
Selous Bushskills
presents
Bushskill series
Bush Survival

Contents

Bush Survival

Selous Bushskills

Walk the old way...

Bush Survival

Navigating your way around

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Essentials for survival

Essentials of survival

The essentials for survival are listed below. Apart from air to breathe water is an absolute priority. Under hot conditions the survival time without water is very short. To conserve body water work during the cooler hours of the day, avoid salty foods and smoking, take frequent rests, try and stay in the shade as much as possible, wear a head covering. Take at least 1 – 2 litres of water with you when you leave for a day in the bush. Hydrate yourself well before leaving camp.

And yes, you can go for a long time without food. It is not a priority even though the hunger pangs you might feel will be uncomfortable. Keeping warm when it’s cold and cool when it is hot is more important in the short term than finding food. Overheating (hyperthermia) and becoming too cold (hypothermia) can cause death in a very short time (within hours). It is almost unheard of nowadays of hunters dying of starvation – besides there is enough to eat in the bush if you know where to look!

AIR (oxygen) – death after 4 minutes

WATER (death within 3 - 4 days) - finding drinkable water in the African bush can be a major challenge - especially during the dry months of the year.

SHELTER (cool in the heat – warm in the cold)

HEALTH – general hygiene, precautions against disease, prompt treatment.

FOOD – death within 60 – 70 days.

Survival kits

Bush emergencies usually come unexpectedly and for the unprepared outdoorsman can have serious and possibly even fatal consequences. Every hunter / outdoorsman should have a basic survival kit which could make all the difference between life and death in a worst case scenario. Now you get survival kits and survival kits. Some are so exhaustive that you would need a large backpack to accommodate all its components. Whereas more is generally better it is not always practical to have to lug a lot of survival gear around with you when you are in the bush on foot. So we are looking at a "bare bones" basic kit which could fit into a small sized hip pouch.
When thinking basic one has to narrow down the emergencies which could be life threatening in the short term. In the modern context hunters or outdoor enthusiasts will seldom be exposed to medium or long term survival situations – meaning 5 days or more. In most instances if a hunter does not report back to the outfitter, or landowner by nightfall or return home to family or friends when expected, a search and rescue operation is sure to be launched. Knowing more or less the area in which the hunter was hunting also makes it easier for searchers to know where to begin looking. Survival challenges will in most cases therefore be of short duration and it is important for us to identify some of the most likely case scenarios when we decide on the contents of a basic bush survival kit.

When we think of survival we should be thinking in terms of meeting physiological and mental requirements to sustain the essential processes for life. What are the basic essentials for life? We need air to breath, water to drink, food to eat, to be in an environment where we can sustain body temperature at 37^0 C (give or take about 4 degrees), and to avoid serious injury or sickness.

Air (or rather the oxygen in it) is vital for life. Four minutes without air will result in unconsciousness as the brain becomes starved of oxygen and damage to brain cells commences. A person can still be resuscitated at this stage but if the brain receives no oxygen for a period of six minutes the brain itself dies and, under normal circumstances, the person cannot be revived and is said to be brain dead or biologically dead. Water is another essential element for life and in a hot environment where there is an increased demand for water to replace that lost in sweat, urine and bodily excretions a person can die from dehydration and the physiological consequences resulting from it within the space of three days. Food, although essential for maintaining body metabolism and providing energy for physiological processes, is not a short term necessity. A person will not die of hunger within the space of a week or, for that matter, a month or more. In fact it takes between 60-70 days for a person to die of hunger and it is extremely unlikely that a hunter will be lost for that period of time.

Maintaining body temperature within normal limits is necessary for survival. Become too cold (hypothermic) or too hot (hyperthermic) and you can die within minutes or hours. Both case scenarios are possible in a hunting environment where bushveld temperatures can soar into the low fourties (^{0}C) and fall to well below freezing. Injury leading to severe blood loss can lead to death within minutes. Other life threatening medical emergencies which a hunter could be confronted with are heart attacks, strokes, snakebite, and severe allergic (anaphylactic) shock resulting from bee sting, foods or medication to which the person is allergic to.

How do we go about now prioritizing what we will include in our basic kit?

A bare-bones survival kit

In the event of a hunting buddy having a heart attack or an emergency involving cessation of breathing it would be wise to include a CPR mouthpiece which would be used when administering rescue breathing. You should also be trained in how to give rescue breathing and how to do cardiopulmonary resuscitation (CPR).

Water is a priority so carry a minimum of 1-2 litres in durable containers with you when you go out into the bush. A camelback is a convenient option. Hyperthermia (heatstroke or heat exhaustion) and dehydration are soon precipitated by inadequate intake of water so the means for procuring and purifying water are absolutely essential. Take enough water purification tablets to purify 3 litres of water per day for 5 days. Also include a small aluminium pot for cooking purposes and in which you can boil water to purify it if you run out of purification tablets. Remember that drinking unpurified water can be fatal. Diseases such as cholera and amoebic dysentery are contracted from drinking contaminated water and lead to severe vomiting and diarrhoea which further compounds problems of dehydration.
The ability to make fire is absolