam'. Once the tinder has ignited, remove the candle and if you no longer need it, blow out the flame and keep it for the next fire.

Fire Paste Fire paste is highly volatile and should be kept for emergency fire-lighting only. It is basically any combustible material that is held in a suitable base: aviation fuel mixed with soap is one example. A small spark will normally ignite the paste, which will then burn for several minutes. As with any combustible material, the paste should be kept in an airtight container when not in use.

In a dire emergency the paste can be burnt purely as a fuel.

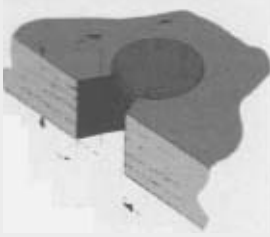
Fire from friction

Creating fire from friction may be the only method left to a survivor, particularly when his consumable means of fire-making, such as matches, have run out. Many primitive peoples around the world still light their fires by friction; it is presumably the oldest method of creating a flame, and certainly dates back to our prehistoric ancestors. Although methods vary from continent to continent, the following covers the basic principles of fire by friction.

Using a Fire Drill



- The ideal wood for the board is old deadfall, dried-out and powdery.



- The ideal drill is a sound, dry length of hardwood.
- Use your best available tinder.
- Settle yourself comfortably, so you can drill for hours if necessary.
- Don't give up - you will need hours of patience.
- Have extra tinder handy to add when you see smoke.
- Have fine, dry kindling handy to add as soon as you have blown the sparks in your tinder into flame.
- Shelter and nurture your burning kindling until you can add small, dry fuel.



Fire Plough The fire plough method involves rapidly rubbing a hardwood shaft against a soft-wood base. Under ideal conditions both woods should be seasoned so that the moisture content is minimal. In an emergency this can be achieved by sun-drying green wood, although it will take several days.

The baseboard should measure *around* 30cm by 10cm (12ins by 4ins) and have a straight central channel cut down the entire length of one side. One end of the shaft should be rounded to fit into this groove, and ground up and down the baseboard channel - adding a little sand will speed up this process. Once both the tip of the shaft and the channel have become blackened and smoke can be seen rising, the fire plough is

ready for use. Kneel and place the baseboard against the left thigh. Grip the shaft with both hands and make a sharp, stabbing, ploughing action. As you build up speed small particles of wood fibres will fall to the ground. Place a small amount of dry tinder at the base of the channel ready to catch these. Once the tinder is smouldering, blow on it until you have fire.

Bow & Drill The basis of this classic method is a flat dry board of powdery wood and a hardwood stick. The principle is to make a hole in the flat board into which the hardwood stick - *i.e.* the drill -will fit neatly. The baseboard can be any length, but 30cm by 10cm by a minimum of 2cm thick is ideal. Cut a V-shaped notch about 2cm wide on one edge of the block.

The drill should be made from a length of medium-hard wood such as elm, willow, cedar, cypress, cottonwood or balsam fir. Make sure that the chosen piece is sound and dry, and that you are able to cut a straight length from it 20-25cm long and 2cm thick. Sharpen one end of the drill to a 45 degree point and the other end to a 60 degree point.

The baseboard should be placed on the ground and held in place by the toe of your boot. Place a small ball of tinder directly under the notch cut in the baseboard, dropping a little into the notch itself. The best tinder is dried grass mixed with small strips of cedar or birch bark. Fit the sharper end of the drill into the notch of the baseboard, and prepare to rotate it backwards and forwards. This can be done by rubbing the drill between your palms, but using a bow will speed up the drill considerably.

Make a small bow about 60cm-70cm long, and loosely string it with a length of cord or leather thong. Twist a loop in the bowstring and slip it over the drill. Pushing the bow back and forth will rotate the drill in the baseboard notch. Extra pressure can be placed on the drill by using some form of cup over the upper end to hold it in place; in my experience a near-perfect expedient is a small glass jar, as used to hold fish paste.

- Do not expect to make a fire instantly; the drill will need to 'bed' itself into the baseboard, and this can only be achieved after hours of constant drilling.
- An indication that you are close to producing hot embers will come

when the drill becomes charred and smoke can be seen rising from the notch. Add a little tinder to the notch, and work the drill vigorously. Embers from the notch should fall into the tinder below. Carefully move the block away and blow gently on the pile until the tinder ignites. As with any survival skill, practice makes perfect.

Fire Management

- Don't make your fire so large that you can't get near it to put a pot on.
- It is safer and better to cook using only the embers
- If you have the means to make one, an improvised stove is more economical of fuel than an open fire, and more versatile in use.
- Keep plenty of fuel handy, and near enough to the fire to dry out before use.
- Stop your fire spreading: it's dangerous, and wasteful. Beyond a certain size you get no additional benefit from a larger blaze -and your energy expended in gathering fuel is ultimately wasted in the sky above your fire.
- If you stay in the same place for any period of time, use the same spot for your fire.
- Keep drying clothes far enough away not to fall into the fire.

Water



Next to air, water plays the most vital part in daily survival. The human body, which consists of roughly 90% water, cannot survive without water longer than three days in a hot climate and 12 days in a cold one.

In a temperate climate, carrying out a normal level of activity, the body requires a daily fluid intake of 2.5 litres (roughly 4.5 pints). This requirement fluctuates according to the humidity, air temperature and amount of physical activity undertaken. To keep the body efficient and to have a chance of survival, the minimum daily water requirements must be met. It is not only the quantity of water that is important, but also the quality. Contaminated or impure water will do the survivor more harm than good, increasing both fluid loss and the risk of serious disease.

Water Loss

Water is continually lost through the normal bodily functions of urination, excretion, breathing and sweating. The amount of water lost through sweating is notably increased when in hot conditions or during physical activity. This water must be replaced. If, however, your water supply is minimal, the priority is to conserve as much water in the body as is possible.

Drinkable Water Sources

Finding Water Even in Arctic winter you will need a minimum of 2 litres (3.5 pints) of water daily to replace normal fluid loss. Thirst is reduced under Arctic conditions, and the average intake of water becomes less – but as a result the body suffers from progressive dehydration. The first signs are excessive lethargy leading to the desire for continuous sleep. This is easily corrected by drinking more water and monitoring your daily intake.

Finding water is not a problem as the surfaces of both Polar regions are covered with either snow or ice. The problem is converting these to obtain a daily supply of water; this can only be done by heating. Avoid eating loose snow or ice as it can cause damage to the delicate membranes inside your mouth as well as causing dehydration. If you really need to drink and snow is the only thing available, crush it into a snowball with your hands. Continued compression will cause the snow to melt, and you can let the water drip into your mouth. Ice is much easier to melt than snow due to the lack of air between the water particles. Breaking the ice into smaller pieces or crushing it will speed this process further, and you will not need as much fuel to melt it.

Collecting water in a polythene bag placed over foliage.



In summer Arctic water is plentiful. On the tundra and tree line you will find abundant lakes and streams. The water may look dark brown and taste brackish but although growing vegetation helps keep it fresh, always boil your water. Don't waste valuable fuel; melt only what you need, and drink while it is still warm.



Arctic streams are a good source of food and water.

Glaciers and Icebergs A good source of drinking water can be found in the blue ice of glaciers or icebergs, as this ice will not contain any salt. On the ice pack in summer look for small hollows in the icebergs – these will be full of fresh water. Remember that although ice and snow may look clean, there is no guarantee that the water will not be contaminated. If you are in any doubt as to its purity, sterilize it first either by using purification tablets or boiling.

Snow Melting If you plan to stay at your camp site for some time, you can consider using the warmth of any sun to improvise a solar-powered snow and ice melter. This will take much less effort and fuel than lighting a fire. All you need is a black plastic sack or something similar. Open it out and lay it over pebbles, rocks or sticks to raise it off the ground. Make

sure that it has a gentle slope to it, and that the centre line is depressed into a trough. Once the sheet has warmed in the sun's rays, take some loose snow and scatter it thinly over the plastic. The snow will soon melt and the water will run down the trough into your collecting container.

If you do not have any black plastic, find a large flat rock. Place it where it can warm up in the sun's rays, and proceed as before. Wrapping snow in spare clothing or parachute material and hanging it near the fire over a container will also produce water. Make sure that only fresh snow is used; and that the bundle is placed where it will benefit from the radiant heat without any risk of getting scorched.

Covering foliage with a clear polythene bag is one easy way of gathering moisture – this literally pumps the water from the ground for you. Vegetation of all kinds takes water from the soil and distributes it to the leaves, where it is released as part of the respiration process. Find a suitable green plant and place the bag over the top of a piece of healthy green foliage, tying the neck around the base of the plant. Next to the plant, dig out a small hollow and press the plastic into it to form a collection point for the condensing moisture.



A water filter pump.

Sterilizing Water

- Drinking bad water causes weakening sickness, and is more dangerous than thirst.
- Filter water first, using mass and charcoal.
- Kill off micro-bacteria and viruses by adding chlorine-based purification tablets
- If you have no purification tablets, use potassium permanganate crystals.
- If you have no chemical agents, then boil water hard for 10 minutes minimum.



A drinking straw allows you to drink from water extraction or condensation devices.

In a similar way the moisture contained in plant stems and leaves can be extracted. In springtime tapping into certain trees, such as the birch, will produce a drinkable sap. Make a hole in the tree one metre above ground level; the hole should be about 5cm (2ins) deep and slanting

ground level, the hole should be about 5cm (2ins) deep and slanting slightly upwards. Tap a peg into the hole and place your container on the ground below. You should collect 2 litres (3.5 pints) over a 24-hour period. Boil the sap to make it more palatable and prevent it going off. In a survival situation you might try other types of tree; but be aware that milky or coloured saps or juices may be poisonous.

Dew Large droplets of early morning dew can be found on most vegetation, especially grass. This is particularly helpful for those survivors who are injured and cannot move far. The droplets can be mopped up by gently laying a clean cloth over the wet grass, and wringing it out. Several pints can be collected in less than an hour, and the water is pure enough to drink without sterilization.

LIFESAVER

Dangerous Water

Watching animals may lead you to water; but beware of drinking directly from stagnant pools where animals drink, as they transfer a variety of harmful parasites into the water through infected urine or faeces.

Leptospirosis, bilharzia, and dysentery are just a few diseases which can be caused by drinking contaminated water.

- **Animal bones in the vicinity of stagnant water may mean that the water is poisonous.**
- **Always sterilize or if possible distil water from ponds.**
- **Approach any isolated watering hole with caution, as it will be visited by a large number of animal species -some of which have large teeth and are permanently hungry.**



Improvised water filters.

Filtering Filtering will remove mud particles, leaves and small waterborne creatures. This can be done using a clean sock, a shirtsleeve (or women's tights in the case of female survivors), a plastic bottle or a section of bamboo. Fill the makeshift filter with a layer of fresh grass or moss; then add either sun-dried sand or charcoal from an old fire. Allow contaminated water to filter through and run out the bottom end. Don't worry about the water being discoloured, especially if you are filtering with charcoal or are using peat water; this will do no harm.

Filter Hole A filter hole can be made in any form of waterlogged terrain such as a swamp, bog or marsh.

Clear the vegetation and dig a hole above the water line, measuring approximately 30cm (12ins) in diameter and 30cm deep. The water which seeps into the hole may be dark in colour; this of itself is of no consequence, but the water will need boiling to kill off the micro-bacteria and viruses. If you do not have the means to dig, simply remove a large stone or log and let the well underneath it fill up.

Sterilization and Distillation

Once you have filtered your water the next stage is to sterilize it. Sterilization can be achieved by boiling water vigorously for at least ten minutes. Make sure that the heat is distributed evenly -keep your water on a rolling boil.

Another simple precaution is chemical sterilization, *e.g.* using chlorine-based purification tablets, potassium permanganate (see Survival Medical Pack), or iodine. Be sure to follow the instructions for use carefully.

Chemical sterilization tends to leave an unpleasant taste and odour in the water, and both the iodine and potassium will stain the water pink. Adding small pieces of charcoal to the water an hour before you want to drink it can rectify this.

Carrying Water

The survivalist should carry a supply of water even when travelling through an area where it is abundant. There is always the possibility that a lone survivor will fall or otherwise injure himself and be unable to walk. Any available container can be used, but those with a screw cap are best. Bottles, waterproof cloth, condoms, and animal intestine can all be fashioned into makeshift water carriers.

Salt

Salt is next in importance to water, as it helps to regulate the fluid balance in the body. Without an adequate supply you will succumb to muscular cramps, heat exhaustion and heatstroke. The average human body requires about 10gm (0.35 oz) of salt daily to replace that lost in normal sweating. When the body is deficient in salt, the first signs are sudden weakness, muscle cramps, dizziness, nausea and a hot, dry feeling all over the body.

If these symptoms appear, rest and a pinch of salt in a mug of water are the quickest and easiest treatment.

Salt deficiency is common in arid or tropical jungle conditions, so in these environments it makes sense to ensure that you add a small amount of salt to your drinks. It would also be a wise precaution to add some salt tablets to your personal survival kit.

Conserving Body Fluid

- Dehydration kills quickly, but drinking contaminated water kills quicker and is more painful.
- Examine all possible water sources available to you.
- Evaluate water supplies, and discipline their use.
- Exposed skin should be covered, as this will reduce water loss.
- Cool your body to reduce your sweating. Fan yourself,- in a sea survival situation, wet clothes with seawater.
- Minimize movement on hot days, work or travel by night, avoid unnecessary exertion.
- Close the mouth and breathe through the nose.
- Avoid eating where possible.
- Drink when the day is at its coolest. Take small sips.
- Alcohol consumption and smoking will cause further dehydration.

Cold Climate Food



Searching for food in the Arctic or in mountainous areas may seem a forbidding task, and in severe weather conditions it can be. That said, the Arctic has an abundance of wildlife in the form of animals and fish.

You will find that in the areas where man is an infrequent traveller other creatures have flourished. Even in the extreme north the ice and snow may look barren but the water is full of fish, lobsters, seals, walruses and, in the south, penguins. The further away from either Pole one gets, the warmer the climate, and the greater the variety of food resources including animal, insect and plant food.

A recent programme screened by Russian television illustrated a significant contrast in attitudes to life in a challenging Arctic environment. The programme depicted people of the northern Siberian 'gold rush' towns who, due to the collapse of support from central government in the way of wages, fuel and food, had been forced to abandon their homes.

By comparison, when the same interviewer talked to members of the nomadic tribes who have lived in the same area for thousands of years, they smiled and gave the reply: 'We have reindeer. We have water. Life is good!'

For the most part the Inuit following their traditional way of life lived on meat, with a small addition of berries, roots and plants when they appeared in summer. Seal, caribou and fish account for 90% of their food intake, the remaining 10% being provided by birds, polar bears and musk-oxen. Because of the lack of fuel for burning, and given that the oil stoves they used did not provide sufficient heat for cooking, most of the food was eaten cold.

There are several poisonous plants in the Arctic, and all fungi are best avoided; but these are in the minority, and for the most part fresh Arctic plants make good eating. A selection of edible plants and lichens are listed as follows, but if you are not 100% sure refer to the edibility test. There are no known Arctic plants which produce contact poisoning.

In a long-term survival situation plant food on its own will not provide a fully balanced diet, and you may have to eat more than normal to fulfil your body's requirements. However, in times of need plants are a valuable resource and will keep you from starving.

Starvation

During the Second World War a number of parties of servicemen - mostly aircrew - became marooned in the Arctic wasteland, and most of them died. They perished because few ventured far from their crash sites; they made no attempt to catch fish, hunt game, or even to travel south. Of those who were later found, none had prepared a rescue signal, and of the dead, most had died not from cold but from starvation.

Some edible plants contain elements that are dangerous to health if they build up in the body. Be wary of eating too much of the same plant over long periods. A varied vegetable diet will be tastier and provide much more balanced nutrition.

The plants mentioned below are intended only as a guide. They represent only a small fraction of the plants which have uses as either food or medicine or both. It is recommended that you read about the plants that are native to the area where you intend to travel - learn to recognize them and know their properties.

Arctic Plants

Cloudberry (*Rubus chamaemorus*) Cloudberry inhabits the mountainous areas of cold Temperate and Arctic regions. It is a herbaceous, bramble-like plant which grows 15-20cm (6-8ins) high. It has lobed leaves and a single white flower, followed by a large orange-red fruit composed of many segments. It is these fruits or berries which may be eaten raw; they have a pleasant taste. Medicinally, the bark of the root and the leaves are astringent and are therefore helpful in cases of diarrhoea.



Bilberry/Whortleberry/Huckleberry (*Vaccinium myrtillus*)

Inhabiting heathland, moorland and woodland from Temperate regions to the Arctic tundra, the bilberry prefers *acid* soils and is often found growing with heather.

It is a hardy, deciduous branched shrub with erect stems. The leaves are light green; small, globular green-pink flowers ripen into single black berries. When fresh these berries, high in vitamins B and C, are sweet to the taste and can be eaten raw. Medicinally, the fruits can be dried, and a decoction will help treat diarrhoea, enteritis and other inflammations. The dried leaves can also be used in the same way, but must not be taken for too long a period at any one time as this can lead to hydroquinine poisoning.



Rock Tripes (Umbillicaria) Rock tripes are a lichen which attaches itself to rocks by means of a large, central stalk. They are found in rocky locations all over the Arctic and northern regions. They can take many forms but are usually roundish in shape, rather like a blister, and grey or brown in colour. Some are smooth but others can present a warty appearance. Lichens of any kind must never be eaten raw as they contain an acid which can cause severe irritation. Before eating they must be soaked for several hours, and then boiled thoroughly. They are available all year round, and are highly nutritious.

Arctic Willows (Salix sp.) Arctic willows, a smaller cousin of our better-known willows, inhabit the tundra regions. They are small shrubs no more than 0.6m (2ft) in height, which form dense mats. The leaves are rounded in shape and shiny. The shrub produces yellow catkins. Many parts are edible - the leaves, young shoots, young roots (peeled), and the inner bark. Arctic willow is very rich in vitamin C.

Other Edible Plants

Dandelion (*Taraxacum officinale*)

Distribution: Northern Temperate regions up to 2000m (6,500ft).

Habitat: Meadows, pastures, roadsides, waste ground. Perennial. Stems, up to 30cm (12ins) long and containing a milky latex, grow from a long, fleshy tap root.

Leaves are dark green and deeply toothed; at the plant's base they form a rosette. The solitary flowers appear from March to August and are bright yellow in colour.

Availability: Leaves and roots can be used all year round.

Edibility: The young leaves can be eaten raw in a salad, although they do have a very bitter taste; this can be remedied by soaking the leaves in cold water for a couple of hours. Older leaves can also be eaten but will need to have the tough central vein removed first; they will be more palatable if boiled. The newest shoots, picked before the stems develop, can be boiled and used like Brussels sprouts. The tap roots, once cleaned, can be boiled as you would a root vegetable; the taste is very pleasant. The roots can also provide a good substitute for coffee, if dried and crushed.

Medicinal: The leaves have a mild diuretic effect. The juice from the root, usually extracted by boiling, makes a good tonic for the liver and the digestion. The leaves are rich in vitamins A and C and are also a good source of iron and potassium.

Bracken (*Pteridium Aquilinum*)

Distribution: Throughout the world, except the extreme south and north.

Habitat: Heaths, moors, woods. A perennial which can grow up to 8ft (2.4m) in the right conditions, but is usually only about 2-3ft (0.6-0.9m) in height. The stem is erect and tree-like, with a velvety feel to it at the base. It carries large pinnate fronds, usually three on each stem. The young fronds are coiled inwards but soon unfold, and can be seen to have three prongs. The rootstock or rhizome is long, thick and succulent, and creeps horizontally beneath the soil. Be careful not to confuse this plant with the male fern which can be found growing alongside bracken. The male fern tends to have only one frond.

Preparation

Leaves, stems and buds are best boiled until they are tender. Keep replacing the water if your plant material has a bitter taste - this will reduce it.

Grains and seeds can usually be eaten raw, but most will taste better after being parched. Parching is usually done in a metal container, but can be done on a hot, flat stone on top of a Yukon Stove if no other container is available. Heat the grains or seeds slowly until they are well scorched.

Nuts are in most cases perfectly edible raw, but some, such as acorns, can be very bitter. These are best boiled for two hours and then soaked in fresh water for three or four days. All nuts can be ground up into a paste, which can either be added to soups or stews, made into a gruel, or dried into a flour' to make unleavened "bread'. Sweet chestnuts (not to be confused with poisonous horse chestnuts or 'conkers') taste delicious whether roasted, baked, steamed or raw.

Fruit Berries and soft fruits provide a welcome change to a survivor's diet. Both are best eaten raw as they contain many valuable vitamins which may be lost when cooked. Those fruits with thicker or tougher skins can be boiled, baked or roasted.



Availability: All year round.

Edibility: The young fronds can be cooked as vegetables, like asparagus,

although you will need to scrape the hairs off first. They also need to be boiled for about 30 minutes as they tend to be very bitter otherwise. The starchy rhizome can be cleaned and roasted; the inner portion can then be eaten.

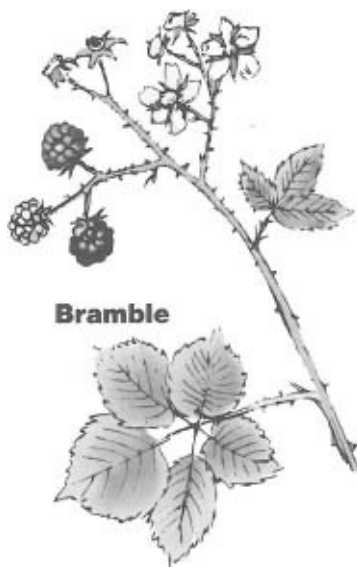
Medicinal: None, although the rhizome's astringent qualities may make it useful for healing wounds.

Other uses: Bracken makes good bedding material, and also can be used to thatch the roof of a shelter. When burnt, bracken ash contains high proportions of potash. When the ash is mixed with a little water or fat it can be used as a soap substitute.

Bramble, Blackberry (*Rubus fruticosus*)

Distribution: Northern Temperate regions below 450m (1,500ft).

Habitat: Woods, heath, scrub, wasteland, hedges. A perennial deciduous shrub with long, arching, thorny stems forming intertwining bushes. The leaves are mid green, pinnate, with five to seven toothed leaflets. The flowers are pale pink and may be seen on the bush at the same times as the fruits. When ripe the latter are black in colour and consist of many segments.



Availability: Spring to autumn.

Edibility: The ripe berries are the obvious food of the bramble and can be eaten raw or in salads. A refreshing drink can also be made from them. Blackberry leaves also make an excellent tea. For this, the leaves must either be very fresh, or will need to be slowly dried and crushed.

Medicinal: The leaves of the blackberry are very astringent, so a tea made from them is effective in treating diarrhoea and gum problems. High in vitamin C.

Rowan (*Sorbus aucuparia*)

Distribution: Throughout the Temperate regions.

Habitat: Mountains, hillsides, hedgerows and woodland. This delicate-looking deciduous tree can also be found in places that have been, or still are, inhabited by humans. It grows up to 20m (65ft) high, with pinnate leaves and a smooth, grey bark.

Availability: White flowers appear in May to June, and are followed by bunches of red berry-like fruits in July to September.

Edibility: The fruits are edible; although not poisonous raw, they are extremely bitter. To counteract this the berries should be briefly boiled and then the water discarded.

Medicinal: The fruits contain high proportions of vitamin C. An infusion of the dried flowers and fruit can help to combat constipation, and rheumatic pains. The juice of the fresh fruit has the same effect.

Hazel (*Corylus avellana*)

Distribution: Throughout the Temperate regions.

Habitat: Woods and hedges. The hazel does not usually grow very tall, and often appears more like a shrub than a tree. The bark is smooth and red-brown in colour, and the leaves are almost round in shape. The most visible flowers are the male catkins which appear in spring; they are followed in autumn by the familiar fruit, the hazel nuts.



Edibility: The nut is pleasant to eat on its own and also highly nutritious, being rich in oils and vitamins. The oil can also be crushed out of the nut to provide a cooking oil.

Coltsfoot (*Tussilago farfara*)

Distribution: Throughout the Temperate regions.

Habitat: Waste ground, banks, scree and dunes. The remarkable feature of this perennial plant is that the yellow flowers and their purple stems appear in March/April, ahead of the leaves which come forth in May. The leaves are large, polygonal in shape and have a whitish look to their underside.



Edibility: The young leaves are edible, either eaten raw in a salad or cooked in soups and vegetable dishes. The same applies to the young shoots and flowers. Coltsfoot has a rather aromatic flavour which is quite pleasant once one has got used to it.

Medicinal: An infusion of coltsfoot leaves, either fresh or dried, will help to soothe coughs and will calm the stomach if digestive problems occur. Small cuts and wounds can also be helped to heal by placing a bruised coltsfoot leaf on them.

Reeds (*Phragmites communis*)

Distribution: Throughout many regions of the world.

Habitat: Fresh-water aquatic plant, commonly found on river banks. A stout grass which can grow up to 3m (10ft) high, it has a creeping rootstock and grey-green leaves. The flowers, carried on the tall stems, are purple-brown in colour.

Edibility: The root, which is high in sugar content, can be cooked. The stem, if crushed, will yield a sugary gum which can be used for sweetening.

Seeds

All edible cereals are derived from wild grasses that produce heavy seed yields. A wide variety of grasses can be found in most regions, from the coldest tundra to all but the hottest desert. Although laborious to collect, the seeds will provide a basic food. They are best removed by simply gripping the seed head and pulling backwards so that the seeds fall into your hand. They can be collected in any improvised container, such as a hat or spare shirt. Once you have collected enough, rub the grain between your hands to loosen the chaff, and separate by throwing the whole lot into the wind, which will blow away the lighter chaff.

The seeds can then be ground into flour using a flat surface and round smooth stone. This flour can be mixed with either nuts or fruit, and baked into bread or biscuits.

Oil-Producing Plants

Poppies produce oil which is both edible and can be used as fuel for lamps.

The poppy is one of the easiest flowers to recognize growing in the wild, and is almost always found in abundance. It favours recently broken ground. In moderation the seeds can be eaten raw with no ill effects, but they are best used to produce oil.

The seeds *or* fruit of any oil-producing plant need to be harvested and wrapped in cloth to make 'cheeses' (flat, round cakes); these are stacked on top of one another, and pressed. If using seeds, they are best cracked first on a smooth stone before being pressed. In a pure survival situation pressing presents a problem and some form of leverage needs to be implemented. A simple press can be *made if* a vehicle jack is available.

The residual 'cake' is also edible, and is best rolled into biscuits and fried.

Nuts

Nuts are an extremely valuable food source and can be *found in* most countries and climates except for the Polar regions. Pine nuts can be found in alpine forests and, like all nuts, are extremely nutritious, providing high levels of protein, fats and vitamins, if you have a plentiful source of nuts, gather as many as possible and store them in a cool, dry place. The nuts will remain edible for several months if left in the shell. Nuts are quite easily carried and make an excellent portable food store.

Fruits

Fruits, like nuts, are found in all climatic regions except for the most extreme. Fruits can be extremely high in vitamins and sugars, and often occur in plentiful amounts. Do not gorge yourself on wild fruits, however, as this may well cause severe diarrhoea and sickness. What you can't eat at once, collect and dry. Make sure that you dry them thoroughly, however; otherwise they will become coated with harmful moulds and mildew. For the same reason, only pick and eat fruit that are healthy and not overly ripe.

Clamping Many root vegetables can be preserved through the winter by 'clamping'. A thick layer (20cm/ 8ins) of dry straw or bracken is used as a base onto which the tubers are placed in a pyramid. Cover the pile with more straw or bracken; and allow it to settle for two days before covering the whole pile with dry earth. It is a good idea to allow some strands of straw to protrude through the earth so that your 'clamp' may breathe.

Animal Food

Mammals, birds, fish, reptiles, crustaceans and insects are all sources of animal food that can be found in the wild. Animal foods of any type will provide a higher food value than that obtained from plants; however, far more energy-sapping effort will be needed to catch an animal than to gather plants. Hunting and trapping all require time, skill, and good information. It is vital, therefore, that the result matches the cost of the methods employed. You must not expend more energy in catching the food than that derived from the food value caught.

Hunting Hints

The process of catching an animal is called hunting; this can be achieved by either trapping or pursuit. The first requires constructing some form of trap best suited to catch your animal; pursuit means to stalk or ambush an animal and kill it by direct means, *i.e.* stabbing, clubbing or shooting.

Traps can be constructed to catch just about any size of animal from a mouse to an elephant. If pursuing your prey or waiting in ambush you will need a weapon; this can range from a rock to a gun. A firearm will provide the best chance of successful hunting, with snares coming a close second. The construction and efficient use of primitive types of hunting weapon require a great deal of skill and practice.

Unless you are an expert, hunting with anything less precise than a rifle will probably produce little success; but lying in ambush will increase your chances.

- To be able to ambush your prey you will need to know where it lives and when it moves. Look for an animal trail, especially one that leads to water. Most animals will use these trails between their feeding and bedding grounds and their water source either in the early morning or in the late evening; so pick one as your time of ambush.

Author's Note

It is my firm belief that there is no justification for hunting any animal for sport. Only within the context of this book do I advocate hunting, and then only as a matter of human survival under the laws governing nature - in as much that the strong and intelligent of any species will survive by preying on the less fit. Even in this situation the hunter must act responsibly, and not let any animal suffer unnecessarily. (All the dead animals pictured in this book were purchased dead from local country markets.)

-
- Animals have more acute senses than humans, and are always on the alert for danger. Be patient; observe all potential prey; camouflage both your appearance and scent - daub mud over your face and hands. Keep a low, silent profile and use smooth, careful movement downwind while the animals are feeding. Find a good place to hide, and position yourself there well before any prospect of animal movement.
 - Snares and nets work well when set around an area where an animal has been cleaned or butchered. The entrails will act as a very effective bait.
 - Care must be taken when returning to a trap or a snare, as any wounded animal may be dangerous.
 - A sharp whistle can stop rabbits and hares if startled into running. You may even be able to attract them to you if you make a high-pitched kissing sound with your lips on the back of your hand - this simulates a squeal.
 - Birds should be watched to see if their movement will reveal a nest site containing nutritious eggs or young. These should never be overlooked as a food source.
 - As a last resort, the survivor must consider eating anything that walks, flies, swims, crawls, creeps, jumps or wriggles.
 - Where possible, try to use all of a carcass - do not discard anything without careful thought. Skins can be made into clothing; bones can be fashioned into arrowheads, fish hooks or needles; sinews and gut make good bow strings or sewing thongs.

Snares

Snares and traps are a far better alternative to hunting and ambushes, as they require less physical effort and time spent waiting. A well-made and correctly sited and set snare or trap will be effective 24 hours a day, without the need for constant vigilance. This method guarantees a 'cost-effective' meal in terms of the effort/benefit equation of survival. Start out by snaring small game; they are easier to trap, transport and prepare.

Always set several snares, but keep some distance between them; an animal caught in one snare will create enough noise to alert others to the possibility of danger. Make sure that all snares are checked on a daily basis - the caught animal may be your next meal, but there is no reason to let it suffer unnecessarily. If you are successful with any of your snares, collect the animal, kill it if necessary, and reset the snares for the next day.

Drag Snare If properly positioned the simple drag snare is a most effective way of catching a meal. Ideally the snare should be placed along a fresh run, in such a way that the animal's head will be caught. Tie the noose to a stake which has been driven firmly into the ground; or, if it is suspended above the run, secure it to a strong branch. To set the noose, position it so that its bottom edge is about 10cm (4ins - the width of the average hand) above the floor of the run; and adjust the noose until it is about the size of two clenched fists. If possible, encourage the rabbit or other animal into the trap by piling up dead twigs and branches on either side of the path leading up to the snare. However, do not make the mistake of using green twigs - the animal may consider these to be a distractingly tasty snack.

Balanced Pole Snare The simple drag snare can be modified to make it even more efficient. A balanced pole snare will not only catch your prey, but will also lift it clear of the ground - out of reach of any other hungry predators or scavengers. This requires a suitable length of pole secured at its mid-point across the trunk of a nearby tree in such a way that the lighter end of the pole can be pivoted downwards directly above the animal run. Fix a snare firmly to that end of the pole. At the opposite end of the pole fasten a heavy rock to act as a counterweight. This counterweight should be heavy enough to lift your catch clear once the

snare is activated.

Make a trigger by cutting interlocking notches in two pegs, which hold them together against straight line tension (i.e. when you try to pull them apart along the axis of the pegs) but which slip apart easily when disturbed sideways. Hammer one peg firmly into the ground at the side of the animal run. Attach your snare to the other, free peg; and also tie a line from this free peg to the light end of the pivot pole. Swing the light end of the pole down and hook the trigger halves together; check that they work smoothly. Check that you have set the noose at the correct height above the run and that the wire loop can move freely.

A simple trigger construction



Snaring

The use of snares is discussed here purely in the context of survival, snaring animals is against the law in some countries, and is disapproved of in many others.

Making a Snare

The easiest type of snare, both to make and to use, is the drag snare, which kills by strangulation. A noose can be fashioned of any strong wire, nylon cord, hide strips, or even a wire saw (see Survival Kit). The best material to use is brass snare wire. You will need about 80cm (30ins) of wire for each snare. Make a 1cm (1/2in) loop in one end, passing the other end through the loop to make your noose. The pliability of the brass wire makes for a quick, smooth strangulation, which will lock in place as the animal struggles.

Before setting it make sure that the wire is free of kinks and that the noose runs freely. Snares are best rubbed with animal excreta to remove the brightness of the metal and the human scent which your hands will leave on the wire.



Setting a drag snare

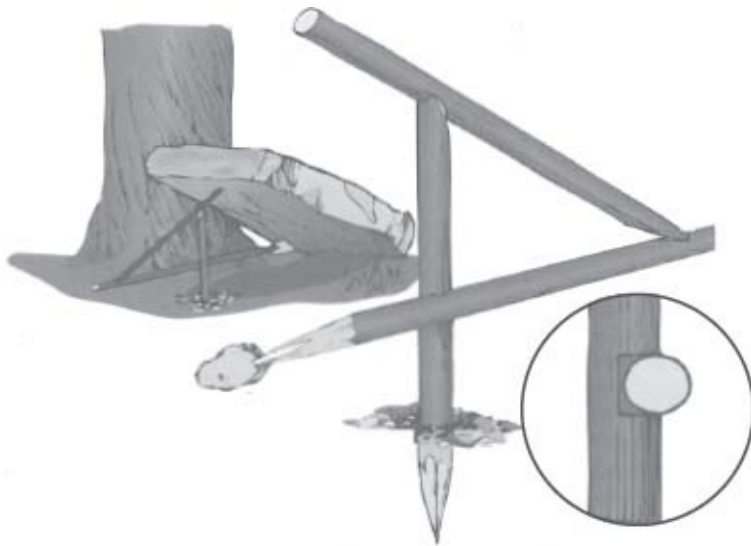
Spring Branch Snare A similar effect can be achieved by substituting a springy, bent-over branch from a nearby tree, or a bent-over sapling, for your pole and counterweight. Again, hold it bent down under tension by tying it to your notched trigger pegs and tying the snare to the free peg. If you intend using this method you are advised to check the spring strength of the branch beforehand, and adjust your trigger setting accordingly.

Hoop Spring Snare A hoop spring snare can be used where trees are scarce and you are forced to rely on small saplings. Using two saplings - either growing naturally close together, or cut down and firmly planted in the ground where you need them - bend them into an arch. The two tips are locked together by a notch which in turn is held in place by a vertical bait bar. (A rock can be attached to the bait bar if necessary, to supply the downwards tension to lock the notch.) A number of snares are attached to the saplings and positioned in such a way that the animal must pass its head through a loop in order to get at the bait. Movement on the bait bar will trigger the trap and snatch tight the snares.

Whore Trap The whore trap relies on forcing the animal's head into a baited 'V'. A willow stick, sharpened at each end, is bent into a hoop and forced into the ground. The snare is fixed to the end of a bent-over sapling, or the end of a balanced pole snare. A bait stick is positioned so that the snare peg, which fits through the hoop, can rest on it. Two large logs or a series of stones form a barrier either side, forcing the animal to place its head through the snare before it can eat the bait. As the bait is taken the snare is activated. Of all the snare traps shown this is by far the most reliable.

Purse Net A simple purse net, if you have one, is another efficient way of catching small game. If you do not have one, make a gill net (see Fishing). The net can be used in several effective ways. First find a burrow showing signs of recent use, and stake the net over a fresh entrance. Block all of the other burrow holes except for one. In this hole either light a fire and blow smoke, or simply pour in water. Either method will make any occupants of the burrow panic, forcing them into the net.

Figure Four Trap



- ❶ Place your figure four trap where you see signs of animal activity.
- ❷ Make sure that the bail is secured and that movement on it will trigger the trap.

Long Netting This is a simple and effective way of catching several rabbits at once. You will require a long net, which is placed between the burrows and the grazing ground. It is erected rolled up and balanced on several sticks; a cord is attached which allows the net to be drawn out. It is best used after dark when the rabbits are feeding. Stretch out your net, and then get behind the rabbits and make a lot of noise. The rabbits' first reaction is to bolt for their burrow.

Figure Four Trigger This type of trigger has the advantage of being easy to make, light to carry around with you, and capable of supporting any combination of useful traps. It is constructed from three lengths of thick branch, notched in such a way that they form a figure four. This trigger is firmly fixed in the ground where it will support a deadfall log or flat rock, or alternatively a drop net. Whichever method you choose, once the trigger is disturbed the trap will activate. The Figure Four Trigger is the ideal trap to use while travelling.

Squirrel Snares Once you have identified the presence of squirrels in an area it is fairly simple to catch one. The most effective way is to induce

the squirrel to climb down a pole which is purposely positioned. Look for signs at the base of a tree to make sure squirrels are resident - pine cones husks, nut shells and bits of old mushroom are a good indicator. Fit three or four snares evenly spaced to a suitable pole about 4-5m (13-16ft) long. Place this against the tree, wedging it into a fork just below the foliage line. Any squirrels climbing the pole to their tree will run into the snares and be caught. A struggling squirrel will often attract others, who will come to investigate and then ensnare themselves.

Tin Can Trap One way to catch small animals is to dig a hole large enough to sink your billycan and half fill it with water. This is best done along the animal run, concealing the open top with grass. Most Arctic rodents feed on grass seed or moss, making them an attractive source of clean food.

Birds

All birds and birds' eggs are edible. Their taste depends on their habitat: those which live or feed at sea will be less palatable than those that feed on the land. The flesh from sea birds is nutritious but barely digestible, though this can be improved by thoroughly cooking it.

Although it is difficult to identify a particular bird species by its track, you can still get a rough idea of the type of bird. By using the following simple guide lines you should be able to tell the difference between perching birds, swimming birds and wading birds:

- Perching birds (e.g. sparrows & crows) leave tracks with a long first toe (the gripping toe) behind three front toes.
- Swimming birds (e.g. ducks) leave webbed footprints.
- Wading birds have long slender toes spread wide apart. You will find their tracks in mud.

Birds and Eggs

- Arctic birds are to be found everywhere.
- Most are fairly tame and will not run away if approached quietly.
- Some will allow you to literally pick them out of trees, hold them with the wings folded against the body so that they do not flap and frighten the others.
- The Inuit would place small bits of meat around the air hole in the top of their igloos in order to attract birds,- alerted by the flapping of wings, they would quickly grab the birds' legs.
- Nests can also be found in the lower latitudes and forest country, always check for eggs during spring and early summer. All eggs are edible and offer a good source of long term protein.
- If you are travelling in the Arctic and come across a source of eggs they can be cooked by wrapping them in moss and adding the bundle to the top of your fire carry These will cook while you travel and supply a warm meal on the move, they normally take around two hours to bake solid

Bird Snares Birds can be caught in any number of ways, from throwing a stone to hitting them with a long stick. One of the simplest ways is to snare them. First find a perch that is well used by birds - this can easily be identified by the large amount of droppings either on the branch or on the ground below. The snares can then be hung above this branch. Once a bird has put its head through a loop it will not withdraw but will try to escape by flying forward, and thus become trapped.

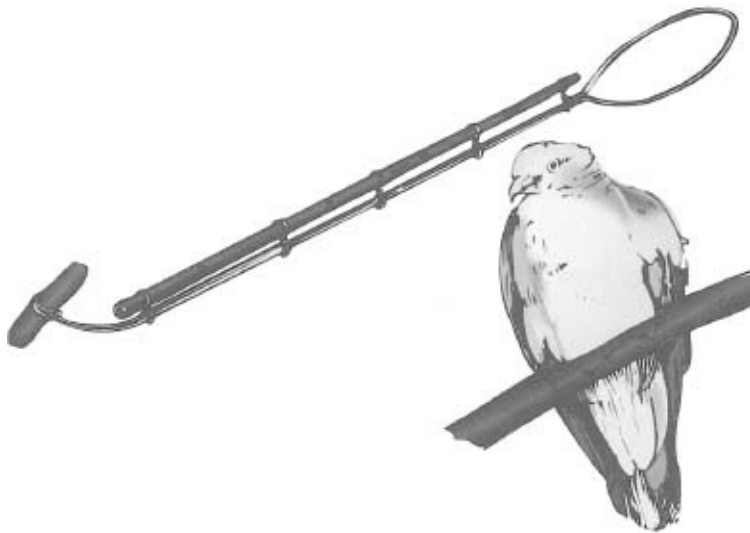
Another method is by using the baited perch. If you have sufficient wire - at least 2m (6.5ft), make a snare loop at either end and fold them over a branch. Next form a square-ended perch with the trailing end onto which the birds are enticed to land. When a bird rests on the perch it will

the snare are attached to a line. When a bird steps on the perch it will dislodge the whole snare, trapping the bird's neck at the same time. In most cases both bird and trap will fall to the ground.

Baited Bird Hook A simple baited hook (an open safety pin is ideal) can be used to catch larger birds such as seagulls, wild ducks and geese. These birds are greedy and swallow their food quickly. Make sure the line is well secured, and that you check all of your snares each day.

Bird and Fish Catcher

In isolated regions where man is rarely seen, most birds will remain perched and unafraid. Use a long gaff with a snare attached to hook your dinner.



Bottle Trap Floating traps can be used to capture waterfowl while on the water. If you do not have a bottle, use a small log instead. Half fill the bottle with water, and tie two or three snares to the neck so that they sit about 5cm (2ins) above the water. A little foliage will make the trap more attractive to any curious bird.

Unless the water is shallow and safe enough for you to wade in and retrieve the trap, secure it to the bank with a line so that you can pull in any catch.

Eggs Any survivor should keep an eye out for birds' nests; eggs offer high nutritional value, are convenient and safe, even if the embryo has developed inside. They can be boiled, baked or fried. Hard-boiled eggs can be carried as a food reserve, and if submerged in clean water will keep for several weeks. A thin coat of fat or grease around a fresh egg will keep it edible for a month or more. A survival diet of bird's eggs and boiled nettles will sustain life for a long time.

Never remove all the eggs from a nest; by leaving one or two you will encourage the bird to lay more. Mark those you leave to ensure that you

encourage the bird to lay more. Mark those you leave, to ensure that you are removing only the fresh eggs.

Preparation of Birds

Before cooking, birds need to be prepared by plucking and cleaning. Most birds can be plucked more easily either immediately after death, or after being plunged into boiling water. The exceptions to the latter are waterfowl, which are easier to pluck dry. Do not throw away clean feathers as these can serve many purposes, from insulation in bedding or clothing to making flights for arrows. Although it is possible to skin a bird, removing its feathers at the same time, remember that the skin will provide extra food value.

Once the bird has been plucked, cut off the head and feet and make an incision into the lower stomach below the breastbone. Use this hole to draw out the bird's innards and neck bone. (The heart, kidneys, liver and neck bone will form the basis of a good stew.) Wash the bird thoroughly, both Inside and out, with fresh water. Small birds, once gutted and cleaned, can be enclosed in clay and baked on an open fire; the feathers and skin will pull away with the clay.

Carrion eaters - *e.g.* vultures, buzzards and carrion crows - are likely to be carriers of disease and parasites. They are still edible, but need to be boiled first for at least 20 minutes before any other form of cooking. Boiling will kill any parasites and bacteria present, and serve to make stringy meat more tender.

Traps for Larger Game

Scissors Trap A simple scissors trap features one log raised above another in a V-shape. The falling log is held in position by a trigger, and the direction of its fall is guided by stakes. It is essential that both trigger and retaining cord are strong enough to support the deadfall, yet upon activation will release quickly and smoothly. The falling log can be weighted to improve kill efficiency. One of the best trigger release systems is where two pegs or modified branches support a toggle attached to the release line. The toggle itself should be baited to avoid the risk of the cord being chewed by the animal, and placed in a position where the animal must expose its neck in order to get at the bait.

Deadfall and Spears A variation on the scissors trap is to cross the animal trail with a trip line, which when activated will drop either a log or weighted spears. *Note:* Many survival books illustrate this trap with the deadfall or weighted spears falling or swinging across the line of the path. Situating the fall to activate along the line of the animal trail will produce much better results.

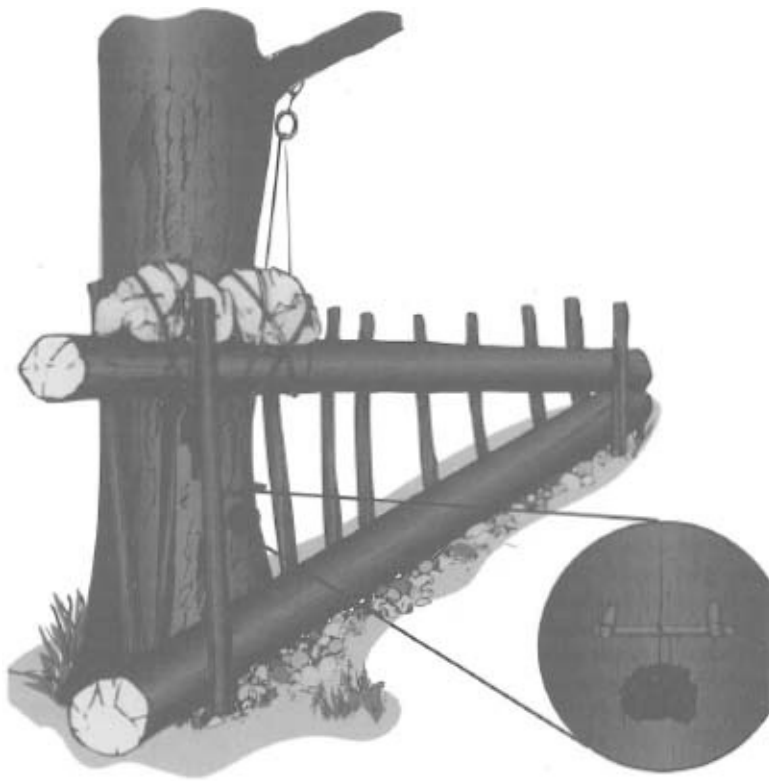
Arctic Trapping

- The Arctic wastes may look hopelessly empty, but have confidence - they do support game, and the predators which feed on that game.
- The bare snowscape can work to your advantage. Hungry animals have to forage far and wide, too -which increases the chances of them passing near your trap.
- Their senses will detect and lead them to your bait over far longer distances than you could hope to spot and stalk them if you were hunting. Their hunger will make them incautious when they find it.



An example of deadfall and spears

Scissors Trap



Use guides to ensure your scissor trap closes correctly

Weight the trap to ensure a clean kill

Position the trigger and bait so that the animal is forced to commit itself correctly into the desired spot.

Baited Pit Constructing a trap by digging a hole takes a lot of energy, although there are times when the ground is soft and the surrounding area is habitat to the ideal catch. The jungle is just such an environment, and wild boar and pig the game.

Providing you have the means, you need to dig the pit at least 1m square by 1.5m deep (3.25ft square and 5ft deep). Placing sharpened bamboo stakes in the bottom may help disable the animal, but they are unlikely to kill it. Covering the pit so that it matches in with the natural surroundings is vital. Likewise, the support for the concealing cover needs to be firm enough so that it gives way only when the animal is 'centre stage' - this can be achieved by cutting part way through the supporting branches.

Always approach an activated pit with care: injured animals can leave a nasty infected bite. Make sure your prey is dead by stabbing it with a spear before attempting to remove it from the pit.

Bait The use of bait will increase your chances of catching a meal, be it an animal or fish, but what you use as bait is Important. The idea of baiting is to attract the animal by offering an easy meal, and to optimise the efficiency of the trap or snare. In the first instance the bait must be acceptable to the animal; there is little point in using a worm if the wet ground is covered with them. Conversely, strange-looking bait may make the animal wary. Almost all animals and birds are attracted to blood, brightly coloured berries, and salt.

Hunting with a Weapon

Most improvised weapons, whether hand-held or projectile, require the addition of a cutting or piercing blade or edge. These can be fashioned from a wide variety of materials. Stone can be chipped to form an edge, and flint is particularly good for making weapons. Wood can be shaved with a knife into a point and hardened by charring slightly over a fire. Some woods, like bamboo, are naturally hard and only need trimming to a point. You can use man-made materials such as metal and glass to produce a good cutting edge.

AR-7 Survival Rifle Though it is rare nowadays to find a rifle packed in a survival kit, they do exist, and in certain environments prove most useful for hunting. Most survival weapons are of small calibre, since the relatively devastating ammunition used on the battlefield is unnecessary for hunting. The popular AR-7 survival rifle fires a .22 Long bullet. The AR-7 conforms to the needs of a survival situation, since it packs down for carriage into its own hollow stock, is lightweight, and will even float in water. Its 20-round magazine should, if used with sensible economy, supply sufficient meat to last several months.

The weapon is semi-automatic, which means it will fire a round each time you pull the trigger, *i.e.* you are not required to cock the weapon each time. For this reason, be careful not to let your trigger finger 'run' - aim for one round, one kill. Try to shoot an animal that will provide a good amount of meat, such as a fox, wild pig or capybara. Rabbits and birds can be caught by snare and are a waste of ammunition. Conversely, if you hunt game that is too large, such as a moose or bear, you will only wound it - which is wasteful of ammunition, cruel, and often extremely dangerous.

Assembling the AR-7 is simple:

- Open the rear of the stock, and empty out the parts.
- Slot In the trigger housing and bolt action assembly.
- Match up the barrel and body notches and secure with the screw

collar.

- Check all parts are hand-tight; then fit the magazine.

Zeroing Under survival conditions your ammunition will be limited, perhaps to one full magazine (20 rounds).

If the rifle is inaccurate, even by a small degree, you could miss with every shot. You are therefore advised to test the rifle by firing three rounds at a large target.

From a distance of 50m (55 yards), fire at the same fixed point each time. Estimate an imaginary point at the centre of your three bullet holes, and measure the distance and angle from your fixed point. If the centre of your group is left 5cm (2ins) and slightly high, then you need to aim off to the right by the same distance and slightly low. Aiming off is better than trying to adjust your sights, as you will need to confirm any adjustment by firing more ammunition. Always aim at the centre shoulder area of your animal.

Bow and Arrow Providing you can locate the correct materials it is possible to make a good hunting bow in a fairly short time. The most important part of the process is to select your stave - the part that forms the arc of the bow. Select carefully, choosing a strong, healthy section of wood without side shoots. The best and most traditional wood to use is yew, but oak, birch and hickory are all suitable. The wood should be long enough to make a bow stave about 130cm (50ins) in length.

Flex your stave several times to find out which side bends naturally. Mark this side, and taper off the last 50cm (18-20ins) at both ends. Traditional English bow makers always tapered their bows to a round section and made the ends as even as possible - this was to stop the bow twisting when it was drawn. The bow stave should be slowly dried over a fire for about two or three days. Notch the ends to receive the bowstring.

To string the bow use whatever cord you have to hand, as long as it is very strong; parachute cord or oiled rawhide thong will do. Another alternative is to use cleaned animal intestines dried and twisted together to form a string. Tie the string on to one end of the bow only. Make a loop in the other end so that it can be slipped over the other end when the bow is flexed. The bow should only be strung like this when you intend to

bow is flexed. The bow should only be strung like this when you intend to use it; at all other times it should be left untensioned.

Arrow shafts Arrows are made from straight, strong wood about 65cm (25ins) long and 1cm (0.4in) in diameter.



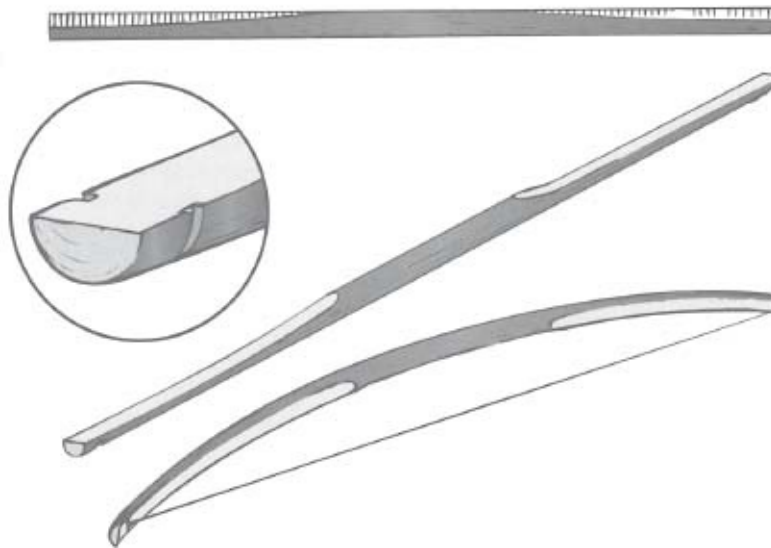
Keep in Mind When Hunting:

- Hunt smaller and slower animals. If you have any choice in the matter, always check that what you are following is not big enough to bite back.
- If you have no choice, then at least be prepared to defend yourself. Arctic carnivores have evolved by natural selection of the aggressive and cunning.
- Wolves will come close, but rarely attack humans.
- Foraging bears will not hesitate to enter your camp and your shelter, especially at night. Be prepared.
- Be careful of any live animal caught in your trap.
- Do not put your hand into a burrow,- it is better to lay a loose net or snare near the entrance.

- Making a kissing noise repeatedly on the back of your hand produces a sound like the squeal of a small animal wounded or trapped This may attract larger game - remember that it will be carnivorous.

Most types of wood will do, but choose birch saplings if you can find them. Clean any bark off the arrow and straighten it as much as you can - a good method is to gently chew the arrow between the teeth. Remember - a straighter arrow will fly further and hit with greater force. Balance the arrow on your finger at its halfway point. Insert your flight in the lighter end and the arrowhead at the heavier. At the flight end cut a notch about 6mm (0-25in) deep to take the bowstring - check the width against your string material.

Making a Bow



Select a hardwood staff about 1.3m in length that is free of knots and limbs
Chamfer a third of the length at Bach end.

Notch both ends to receive the bow string

String the bow by securing one end and forming a slip-over loop on the other



Arrow flights

Arrow flights Arrows need flights - 'feather' - in order to keep them on course when shot. They can be fitted with double or treble flights, and those can in practice be made from actual feathers or plastic. polythene or cardboard. The flights should be 10cm long and 5cm wide (4ins by 2ins). In a survial situation a one-piece double flight is best used.

Using a knife or other thin blade, carefully make a split about 15cm (6ins) long into the flight end of the arrow shaft. Insert a double flight into this - *i.e.* a single piece which protrudes equally on either side of the shaft. If the arrow splits completely, bind the split ends together tightly with flight cotton, fish line or very fine snare wire.

Arrowheads A variety of arrowheads can be made using different materials, but all are attached in a similar manner to the flights: carefully split the shaft, insert the head, and bind the split shaft tightly. If you can find nothing to act as an arrowhead, harden the tip of the shaft by turning it slowly in a fire. Once hardened, any charred material should be removed and the tip sharpened to a point.

Blow Pipe Although most people think of the blowpipe as a weapon used by jungle tribes, it is possible to construct a very effective modern-day variation which can be used for hunting small game such as birds and rabbits. Most of the materials required can be found in any modern vehicle or aircraft. For example, the body of the blowpipe can be constructed by simply cutting out a length of fuel pipe. Choose a section that is straight and at least 1.5m (5ft) in length; if this is not possible, try joining two or three shorter sections together. More air will be forced down the pipe if a mouthpiece is fitted at one end; this can be cut from card or plastic and held in place with ducting tape.

Metal darts between 10 and 15cm (4-6ins) long are constructed from stiff wire. Heat one end in a fire until it is glowing red, then flatten it to form a point by beating. Allow it to cool or dip it in water. The flight can be made from any soft, pliable material, *e.g.* seat foam or polystyrene. Use a short section of pipe which has the same diameter as your blowpipe to stamp out your flights; this will ensure an airtight fit, while allowing the dart to be blown easily through the blowpipe.

Slingshot The slingshot is a very simple weapon, easy both to make and, with practice, to use. Take two equal lengths of cord or leather about 35cm (14ins) long, and attach one end of each to a small, shallow pouch of fabric or leather which will hold a walnut-sized pebble. Tie a loop in the opposite end of one cord, and a knot at the end of the other.

Place the loop over the index finger of your dominant hand, and trap the knot between index finger and thumb

knot between index finger and thumb.

Place your ammunition securely in the centre of your pouch - ideally this could be a small, smooth pebble. Bring the sling above your head in one quick swinging motion to gain momentum. Let go of the knot to release the stone. You do not need to swing the sling more than a couple of times. Try using a flicking action to improve accuracy.

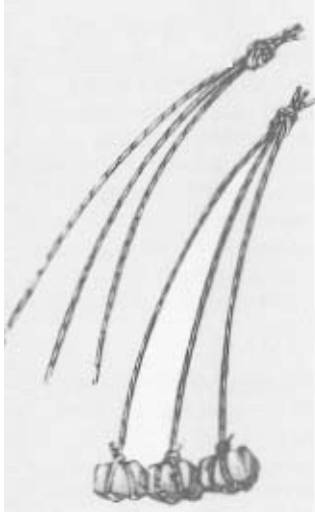
Throwing Stick Used properly it is a most effective means of knocking down and stunning a running animal. It is best to cut several 50cm (20in) lengths of heavy fist-sized sticks for throwing. Hurl them overhand or by side-throw, using a flicking motion on release to make the stick spin through the air. Advance on the animal the moment it is down, and club it to prevent any undue suffering.

Club Clubs can be made from either wood, stone or metal, and can be weighted or formed into a 'mace'. Construction of any club should be designed around its planned use and the ability of the user. Making a club will protect the survivor against some larger animals, such as wild dogs; and will also serve to ensure a clean kill of any animal caught but struggling in a trap.

Bolas The bolas is a very effective weapon for bringing down large, long-legged animals such as deer, wild sheep or ostrich. It is simply made, comprising three lengths of strong cord knotted together at one end and weighted with stones at the other ends. The stones should be of even weight and no larger than a duck egg.

Practise on a nearby tree by swinging all three lines in unison, in a arc above your head. When you let go of the knotted end the lines will separate and wrap around your target. You must be ready to spear your game the moment it is down, as the bolas will not immobilize it for long.

The Bolas



Attach evenly sized rocks to three bits of strong cord



Wind up above your head

The stones will separate as you throw them at your prey.

Catapult If you have the means to make a catapult under survival conditions it will prove to be a highly effective hunting weapon. All you need is a strong, forked twig and a length of elastic (you might even consider putting some into your survival kit). A good source is the rubber taken from a vehicle's inner tube. Avoid clothing elastic, as this is generally too weak for the purpose. Construction is simply a matter of tying the ends of the elastic to the forks of your Y-shaped twig and the

other ends to a good-sized projectile pouch - tie them tightly, and make sure the pouch is centred.

If you have a good length of elastic available, experiment with using an arrow instead of a stone. Once this method has been perfected you will find that it is both more accurate and more deadly.

Spears Spears are useful for protecting yourself against an attack by a wild animal, but they are of less use for hunting. To make an efficient throwing spear and achieve consistent accuracy demands skills of a high order. A thrown spear is less accurate and projects less killing power than an arrow. For hunting a spear can really only be used against cornered prey, although fishing spears are of more value.

To make a spear, choose a strong staff about 180cm (70ins) long and sharpen the end. If you have the materials and the time, experiment with making and using spearheads of other materials, such as flint, or metal or glass from a vehicle or aircraft.

Animals to Hunt: Tracks

Whether or not you actually see a prey animal, you will often be obliged to try to identify and locate it by studying and following its footprints or tracks. Efficient tracking is a highly sophisticated skill, and acquiring it in a survival situation will present a considerable challenge to most people from a modern urban background.

One animal's track can look like that of a completely different animal depending on the surface into which it is imprinted. Sand, mud and snow will alter the image of an animal's footprint. You will rarely find a perfect print with the elements against you, *i.e.* snow thaws and rain will wash away mud, resulting in a distorted shape. Even if you overcome these difficulties and are convinced that you are trailing one type of animal, it could still turn out to be another. There is always a chance that a young animal could leave a print similar to that of a smaller creature. Likewise, the different tracks made by forefeet and hind feet can trick you into thinking you are following the tracks of a different animal.

With all this against you, you need to have a clear idea of what to look for in the first place. Your conclusion should not be based purely on the print

in the first place. Your conclusion should not be based purely on the print, but also on your surroundings. You should be considering what type of surface the track has been made in; the time of day or night; the weather conditions which may have affected the print; and, most important of all, the probable game in your particular surroundings. Also remember to look for any other clues near the track.

Spears

Spears with multiple barbed heads are best for fishing



Split the shaft to attach a metal or stone head.

As an example of similar tracks, consider a rabbit and a squirrel. The rabbit will push off with its hind feet and land on its forefeet, which touch the ground one after the other. The hind feet then touch the ground landing in front of the forefeet. This leaves a print of the larger hind feet, followed by the print of the smaller front feet. The squirrel has a similar type of movement, with the hind feet landing in front of the forefeet, leaving the same type of print. Being so similar it would be very difficult to decipher which footprints had been left by which animal - if it were not for one simple clue. A squirrel's trail starts and ends at a tree.

A series of tracks made by an animal will give you a trail. This gives you an idea of the speed at which an animal was moving. The greater the gap between the groups of tracks the faster the movement. A walking animal moves its right forefoot first, followed by the left hind foot. Then the left forefoot is moved, followed by the right hind foot, and so on. A trail made by a walking badger will show that the hind foot has landed on the track

of the forefoot. This is called 'being in register', and is what happens when an animal has been walking or trotting - it moves its legs in a definite order. If an animal has been galloping, the tracks will not be in register.

Hunting

Much of the Arctic is fairly exposed, making stalking difficult; therefore traps, snares and ambushes offer the best opportunity. Historically the Arctic peoples used a variety of weapons including bows, and harpoons tipped with stone, whalebone, deer antlers and ox horn. If you have a gun, bow or catapult you are advised to stay concealed downwind and lie in ambush. If stranded on ice floes the best hunting is around the edge, or by a seal breathing hole.

Always use your height to observe game, but do not silhouette yourself against the skyline. Watch over open ground, preferably downwind. Be silent; be patient; let the animal come to you. Fire or throw your weapon from a concealed position. If travelling for any distance, make sure that you mark your progress - it is easy to get lost while tracking in a strange environment, so use strips of a brightly coloured material to mark the trail back to your shelter.

Animal Sign Animal sign can be anything, from a hoofprint to the biting of tree bark, which indicates that there is animal life present. Learning to interpret these signs can take a professional hunter years - time which the average survivor does not have. The markings on a tree may or may not mean the presence of an animal, whereas animal droppings will leave little doubt. The shape, size and colour of any animal droppings are of little concern other than to indicate the size of the beast. Tracks and prints are easy to follow during the winter, and in most cases will lead directly to the animal's habitat.

Arctic hunting requires practice, patience and experience. Knowing what to look for and where to look is a great help. Larger game such as caribou live on grass or 'caribou moss'. Wolverine and bear will live mainly in the forest, while the ice pack remains the home of Polar bear and seal. In the lower regions animals such as ground squirrels and porcupines can be caught by hand, although beating them with a stick is safer.

Trapping vs. Hunting

- Hunting demands practised skills - silent movement, concealment, reading the natural environment, predicting animal behaviour. Survivors from urban backgrounds rarely have them All potential prey animals do.
- Trapping demands the ability to visualize basic mechanical principles, to fashion simple materials, and to study the surroundings. These are skills which even urban adults can master well enough to deceive most animals.
- Hunting means movement, sometimes over long distances. This expends the survivor's energy If he is unsuccessful, it is not replaced.
- Making and setting traps and snares demands little strength, and less movement across country - therefore less energy loss.
- The hunter normally has to focus on a single prey. If that prey escapes him, his time and energy have been wasted.
- The trapper can set many snares, all of which are potentially working for him simultaneously and for 24 hours every day. They are dramatically more productive by the equation of cost against possible rewards.

Although the exposure makes stalking difficult, the ease of locating animal tracks in the snow is a major advantage when hunting in the Arctic. They are easy to follow and give a great deal of information about the animal that you are tracking. Do not worry about recognizing an individual animal from the spoor; the size of print and distance of the pace will let you know how large it is. Make sure that it is alone; shooting a three-foot bear may not seem such a good idea when its six-foot mother comes along. If you think you have made a kill, always make sure that the animal is dead - even a small wolverine will put up an impressive fight. This is best done by touching the animal's eye with your gun muzzle or the tip of your spear; at the first sign of movement pull the trigger or stab it.

Rabbit Rabbits deserve a special mention; they are a great source of

wild food, and are found on every continent living in all conditions, from Arctic to desert. They are easily recognizable, and being a social animal are always found in large numbers. They usually stay in one territory all their lives, where they live in burrows, often with more than one entrance. They are most prevalent in open grassy areas and open woodlands, especially where the soil is dry and sandy. Burrow sites are made in banks and slopes with light tree or shrub cover.

The tracks that rabbits regularly use are called runs. These are easily seen between the burrow entrances and, if in present use, will have rabbit droppings on them - small, dark, round 'currants'. When you set a snare make sure that it is a little distance from the burrow entrance itself - animals are far more wary when emerging from underground than at most other times, and a snare set too close to the entrance may well be seen by the rabbit and avoided. Take care not to disturb the ground or foliage around the run when setting the snare, and conceal your scent by rubbing the snare and your hands with animal droppings.

A live rabbit is best killed by holding its hind legs in your left hand and its neck in your right. Stretch and twist the neck sharply until the neckbone breaks; death will be instantaneous.

Deer Deer can be found from the lower Arctic to the lower reaches of the jungle. They walk on two toes, leaving a definitive track. They live in open country and woods. Many have branched antlers, which they drop after the October rut - the mating time for deer and other hoofed animals. Red deer start off as spotted calves; during the summer their coats change to a red/brown colour. Their diet consists of grass, fruit; heather and tree bark; it is also not unknown for them to raid crops.

Elk and Moose These are large deer, their coats ranging from grey/brown to black in colour. They live mainly solitary lives, but can live in small groups. Their habitat is open forest, especially close to water (they are very good swimmers). Marshlands make an ideal setting for them in the summer, although they often move to drier ground in the winter months. Their diet includes leaves, young shoots, water plants, grass and moss.

Wild Boar The adult wild boar has a dense, dark-coloured coat, although

youngsters are striped. They have a long snout and the male has large tusks, which can grow up to around 30cm (12ins) long. The male lives a solitary life except in the rut. They live in deciduous woodlands and marshes of North America and Europe, and in the tropical forests of South America and Asia. Their diet includes roots, bulbs and fallen fruit. Some tropical boar can be very dangerous; despite their size they are able to attack humans, being fast, heavy and aggressive. Wild boar are heavily infested with worm.

Fox The fox's coat varies from sandy to a dark chestnut colour. The red fox has a bushy tail, usually with a distinctive white tip. Their preferred habitat is woodland, although they are very adaptable and will live in built-up areas. They are usually nocturnal, and are active all year round. Their natural diet includes young deer, small mammals, birds, poultry, grass and fruit. They normally live in a single-entrance burrow, making them easy to catch if you dig them out.

Warning: Many foxes carry rabies.

Rodents Rodents belonging to the subspecies known as myomorpha make up about a quarter of all mammals. The best known of these animals are the various types of rats and mice. They have adapted themselves to surviving in almost any location except for Antarctica and the colder regions of the Arctic. Their diet usually consists of seeds and other vegetation; but certain species have become omnivorous, and will often eat any food left out by humans.

The problem for the survivor is that rodents are the carriers of many diseases - leptospirosis, rabies, ratbite fever, murine typhus, bubonic plague, hantavirus and spirochetal jaundice, etc. Through their urine, droppings and hair food can easily become contaminated, and at the very least will pose a threat of bacterial food poisoning. Despite this, the animals are edible. This makes them a ready source of food, and one which mankind has often turned to, especially in times of famine.

Norway Rat The Norway or Common Rat actually originated in eastern Asia, making its way into Europe at some time during the Middle Ages. This rat can be distinguished from others of its species by its blunter nose, smaller ears and shorter tail. It is a very adaptable animal, capable

of living either in the wild or urban habitats, but its preferred environment is a wet or damp one. In towns it can therefore often be found living in cellars or in the sewer systems, whereas in its natural state it will live along river banks or beaches. The Norway rat is a burrowing animal; its burrows, usually in river banks, will often be up to half a metre (18ins) deep and will have several entrances and chambers. Small family groups, organized by a system of hierarchy, inhabit these chambers. These rats tend to have small territories and, as long as there is enough food, will stay within their boundaries. They are creatures of habit and will follow the same foraging trail each time they go to seek out food.

Seal For any Arctic survivor the seal is likely to be the best source of food, protection and means of lighting a fire. Seals are easily recognized by their torpedo-shaped body. They are superlative swimmers and spend most of their time in the water, but they must surface to breath from time to time. For this purpose they make small breathing holes in the ice. The best way to kill a small one is to wait by a breathing hole and club it, before dragging it onto the ice. Larger seals need to be clubbed or shot on land. (The elephant seal, which lives in waters near Antarctica, can grow to 6m long and may weigh up to 3000kg - 20ft, and 6,600 pounds.) Seals also give birth to their young on land between March and June - new-born seals cannot swim.

Seal meat has a very strong flavour but is perfectly edible. Remove the skin and cut away the layers of blubber, meat, bones and intestines. Freeze or cook the meat before eating.

Warning: Avoid the liver - like that of the Polar bear, it contains poisonously heavy concentrations of vitamin A.

The blubber can be used for cooking and for burning in oil lamps. The skin and intestines can be used to make waterproof clothes, boots, shelter and boat-covering. The blubber and bones will make a weak fire in an emergency.

Walrus Walruses live in shallow Arctic waters around both ice floes and land. They can be found across the entire polar basin. They are recognized by the long tusks projecting down from the upper jaw of the male, by prominent whiskers, and by their size -some grow as large as

3.5m (11.5ft) and weigh up to 2 tons. **Warning: While walruses may look slow and cumbersome they are very dangerous; leave them alone unless you are armed with a good rifle.**

Lemming The lemming is a tennis ball-sized animal related to the mouse. They dig into the soil to build their nests, living under the snow during winter. The females give birth to three to eight young as often as ten times a year. A young lemming can be fully grown and ready to breed in three months. Lemmings feed on Arctic grass, and most other animals feed on the lemmings; for snowy owls and Arctic fox they represent the only source of readily available protein. Lemmings are good to eat, but the flesh is best cooked. Living off lemmings for an extended period of time will cause fat deficiency, however.

SAS Experience

During one winter exercise my patrol parachuted onto the island of Senya in the frozen reaches of northern Norway. There, in the middle of winter, the only daylight we saw would sneak under the canopy of darkness for an hour at midday. As we dropped into a blinding snowstorm it soon became obvious that survival would take precedence over the exercise.

Our sledge, containing all our fuel and rations, had been parachuted moments before us, but became lost in the darkness. For four days we walked knee deep (our skis were useless) in a blinding snowstorm in temperatures that fell below 30 degrees. Living on what we could carry in our rucksacks, the patrol faced a test of human endurance. We made shelter, built a fire, and waited to be rescued, in these conditions travelling would achieve nothing.

As the days went by we found ourselves making stone stew, a mixture of water and anything we could find in our rucksacks and pockets - boiled sweets, biscuits and a chocolate bar. On day five - the day of our rescue -we had made a hole in the ice of a nearby lake, from which we pulled three large fish. We were so pleased with our catch that we took them back in the helicopter to show everyone.

Arctic Hare The Arctic supports two types of hare, the Arctic hare and the tundra hare; but for the purposes of this book they are as one. They are to be found in large numbers in Canada, Alaska and Greenland, most living on the rocky uplands of the Arctic tundra. They move very quickly, so snaring or netting offer the best chances of trapping them. Prepare and cook as for rabbits.

Ptarmigan This small chicken-like bird is commonly found on the Arctic tundra. Their plumage is brownish with dark stripes in summer, changing

to completely white in winter. This camouflage is excellent for hiding in rocks or bushes or feeding on a carpet of snow. Ptarmigan can fly but they usually walk, feeding off berries and leaves from the tundra plants. Approach them with care, circling if need be, until you are close enough throw a stone or stick.

Arctic Fox This small fox lives mainly on the far northern tundras of Europe, Asia, and North America. Its fur, which is grey in summer and pure white in winter, provides the Arctic fox with perfect camouflage while hunting its prey. It can be found as far north as the ice floes, but has a tendency to migrate south with the seasons. Unfortunately, due to its valuable fur its numbers have been reduced through hunting. The Arctic fox is a scavenger, often living off other animals' leftovers, and is best caught using a baited deadfall trap. Prepare it as you would a small deer.

Wolverine The largest of the weasel family; adults average some 1.1m long (3.6ft) and may weigh up to 25kg (55 pounds). The long, shaggy hair is mottled dark brown with black patches, giving them a bear-like appearance.

The wolverine is extremely aggressive, and will defend its kill even against Grizzly bears; it is also adept at taking food from other animals. In recent years it has been over-hunted for its fur. Its meat is said to be very tasty and rich in protein. Best caught with a baited deadfall trap.

Mountain Goat Mountain goats/sheep can be found mainly in the northern alpine ridges, although they do venture down to lower pastures. Their remarkable agility in the steepest mountain terrain is a form of protection from predators. In summer they deliberately shed their wool by rubbing against rocks and branches. This wool was collected and used by Native Americans to make ceremonial blankets. Hunt mountain goat only if you have a weapon which is accurate and deadly at some range, *i.e.* a gun or a bow; trying to chase down any type of mountain goat is a waste of time and could prove dangerous.

Caribou The caribou is basically an undomesticated reindeer. They live in large herds which are constantly on the move, feeding on the moss and lichen which grows throughout the Arctic tundra of Canada, Alaska, Greenland and Russia. If you come across a herd of caribou, search for

one that is injured and therefore slow on its feet. Caribou are not as shy as most deer, and are normally easy to approach if you move stealthily.

Musk Ox This striking-looking beast is easily recognizable by its long, thick, shaggy brown coat, which covers its whole body and often hangs down to the ground. It can be found in small numbers throughout the Arctic (and has a close relation, the takin, which lives in the Himalayas). They average around 1.5m (5ft) tall and weigh 300-500kg (660-1,100 pounds). Although a herbivore and fairly placid, they should be approached with caution as they often use their hooked horns to chase off intruders. They are best hunted with a rifle; aim for the heart - the skull is extremely thick and capable of stopping a .22 survival bullet. Prepare and cook as for a deer.

Polar Bear The average Polar bear stands about 2.5m (8ft) tall, making it the largest of the bear family. They live only in the northern Arctic and spend most of their time on ice floes hunting seals. Polar bears are excellent swimmers, but generally hunt seals out of the water, waiting by their breathing holes; a single blow is enough to kill even a large seal and the clawed paw will lift it out with ease.

Warning: Polar bears have a keen sense of smell, move fast, and are extremely dangerous; they regard humans as food. They should not be hunted with anything less than a high-powered rifle. Polar bear liver is over-rich in vitamin A, making it poisonous to humans.

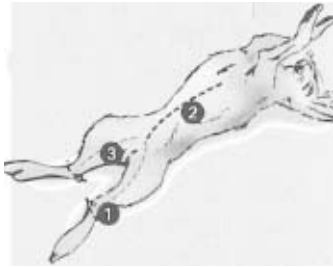
The Preparation of Animals

Skinning and dressing an animal carcass will be much easier if it is done as soon after death as possible. First the carcass should be bled. Smaller and medium-sized animals can be hung upside down from a frame, with the ropes attached around the hocks. The throat should be cut and the blood collected in a container below. Do not throw away this blood; it contains many valuable vitamins, minerals and salt, and once it has been boiled thoroughly it can be used as a food source. It is ideal for thickening and adding flavour to soup.

Note; If you catch an extremely large animal such as a moose or bear, which is impossible to haul up for butchering, you should consider moving your camp to the beast rather than trying to carry it back piecemeal.

Preparing Rabbits Rabbits and small members of the cat family can provide a survivor with a relatively easy-to-catch source of meat. However, rabbits lack the fats and vitamins needed to sustain a survivor's health. Be aware that although a rabbit-rich diet may be easy and tasty, it can also lead to severe malnutrition over a period of time.

Preparing a Rabbit



As with most animals, cut around the leg joints below the thigh.

Make a centre cut from the neck down to the stomach.

Cut down both legs to allow you to remove the fur in one piece.

Remove gut and press down on the bladder before removing fur.



When skinning a rabbit, first make a cut behind the head and make sure that it is large enough to insert two fingers. Peel the skin back and cut off the head and lower limbs. To gut the carcass, cut a line down the belly and open out the body. Most of the innards should fall out when you give the carcass a sharp shake, but make sure that any remaining pieces are scraped out with a knife and washed away with fresh water.

Preparing Rodents Rats and mice are not only edible; they are delicious when stewed with dandelion leaves or other kinds of vegetable. Skin, gut and wash them in the usual way; but boil them for about ten minutes before any other form of cooking, to destroy any parasites or bacteria they may be harbouring.

Preparing Hedgehog, Porcupines etc. Animals that have a protective coat of spines or a thick shell are best rolled in a thick layer of clay and

cooked in the embers of an open fire. Make sure that these animals, especially large ones, are cooked all the way through; any sign of blood when you open it means it is not cooked properly. Crack and remove the clay; the spiny skin will pull off with it to reveal the flesh below. Eat only those parts you are familiar with, keeping the rest for use as bait.

Preparing Insects To humans, insects are not the most appetizing food source; yet any survivor would be foolish to overlook their potential. They are the most plentiful life form on earth, and pound for pound provide twice the amount of protein as the best steak. The tribal peoples of undeveloped regions continue to harvest this bounty with enthusiasm. This reticence to eat insects on the part of modern urban man is understandable, but resistance is primarily based on aesthetic disgust at the thought of eating a live, wriggling, pollution-filled creepy-crawly - and the well-informed survivor will not have to face this ordeal.

Insects live both above and below ground; in either case their nests are easily found. Rotting logs provide homes for grubs, termites and beetles. Large flat stones make good nesting sites for a whole host of different species. Remember that insect larvae are also edible and highly nutritious.

Warning: A few insects are best left alone.

These include any which are brightly-coloured or hairy, and those that carry disease such as ticks, flies, and mosquitoes. Be aware that some adult insects will bite, and those with hard-shell bodies can harbour parasites.

Almost all insects are found in abundance, so their small individual size is of little consequence - the mass will provide enough protein. The appearance of insects is also of little importance other than providing the means to recognize its suitability for eating. The secret of dealing with insects lies in how they are prepared.

This is best done by collecting as many as possible - a minimum of several cupped handfuls. These should be placed in a metal container which has been preheated over a hot fire (a lid of some sort will stop the more active species from crawling out).

It will take several minutes for them to cook, and it is best to turn and

It will take several minutes for them to cook, and it is best to turn and shake the container in order to toss the insects and prevent them from burning. Once all the insects are inert, leave them to dry further beside the fire. A good test is to pick an insect from the container and crush it between your fingers; the whole body should disintegrate to a dark brown dust. Next, grind the cooked insects using a stick as a pestle. When this is done pour the powder into a container of warm water; this will separate the wings, legs and any body crustaceans, which will float on the surface where they can be removed. The remaining liquid is little more than a tasteless protein soup, to which edible plant parts can be added to make a nourishing meal.

Butchering Larger Animals

Once your deer, pig, wolf, *etc.* has 'bled out', the carcass can be skinned:

Make the first cut around the knee and elbow joints. Carefully make a full circular cut around the genital organs. Then, starting at each knee, cut the skin down to the abdomen, forming a V-shaped cut.

Continue cutting down the front of the animal, stopping at its neck. Be careful not to pierce the abdominal wall beneath, as this will spoil the skin. To protect the abdominal wall from the knife, place your hand behind the cut, inside the carcass.

Make two more cuts from the front elbow joints in towards the belly.

Return to the hind legs and peel back the skin; a cutting and pulling action is best. Continue until the skin has been completely removed.

Cut open the abdominal membrane - without piercing the stomach or other organs - down to the chest bone. Use wooden skewers to pin back the flaps. Much of the gut will fall from the stomach and drop onto the ground.





Check that you have removed all internal organs, starting with the windpipe and moving upwards. To clear the entire mass, use a knife to make a deep circular sweep around the genital organs; avoid cutting the bladder.



After inspection for any signs of disease, keep back the parts of the offal which will be useful (e.g. the kidneys, liver, heart, and the fat surrounding the intestines). Use the rest of the innards for bait, or to make sewing gut. Also keep back the meaty parts of the skull; the brain, eyes and tongue are all edible.

Once you have cleaned and prepared the meat the skin can be cleaned and dried in order to preserve it.

Skinning is easier if performed while the carcass is still warm.

Roll up hides fur side out before they freeze, and secure them with a

Roll up hides fur side out before they freeze, and secure them with a carry strap by tying with a length of intestine. If the animal is too large, cut it into manageable portions so that it can be easily carried.

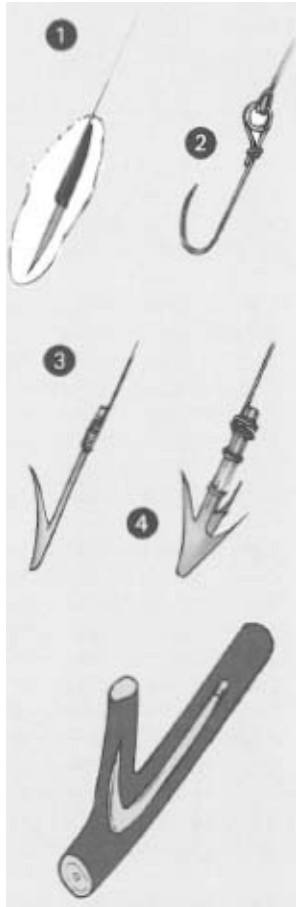
Remember that it is easy to cut meat when it is still warm and extremely difficult once it is frozen.

Some animals carry disease, therefore it is always best to cook or boil the meat before eating. Store any leftover food with care - there is always some other animal looking for a free meal.

Fishing

Of all the aquatic foods, fish are the easiest to catch and offer the most obvious form of nourishment. Even with the crudest of fishing equipment, as long as you have knowledge and patience you will be able to catch enough fish for your needs. As with most things, catching fish is a skill and requires practice, and it is unlikely that you will catch much on your first attempt. With growing experience, patience, and the ability to vary your methods according to the situation, you will find a fishing technique which will achieve the results you want.

Fish Hooks



Improvising a fish hook can be simpler than it seems.

A simple bait covered gore.

Stiff wire or safety pin.

Whittled hardwood.

Strong dog rose or similar thorn.

There are not many general rules that apply to fishing, as they can be caught by a variety of methods - hooks, nets, traps, snares, spears, stunning, poison, and even by simply using bare hands to grab them. All species differ in their feeding habits; however, it is generally accepted that most fish will take bait at dawn and dusk -look for the signs of feeding at those hours. Big fish are hard to catch as they are heavy and full of fight: if you do not have the correct fishing kit in your survival pack.

can't bring it, if you do not have the correct netting kit in your survival pack, then improvise. If you see large fish close to the surface try using a spear or bow and arrow, stalking your fish with extreme care in order to get close enough.

When and Where to Fish

In cold weather, or at dawn and dusk, fish tend to prefer shallower water or can be found around the edges of a lake or pond. Fish need a certain amount of warmth and will seek out warmer water. They also tend to feed better in shallow water. Fish will always lie in the water facing the oncoming current. This enables them to spot any food coming towards them, and also ensures a better flow of water over their gills. Knowing this, you will have better success if you let your natural bait move downstream towards likely shelter spots at a natural pace, so that they can see it and hopefully accept it as a normal piece of food.

Fish also like to be where the water is well aerated, such as at the bottom of a small waterfall. When using natural bait, cast it into the cascading water and let it move naturally down and across the pool, or for a little distance downstream if in moving water. Then, very smoothly and quietly, bring the line in and cast again as before. The best pole to use for this type of fishing is a slender, flexible one, as this enables the line to be pulled gently out of the water instead of being dragged back through it. This type of pole also makes casting and recovery a lot less effort for the angler.

Winter Fishing

- For best results, make two holes through the ice and set a net between them.
- If you have no net, make several holes and set several baited lines.
- Anchor nets and lines firmly to poles longer than the width of the ice hole.

Bait Your first choice for bait should be food that is normal to the fish's diet. Before you start to fish on a stretch of water, study it and the

surrounding shore for morsels normal to the fish. Look for insects, worms, shrimps, minnow or shellfish. If none of this natural bait is available you will have to substitute an alternative, such as small scraps of meat or artificial substitutes.

Fish are often attracted by the struggles of live bait. Try using a grasshopper or a beetle and see if it is taken by a fish. If it is, take another insect and carefully impale it on the hook without killing it. This should attract another bite from the fish, which this time will end up being caught. Minnows can also be used as bait in this manner, but under the water. The hook should pass through the body under the backbone and to the rear of the minnow. A float will be needed to keep the bait off the bottom of the water.

Lures and Hooks A lure is some form of artificial bait. It is designed to look like an insect or a small fish in order to fool the fish into thinking that what it sees is its natural food. A convincing appearance alone is not enough; the angler must also be able to manipulate the lure in order to mimic the movements of live bait struggling in the water.

Lures can be improvised from many sources of material. They can even be made from a tuft of hair (from your own head if necessary), feathers, a scrap of brightly coloured cloth, or a fish fin with a piece of flesh attached. In fact, anything will do as long as it looks like an insect of some description. The lure should be constructed around the hook so that this is hidden.

Your basic survival fishing kit should contain a good supply of variously sized hooks. Good fishing hooks can also be improvised from a wide variety of materials and items - thorns, safety pins, wire, *etc.* Always make sure that your hook is the correct size for the fish you are trying to catch; and that, once you get a bite, the hook will stay attached to the line.

Arctic Fishing

Arctic fishing extends from making a hole in the ice of frozen lakes during winter to more traditional methods in summer. If trapped on the ice floes, fish from the edge; if a life boat or raft is available, consider the risks of going out to sea, but be aware of wind drift and currents. Fishing through an ice hole can be done with a hook and line, although you will achieve better results with a net. In summer fish can be caught by damming streams and rivers and making traps.

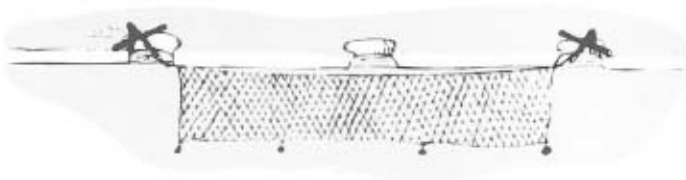
Ice Fishing



Make two or three holes in the ice and push your pole through one end under the ice.



Manoeuvre the pole under the ice with the net attached retrieving it through the third hole.



Secure the net. Use the centre hole to check for fish.

Ice Fishing The main consideration when fishing through ice is the thickness. In severe conditions the ice may be so thick that it is impossible to penetrate; by contrast, walking on thin ice is extremely dangerous.

Given that the ice is both penetrable and safe, there are two basic methods of fishing: line and net. In both cases you will need a tool with which to chop through the ice - a large knife will do, but an axe is better.

You will need to cut down until you have a 30cm (12in) wide hole; this can take time if the ice is thick.

The simplest method is to drop a single weighted and baited line into the hole until it hits the bottom. Raise the line about a foot and jerk it up and

hole and let it hit the bottom. Raise the line about a foot and jerk it up and down. Securing the line to a pole which fits across the ice hole will allow you to leave and start work on a second hole. Fitting a cloth scrap as a flag to the line will indicate when you have a bite.

If you are able to cut several holes, then a net can be inserted under the ice by using a pole and line. The length of the pole governs the distance between the two holes. Tie one end of a line to one end of the net, and the other end to the pole; anchor the other end of the net securely at the first hole. Drop the pole into the first hole and manoeuvre it until the end shows in the second hole. Retrieve the pole and pull the line and the other end of the net out of the second hole. The net is now spread out under the ice between the two holes; make sure you have sufficient weights to fan your net out properly, and that both ends are anchored on the ice.

Tickling a Trout

When you get near what looks like a good spot for trout, lie on the bank and dip your hand in the water to bring it to water temperature. Begin at the downstream end of any possible cover, working upstream, gently and carefully feeling for fish. If fish are present you will encounter the tail first. This should be gently stroked a few times before moving the strokes up the body towards the gills. Once your hand is under the gills, flick the fish quickly out of the water and on to the bank.

There are three main factors to tickling trout successfully:

- Knowing where the fish can be found. Carefully study the water, and discover where they hide.
- Be relaxed. Most people will flinch at the first contact with a slimy fish - prepare yourself mentally not to react. Move slowly and gently, and touch it lightly.
- Be warned that trout are very slippery fish to handle - roll your body back on to the bank as you flick the fish out of the water.



Always attach a stick which is long enough to brace across the ice hole, in case your anchors fail.

Salmon Salmon are found in many rivers and streams. They are born in

a fresh water stream before making their way to the ocean, and return during late summer to their place of birth, where they spawn. During this arduous journey they become prey to a wide range of predators, including man. Pacific salmon do not eat during their spawning journey, but on occasions they will strike at artificial lures. The best method of catching them is by gaffing. Salmon can be caught easily once they have spawned; they are found floundering weakly in river shallows, and can be picked out by hand.

Trout Trout are found around the world but prefer the cooler waters of the Northern Hemisphere. True trout have dark spots on their bodies; there are many species, most of which live in fresh water streams and lakes. In slow-running water they may sometimes be caught by 'tickling'. Trout can be lured from their deep holes by flies, spoons and plugs, but you will need a strong rod and line to land many of the larger fish -these can weigh up to 8kg (17.5lbs) and put up a hard fight. All the trout family gather to the feast while salmon are spawning.

Cod There are few people who have not tasted this staple food fish, which is tasty and rich in nutritious value. It is normally grey in colour but there are also red and brown varieties. Both Pacific and Atlantic cod grow to between 0.6m and 0.9m (2-3ft) in length and weigh anything between 3kg and 15kg (6.5 to 33 pounds).

For most of the year cod live on the ocean bottom, but in summer they venture closer inland, and can be caught in shallower waters of the coastal estuaries with a simple lure on a line.

Arctic Fish Preparation The Inuit clean their fish and lay boneless fillets on the ice to freeze. Once they are completely frozen they chop them into slices and eat them. They say that eating raw fish produces better internal body heat than that achieved by conventional cooking. I have tried this, and found the frozen fish extremely palatable; but one has to be careful to remove all bones prior to freezing, as they are not detectable until swallowed. If a fire can be made, prepare and cook as normal.

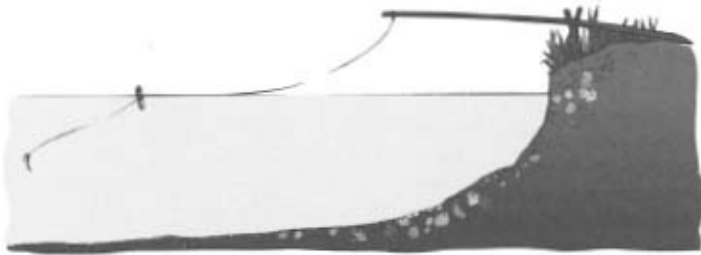
Fishing Hints

Fish tend to be very wary, and will swim away and hide at the first sign of anything they perceive not to be in their normal pattern of events. They are able to detect even the slightest vibration in the water, and are even aware of heavy footfalls on the bank.

Therefore it is vital that when you approach the edge of the water you do so slowly and gently to keep any ground vibration to a minimum. Keep as low as you can, as quiet as you can, and move as little as possible. Never let your shadow fall onto the water.

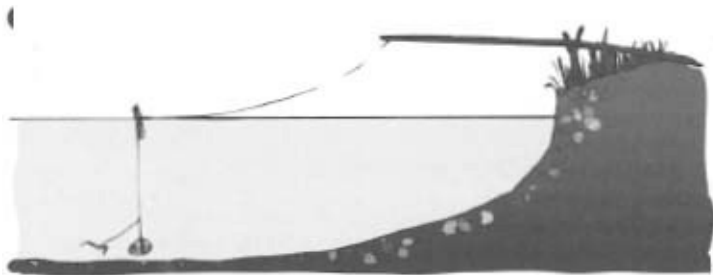
Put your bait into the water slightly upstream from the location of the fish, and allow it to drift downstream with the current until it has passed you. If by that time no fish has taken the bait, gently recover it and try again. If no fish take the bait after a few tries, change your fishing pitch - but remember to make your move slowly and quietly. If you still have no luck, try again at the opposite end of the day, or after dark if the water is clear and shallow.

Night Line



A float will indicate when you have a bite.

The addition of a weight will allow you to determine what depth your bait is.



Night Line Fishing A night line consists of a line with one or more hooks which is left in the water all night. The hooks (preferably gorge hooks) should be baited with something that cannot easily be lifted off by eels, such as a small fish or a small piece of meat. The line should then be fastened firmly to a rock or a stake on the bank or an overhanging branch. The line should be checked every morning for a catch; if there is one, remove it and replace the bait. The line can have a single hook, or several stretched on a line across the river. The depth of the hook can be adjusted with weights to catch a variety of fish under most conditions.

Fish Traps Fish traps can be used in both fresh and sea water. The type of trap required will be dependent on the water in which you are fishing and the size of the fish. Traps can be made to be portable or permanent.

The most common form of fish trap is the portable basket type, built with a cone-shaped entrance. They can be constructed from hazel or willow sticks, reeds or bamboo, or improvised from man-made discarded containers such as a plastic bottle. This shape makes it easy for the fish to get in and almost impossible to escape. Once constructed, the pot

should be baited and placed facing upstream in a river or a rock pool.

Permanent Traps An on-site trap can be made by piling stones or driving wooden stakes into the riverbed to form a pen. It may be necessary to form the trap in such a way that fish will be funnelled through the entrance into a secure compound. The placement of the trap is critical, but where possible full advantage should be taken of natural features which will enhance your catch and save time and energy. It may be possible to herd fish by wading into the water starting 100 metres upstream and walking towards the trap. Trapped fish can be speared with a sharp stick.

Fish and Wild Fowl Snares Snaring fish is not as easy as snaring small game, but it works on similar principles and can be achieved with time, care and observation. Take a normal animal snare and attach it to the end of a stick, which should be at least 200cm (80ins) long. Tie an extension on to the end of the snare wire so that you can close the noose at will, (see page 95.)

Fishing Nets It may even be possible for the survivor to make and use his own fishing net - a gill net - as long as he has enough line (a possible source for this would be a parachute rigging line). First decide how long the net has to be, and then tie the top line of the net between two saplings or stakes the right distance apart. Tie another line below this to define the width of the net. Any nylon lines that are available should have their inner cores stripped out. Take a piece of this inner core and double it. Tie it to the upper of the two lines using an overhand loop. The two ends, which should be 30% longer than the required width of the net, should then be allowed to hang down loose. It is now just a matter of repetitive knotting; but you probably have lots of time on your hands. Depending on your location and the materials available, make your net as large as possible.

Providing a stream is not too wide nets can be erected right across it; if it is, then the stream can often be dammed to make it narrower. Support the net by stretching a line across and secure the bottom edge in the water with heavy stones. In a larger body of water, such as a river, nets should be set just above or below an eddy.

Wherever they are set, it should always be in a stretch of quiet water. On

wherever they are set, it should always be in a stretch of quiet water. On a lake shore the net should be set at right angles to the bank, preferably off a small headland.

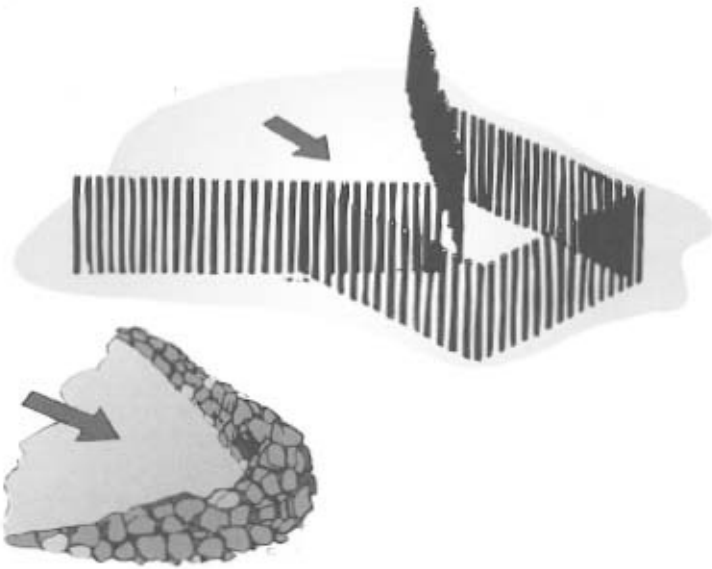
Minnow Traps Small fish such as minnows can be found in most water, especially where it is shallow, such as at the edge of a river or a lake. A normal net will be too large, but several fine-meshed nets can be constructed from a pair of women's tights. Cut a length off the tights, knotting one end if it is not the toe piece; splay the open end around a ring of stiff wire, and secure this to a forked branch. A well-perforated tin can attached in the same way will serve the same task. Do not disregard the food value of very small fish; dried and roasted in quantity, they make good eating.

Eel Traps A simple eel trap can be made from a suitable box. On each side of the box, near the top, make a couple of small holes. Inside the box lay some ripe meat as bait. Weight the box and put it into the water, checking it every two or three days. (To do this, take the box out of the water first and part-empty it before opening it to see what you have caught. Eels are proverbially slippery, and it is almost impossible to hold on to them long enough to lift them out of the water.)

Spearing Spearing fish can be difficult, especially in the hours of daylight, but with practice it is possible. The fish will need to be fairly plentiful if you use a single-point spear, and you are advised to use a three-pronged head or trident for greater efficiency. The spear should be stabbed into the water at the fish, not thrown; and the stab should be aimed directly downwards. Spearing in this way reduces refraction in the water, and thus the risk of misjudging the angle; and will also pin any speared fish to the streambed. The best position for this method is standing directly over a fish run. Make sure the spear is strong enough to withstand the thrashing of a large fish. Always chase after a badly wounded fish, as they will not go far.

Fish Pen

Fish funnelled through entrance to pen.



Where possible, use natural features such as rock pools to trap fish.

Once in the fish may be netted or speared.

Cleaning Fish

- As soon as you land a fish, kill it by hitting the head with a stone or club.
- Slit the stomach from jaw to tail.
- Scrape out the innards.
- Wash out the body cavity thoroughly.
- Hold the tail and scrape off the scales, moving down towards the head.
- Unless you are going to cook on a spit, cut off the head.
- Don't eat fish raw - cook by spit-roasting, baking in embers, or trying.
- Keep head, tail and guts for bait.

Crustaceans

- All crabs, crayfish, shrimps, prawns, etc, start to spoil the moment they are caught.
- Cook them at once, by dropping them alive into boiling water.
- Only thorough cooking destroys any organisms they may contain.
- Throw away the innards and the gills.
- The meat inside the shell and claws is edible.
- Failure to cook quickly enough, or thoroughly, invites serious food poisoning.

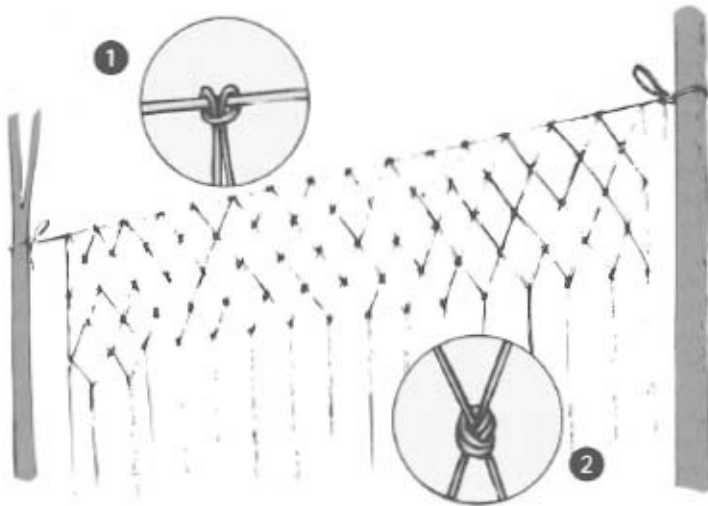


*Gutting and cleaning fish before cooking;
split open the stomach (top), scrape out the
inside (middle), and clean thoroughly in fresh
water*

Making a Fish Net

Place your top line between two trees and hitch a double length of cord every 3cm.

Cross tie the hanging strands with a simple granny knot to form a diamond pattern.



In much the same way, fish can be shot using a bow and arrow. Use long arrows which will be visible above the surface and will restrict the movement of any wounded fish trying to escape.

Crustaceans Crustaceans include crabs, lobsters, crayfish, shrimp and prawns. All are edible, and can be found in fresh and salt water around the world. Most are best caught at night, using a light such as a torch held near the surface of the water.

Mussels, limpets, clams and periwinkles can also be eaten, as can scallops, sea urchins and starfish.

To clean a crustacean, throw away the intestines and gills - the rest of the meat, including that inside the shell and claws, can be eaten.

Warning: All crustaceans must be thoroughly cooked as soon as they are caught, as they do not keep. If you delay in eating any crustacean or you fail to cook it properly, then you run the risk of the worst type of food poisoning.

Frogs Small amphibians such as newts and frogs can also provide a good meal. They are to be found around fresh water, usually revealing their presence by croaking. However, any croaking will stop as you approach, so have plenty of patience and keep still until they are fooled into thinking that you have gone away again. During the mating season (February/March) catching frogs becomes quite easy. All you need to do is to splash the back of your hand gently against the surface water and frogs will jump onto it. It is possible to catch several in as many minutes.

Preparing Fish, Snakes and Amphibians Once you have caught a fish you will need to bleed it immediately. To gut the fish, slit open its stomach from the lower jaw to the tail and scrape out the innards. Wash the area thoroughly to flush out any remaining pieces. Fish can be cooked with their scales on, but if you have the time they make more pleasant eating with their scales removed. To do this, scrape downwards with a knife from the tail to the head. Fish such as catfish and sturgeon, which do not have any scales, can be skinned instead. Smaller fish, *e.g.* those less than 3 inches long, do not need gutting, but some will still need scaling or skinning. The head should also be cut off unless you are going to cook the fish on a spit. Raw fish may contain parasites, and should only be eaten cold if the means to cook are outside your capabilities. This should very seldom be the case if you have a fire; fish can be cooked in a wide variety of ways - spit-roasted, baked, boiled or fried. Fish heads, tails and intestines all make good bait.

Snakes and Reptiles Skin a snake by cutting off its head and slitting its body skin from the severed end downwards for about 20cm (8 inches). Peel back the skin to the length of the cut; grip the flesh and continue pulling the skin downwards until within a few centimetres of the tail; then cut off the remainder. If the snake body looks bloated or lumpy, split it open and remove the innards. Cut the body flesh into small sections and cook - roasting or boiling is best.

Lizards, frogs and turtles are good to eat. Before cooking, take off the head and skin; this is particularly important in the case of frogs, as their skins may contain a poison. Turtles will need to be boiled first to remove the shell. The turtle meat can then be sliced up and used to make a tasty soup with vegetables.

Molluscs Shellfish make an excellent base for a soup to which vegetables can be added. In addition, they can be boiled, steamed or baked in their shells.

Methods of Cooking

The proper preparation and cooking of food will make it safer to eat as well as more appetizing and digestible.

If possible you must try to have one hot meal a day. Most foods, whether animal or plant, require some form of preparation, whether washing, cleaning, scaling, plucking or skinning. How you cook the food also makes a difference, and will eliminate wastage. In the event of a food surplus the survivor is advised to prolong its edible life by preserving.

Roasting Stick Initial roasting should be done over a high heat, which will crust the outside of the meat and seal the juices in. This is followed by slowly turning the meat over a more placid flame. The dripping juices will cause the flames to flare and burn the meat; prevent this by placing a tray below the roast. These juices can be used to baste the roast, and improve its flavour. Larger animals (those larger than a domestic cat) should be cut into small pieces before roasting. These can be roasted by simply pushing the meat onto a stick and holding it over or near hot embers. If you do not want to sit and hold the stick you could construct an arm or a crane.

Automatic Spit With a little ingenuity you can prevent food from burning by constructing a spit which is turned by the wind. This not only cooks the food evenly, but saves the time which is otherwise wasted while watching to make sure the food does not burn. A normal crane is fitted with a wire line (cord will burn through) on which the meat is hung. Adding a flat slab of bark about the size of your open hand will allow the wind to twist the meat; a natural counteraction will turn it back the other way.



Attaching a 'flag' above your Billy can will cause the breeze to gently turn it, thus cooking your food evenly

Boiling Tough meat will need to be boiled to tenderize it, even if you intend to finish it off by some other cooking method. Any nutritional value leached out of the meat through the cooking process will also be retained in the water, which makes boiling a very efficient cooking method as long as you retain and use the water. One thing to remember, however, is that the higher in altitude you go, the longer it will take for water to reach boiling point due to the reduction in air pressure. Above 4000m (12,000ft) cooking raw food by boiling becomes almost impossible and should not be attempted.

Baking Baking is a less intense form of cooking than roasting, and the heat is more constant. To be baked food must be enclosed, either in an oven, or in a wrapping of leaves or clay in a pit under the fire, or in any closed container. Baking is best done with glowing coals rather than flame.

Steaming Steaming food can be done without a container. It is best for foods which do not need much cooking, such as tender greens. The

other advantage of steaming is that it retains more of the nutrients in the food than any other method of cooking. To use this method, first dig a pit and place in it a layer of heated stones. Cover the stones with leaves and put the food to be cooked on top of the leaves. Use more leaves to cover over the food, and push a stick down into the food space. Finally, pack a top layer of earth over the leaves and around the stick. Withdrawing the stick will leave a little hole that leads down to the food space.

When water is poured down this hole it will hit the hot rocks and turn to steam, slowly but effectively cooking your food.

Improvised Haybox Another method of slow-cooking food is to construct an improvised haybox. This will prove especially valuable where firewood is scarce, and allows for a meal to cook safely while you are out foraging or attending to more pressing matters. Another benefit of the haybox is that it cooks food well and cannot overcook or burn it.

A box or container is lined with a thick layer of insulating material; if no such container is available then a polythene bag will do. As the name implies, hay was used as the insulating material but more modern insulating materials such as polystyrene or crumpled newspaper can also be used. The other requirement is a can which will act as a cooking pot, preferably one with a well-fitting lid. Heat your meal over a fire until it starts to boil, then seal the cooking pot with a tight-fitting lid. Place it at the centre of your haybox and surround it with well-packed insulating material. Leave for approximately five hours before opening. It is advisable (although not necessary) to bring the pot back to the boil over an open fire before eating.

Food Preservation

Food-gathering may not always be successful; there will be times when game will be difficult to find or catch, or when the weather will make *food* collection difficult. The survivor must not rely on the assumption that a regular supply of wild food will always be available. In these circumstances, knowing how to preserve and store foods is a valid survival skill. Preserved food will not only back up fresh supplies but may also be carried with you if you plan to move on.

The aim of food preservation is to prevent the deterioration of the food and so prevent wastage. A cold climate makes food preservation relatively easy, as the food can be quickly frozen. To do this, cut it into small strips or pieces and lay it out on the ground around the shelter. Make sure that scavengers do not steal it while it is freezing. Frozen food should also be stored at least 6ft above ground level, out of the reach of other hungry animals.

Meat can be dried either in the sun and wind or else over a fire. The aim of drying is to drive as much of the moisture content from the meat as possible. This not only concentrates its nutritional value, but will also preserve it longer from decomposition and moulds. A piece of dried meat should contain only about 5% of its pre-dried content of moisture. Meat should be cut into long, thin strips and placed to dry on a platform safe from scavengers but open to the sun and wind. The process may take up to two weeks, and during this time the strips need to be kept dry from any rain and free from flies.



Strips of meat can be air-dried in the wind

In warm or damp weather when meat deteriorates rapidly, smoking over a low fire can save it from spoiling for some time. Care must be taken to keep the meat from getting too hot. Cutting it across the grain into thin strips and either drying it in the wind or smoking it will produce 'jerky', which was one of the staple foods of the pioneers. Fish should be flattened by removing the backbone, and skewered in that position for smoking; thin willow branches with the bark removed make good skewers. Willow, alder, cottonwood, birch, and dwarf birch make the best smoking woods, and are found throughout the Arctic and sub-Arctic regions. Pitch woods such as fir and pine should not be used.

A small version of a North American tepee with a platform constructed in the middle makes an excellent smokehouse. By tying meat to the upper ends of the poles and closing the smoke flaps a good concentration of smoke is obtained. Try to create a fire with little flame which produces quantities of smoke. The meat will be ready when it is brittle.



Keeping Meat

- When you have more meat than you can eat in a day or two, preserve it for leaner times or for travelling.
- If near the seashore, boil and distil seawater to extract salt. Rub salt into meat and air-dry it; or store in a salt-heavy brine solution.
- If inland, in a hot climate, slice meat thinly and dry in the sun.
- If the sunlight is inadequate, smoke thin slices slowly over a fire.
- In a cold climate, cut meat into small strips and freeze it.

Plants, leaves and fruits can also be dried by the methods described. To dry fruits successfully, cut them into thin slices first. Mushrooms also dry well, but may need to be soaked in water before use. Berries are best preserved by being turned into jam or jelly.

Salt Brine Salt is difficult to find in the wild, but if you are near the coast it is well worth your while simply boiling sea water until it evaporates. Salt can be used in the preservation of either wet or dry food.

In cool climates, joint your game into usable pieces, rub with salt and allow to hang in the fresh air; repeat the salt-rubbing process for several days. If a container is available, make a strong slurry of salt and water (natural seawater is not strong enough for preservation); submerge your meat completely in this, and cover.

Store the container in a cool, shaded spot.

Rescue



Search and rescue contingency plans come into operation at the first sign of trouble. This will happen when a radio distress call is received, or waypoint call-in procedures have been missed.

All air traffic is monitored very closely, especially commercial aircraft flying on a set route. Radar and the more recent adoption of the satellite Global Positioning System means that almost all transport vehicles, from aircraft to supertankers, can be tracked constantly to within a few metres. Consequently, aircraft that have been forced to make emergency landings or ships that are foundering at sea can usually expect rescue assistance within a matter of hours at worst. If for any reason the location is not known, then Search and Rescue (SAR) teams will be called in to make a search. The area covered will be based on the best estimate of the last known location.

Put Yourself In the Searcher's Place

- Making effective signals depends not on what you can see from ground level, but on imagining what SAR crews can see when looking downwards or obliquely at your location.
- The primary aim is CONTRAST – of colour, shape, movement.
- Against forest, only dense white smoke shows up.
- Against sand or snow, only dense black smoke shows up.
- Against sand or snow – unbroken expanses of single colours – large ground signals of contrasting colour and regular shapes show up best.
- Always keep signal fires ready to light instantly.

How the search is carried out will be determined by the size of the area to be covered, the terrain, the weather and operational necessity. A search

be covered, the terrain, the weather and operational necessity. A search plan will be devised, and search patterns allocated to the aircraft. If radio communications can be established or a beacon signal is received, then a contact search will be initiated. This is designed to concentrate rescue efforts on a relatively small area, thus increasing the speed with which rescuers can get to you. Unless there is accurate knowledge of the location of the party to be rescued, it will be futile and even risky to send out search teams during the night.

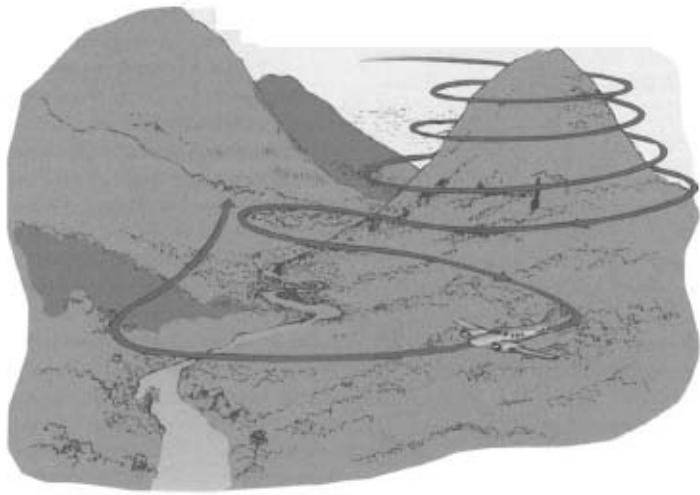
The basic search patterns are as follows:

- **Area search** This involves dividing up the area into smaller areas using natural features as landmarks, giving boundaries in which individual teams are to search.
- **Sweep search** The rescue party will spread out in a line and search the area in a disciplined and organized manner.
- **Contour search** In mountainous country a contour search, spiralling around tall features and flying several times along steep valleys, allows maximum thoroughness.
- **Contact search** A search focused on a smaller area but based on the principles of the sweep search.

Signalling

Signalling is a means of communication which can take the form of shape, sound, silhouette and sight. Sound can encompass anything from shouting or blowing a whistle to using a radio, while sight can mean attracting attention by using anything from a signalling mirror to a smoking fire. The signalling methods you choose will depend on what equipment is available and the conditions in which you find yourself. A direct link radio or satellite phone will produce rapid rescue results; by contrast, the light from a signal fire will only be seen once the search aircraft is flying over your location.

Contour search pattern



Signal Fires

A signal fire needs to be kept ready to be lit at a moment's notice. All the tinder and wood must be dry. The fire is constructed so that the tinder is in the middle, ready for lighting. The aim is that once the tinder is alight all the other fuel should light easily and burn without too much effort on your part. This type of fire needs to be sheltered from the wet. If you are able, build three of these fires in a triangle, 30m (100ft) apart. Make sure that the ground around the fire is adequately cleared of vegetation so that the fire will not spread beyond its boundaries once lit. Using any oil or petrol that you may have can speed up ignition.

Your rescuers may appear at any time of the night or day, so when the moment arrives remember that you need to produce contrast; to work properly the signal fire must stand out from its background. At nighttime it should produce tall, bright flames which are easily seen. However, in the daytime (except in Arctic winter conditions) you will need to produce more smoke than flame. White smoke works best on a clear day, and can be made by adding green or damp vegetation to a very hot fire. On a cloudy day, black smoke will be seen more easily, and can be produced by burning oil or rubber (aircraft or vehicle tyres). In all cases the most important thing is to make sure that your signal fire is going to light quickly and burn fiercely, thus increasing your chances of being seen and rescued.

If you elect to remain with an aircraft you should make sure that its metal

If you elect to remain with an aircraft you should make sure that its metal surface remains free of any falling snow or heavy frost. This is to ensure that the aircraft shape remains recognizable from the air. If you have inflated any of the life rafts or emergency escape chutes, make sure that they are in a position where their high-visibility colour is of maximum value. The main considerations of Arctic signalling are the white snow surface during summer and the darkness of winter. Aside from the normal methods of signalling, the Arctic survivor must concentrate on light and contrast signals.

Light Signals On a dark but clear day with good visibility it is possible for a search aircraft to identify the light from a candle or improvised lamp inside a snow hole from a distance of several miles – the brighter the light, the greater the distance from which you can be seen. A large, purpose-built signal fire can therefore be seen from 40km-50km away (25-30 miles). In practice, winter conditions will normally force survivors to stay inside their shelter; and while snow makes an excellent insulator against cold, it also insulates against sound. It is therefore vital to illuminate your shelter by using a translucent roofing material, leaving a large air hole, or using a thin layer of snow for your roof.

Tree Signal Fire In many cases it will be possible to construct a signal fire using a single growing tree.

Use one that is isolated or growing on the fringe of a forest. Make sure that when it is set alight the fire will not spread to the surrounding trees; clear smaller trees to isolate it if necessary. Thicken your signal tree by stripping branches from other nearby trees and interweaving them. Next build a small fire under the base of the tree; this will act as a booster, and will be partially shielded by the wide branches at the base. This booster fire will need to ignite immediately; either have a container of combustible fuel handy, or – if available – use a salvaged aerosol can (hair spray is excellent). Your signal fire tree should be protected from the snow and rain if at all possible by covering it with a parachute or similar canvas. If nothing is available, check it daily and shake it to detach fallen snow or water molecules.

Pyramid fire A pyramid fire needs a raised base and plenty of dry fuel. The aim of the base is to ensure quick ignition and a good air supply

once alight. As with any signal fire, the fuel should be instantly combustible and stacked in a manner that allows air to permeate and feed the flames.

If you have a suitable salvaged aerosol can, half-bury this in the ground at an angle pointing upwards at the pyramid base. Have ready at hand a large flat stone heavy enough to depress the release button, and a torch made from a length of stick with rags wrapped around one end. At the first sign of rescue aircraft light the torch, put the stone on the button, and place the torch in the spray. Turn your back on the fire when you do this. Once the fire is burning well, distance yourself until the spray can is finished or has exploded.

Warning: Setting fire to aerosol spray is highly dangerous, and should only be attempted in a dire emergency. Extreme caution is advised, as the can will almost certainly explode.

Phones Although mainly restricted to land usage, the global telephone network is extensive and accessible in many remote places. New portable satellite phones are little larger than a laptop computer, and will operate in every environment. Anyone planning to travel or spend any time in regions where survival situations might occur should investigate beforehand access to all forms of telecommunications, from land lines to mobile phones.

Searching the passengers and luggage from any wrecked aircraft will produce a variety of communication equipment, which even if not operable from the present position may connect later on.

Mirrors and Heliographs Any type of mirror – the larger the better – is excellent for signalling providing you have bright sunshine conditions. It is simply a matter of reflecting the sun's rays towards a search plane or party to attract their attention. All aircraft or vehicles carry a number of mirrors any one of which will serve as a signalling device. A more accurate method is to use a purpose-made heliograph. Modern variations of these are smaller than a computer disk, measuring just 5cm x 5cm (2in x 2in), yet they have the capacity to accurately reflect some 85% of sunlight up to a range of some 20 kilometres (12 miles).

Light Light is obviously the ideal means of attracting attention at night,

even after you have made radio contact. Light can be emitted from any number of sources: a naked flame, torch, strobe, camera, or flare.

Although they are extremely effective the problem with most flares and torches is that they are either limited to a single use, or are useful only for the duration of the batteries. All survival flares come with operating and safety Instructions; make sure you read these before commencing any operation. Consider whether handheld flares might not be better used to ignite a larger signal fire.

Parachute and Missile Flares There are many different types of missile flare on the market. Some simply fire a glowing light which lasts a few seconds; some have a parachute attached, which will retard the flare's descent thus making it visible for longer. Always read the instructions carefully and follow them to the letter. The important point is always to keep the flare pointing skywards. Parachute flares are one-shot devices, so make sure their use is justified. The number of flares supplied with any normal pistol is around nine maximum.

Torches and Strobes Any torch is a bonus at night, but for signalling purposes a large, broad beam is required if any rescue aircraft is to see it. Moving the torch from left to right in a slow arc will help attract attention, as will shining it onto a reflective surface – it is not the light which the search aircraft crew will see, but the movement of light. Strobes are designed to create this effect by emitting an extremely bright pulsating light. On a clear night a strobe can be seen some 16km (10 miles) away, and is effective in all terrain.

Vehicle Lights Providing certain elements are still intact a good signalling light can also be generated from vehicle and aircraft lights. These lights are best aimed at a large surface, such as a flat snow surface or mountain wall, with the light being fanned to animate movement. If done properly this will create an effect that can be seen for many miles.

Camera Flash A modern camera flash gun also makes a good signalling device, but as with other battery-powered systems it has a limited life and needs to be used sparingly. In cold climates batteries are best kept warm to maintain their performance.

Whistles and Sound Whistles have improved a great deal over the past few years, and many new models can be heard several kilometres away – provided that the air is still, or the wind is blowing in the right direction.

However, the main purpose of the whistle in many survival kits is to attract the attention of other survivors directly after the disaster. This is particularly so at sea, where all survivors should find a whistle attached to their life vest. On land anything that will amplify sound, such as beating a metal drum with a stick, should also be considered. Obviously, if the survivor is lucky enough to have a firearm, firing a shot will also attract attention; but this should only be done if you have reason to believe a rescue party is nearby.

Warning: Never make a loud noise in snow-covered mountainous areas where avalanches may be caused.

Balloons Radar-reflective balloons are compact, and inflation is initiated by removing a safety pin; this activates a helium cartridge which fills the balloon. The balloon is tethered to the life jacket, from where it rises to around 30m (100ft), where it will remain even in strong winds for up to five days. The 10m (33ft) radar reflective signature can be detected by search vehicles up to 30km (18 miles) away.

Rescue Panels and Streamers These come in various shapes and sizes, but all provide a fluorescent marker which can be seen from the air. Panels are normally 2m x 0.5m (6.5ft x 16ins) or 2m square depending on the design. Two or three of these can be formed into various shapes which indicate your requirements and situation – that you need a radio, or you have wounded with you, *etc.* Distress streamers are used in much the same way but are much narrower and longer, up to 10m (33 feet). These can be spread over the ground surface or floated on the sea behind a life-raft.

Contrast Signals Disrupting the normal pattern of the terrain creates contrast. Do this by introducing regular shapes which do not occur naturally – circles, squares, triangles, letters or straight lines. A large circle with a minimum diameter of 3m (10ft) can be made using stones.

Air marker panels can be made from

any fluorescent material



Contrast is easily achieved in snow by making trenches. This can be done either by stamping down the snow with your feet, or digging with an improvised shovel. The deeper you dig, the greater will be the noticeable shadow. Make the trench in a North/South direction, about a metre wide, banking the removed snow uniformly along the southern edge to increase the shadow. Make shadow signals about 10m (32ft) long, each clearly indicating a letter or sign. Fir branches or any other dark material can be laid in the trench to increase the contrast. The same effect can be achieved in spring, when the melting snow starts to clear from the tundra, by clearing the snow away to reveal the dark earth beneath.

Shapes for Specific Ground Signals

N	Negative
Y	Yes
I	Have seriously injured
X	Unable to move

→	Have gone this way
△	It is safe to land here
SOS	Save our souls



Increased contrast is gained if you incorporate brightly coloured wreckage, clothing, blankets, etc in your signals. Choose the things which make the best contrast against the particular background *surface*. If *air marker* panels are available use these first and construct improvised signals secondly. Make any ground-to-air signals as large as possible, and add extra shapes if space, time and energy permit.

Flying Signals Signals can also be hung from trees. Anything shiny or brightly coloured which is moving will be even more eye-catching. A flag pole will increase the distance over which signals can be seen from the ground. If any possible rescuers are seen or heard, use any available clothing or material as flags, and keep waving. If there is some suitable material that is not required for other uses during daylight hours, it is useful to have it ready, attached to the longest pole you can easily handle for the sake of maximum signalling movement. Two men holding a survival blanket, flag or other brightly coloured sheet can, by keeping it taut, manipulate it to show flashes of light or colour. These will catch a searcher's eye more readily than the display of a static sheet.

Ground Information Markers If you move from your location you may need to blaze a trail or leave ground markers to indicate direction of travel. It is easy to get lost or move off course, especially if no compass or map is available. To aid your progress and to make sure others can follow in your footsteps you will need to blaze a trail. This can be done either by chipping markers on tree trunks or leaving a prominent ground sign.

Trees should be cut at head height on both sides. making a single cut on

These should be cut at head height on both sides, making a single cut on the side pointing away from your last position, and two cuts on the side pointing towards your last position. This will allow others to follow and you to retrace your footsteps if the need arises. Always look back from time to time, making sure that your spacing between marked trees allows the next one to be seen from the position of the last.

A second method is to deliberately place natural items such as stones, sticks, grass, etc in such a way as to mark your direction. The distance apart is determined by the natural path you are taking. For example, if you are on a prominent path you need only mark direction changes at junctions. In a vast field of grass you will need to knot the tussocks on a regular basis, so that each one can be seen from the last.

Helicopter Rescue Procedures

SAR teams are highly skilled and have access to excellent resources, including fixed-wing long range aircraft and helicopters. Most carry personnel and facilities for front line medical care. However, it would be a dangerous mistake to assume that they will always be there to get you out of danger.

Severe weather conditions can keep search aircraft grounded for hours or days. Even once you have been located helicopter crews can take a considerable amount of time assessing the problems of trying to reach you. Over rough terrain it is not uncommon for the pilot to make several attempts to establish a hover close enough to the casualties to be able to get a winchman or mountain rescue team to their position. Having arrived at a workable hover, the next priority is to assess the safest method of rescuing the survivors.

To ensure that no important aspect of the situation is overlooked SAR crews use a standardized system of priorities:

- Aircraft safety
- Winchman safety
- Survivor safety

Landing Areas Where possible the helicopter will land to evacuate survivors. To make this viable the survivor should do everything possible

to provide a good landing pad (LP). Factors to be considered include the size of the clear area, the ground slope, the type of surface, and the direction of wind and approach. First check that the surface will support a helicopter, *i.e.* that it is not waterlogged ground or obstructed by large rocks, fallen trees, potholes, *etc.* Next, make sure that it is free of any loose debris that could be blown about by the rotor downdraft. Check the helicopter's approach path, which will be into the prevailing wind; make sure there are no tall obstructions to the rotor blades. Mark the centre of your LP with some form of marker such as an H-shape; and indicate the wind direction by improvising a wind sock or making smoke.

Winching Techniques Most helicopter rescues involve lowering a crew member to assist those being winched aboard. The survivor will be secured by the winchman and they are raised together. In certain circumstances this may not be feasible, and a one-man lift will be organized. When the helicopter is positioned into the wind above the survivor -who must be conscious and uninjured – a rescue strop will be lowered. The survivor places the strop over his head with the winch cable to the front. The survivor should adjust the strop under the armpits, and tighten it before signalling to the winch operator that he is ready.

Helicopter Rescue

- Wait until the helicopter has landed, and either the pilot or a crew member has clearly indicated to you that you should come forward.
- Never approach a helicopter from the rear, or by descending down a slope -both will put you in extreme danger from the rotor blades.
- The best approach angle is on the cabin door side, from three-quarter front.

Stretcher cases will always be supervised by a lowered crew member.

If you find yourself in a survival situation, whether by design or by

accident remember

FIVE GOLDEN RULES OF SURVIVAL

- ① **Life itself is survival**, all that changes is the environment or the conditions under which you live. When crossing a wilderness area or entering a dangerous environment do so properly equipped.
- ② **A quick rescue is the best rescue.** Use every modern aid to make others aware of your plight and location. No matter what the danger, good communications will prevent a survival situation evolving.
- ③ **We only need the basics.** Given that you are uninjured and functioning properly, you need only air to breathe, water to drink, food to eat and shelter from the environment. However scarce, nature supplies all these elements but you cannot expect nature to change in order to accommodate your requirements. You must learn to adapt to use whatever she provides.
- ④ **Plan your survival.** When disaster strikes think about your situation and make a plan of your basic needs. Through the practical applications of survival you will maintain hope and give hope to others. Maintain your health, care for the injured, build a fire if you are cold, eat if hungry and sleep when tired. Do not needlessly expend energy or put yourself in danger without good reason.
- ⑤ **Recognize that danger is everywhere.** The cold can kill. The heat can kill. The sea can kill. Wild beasts can kill. Despondency can kill. Lack of nourishment can kill. Watch, listen, think and determine the problem – learn to survive.

Acknowledgments

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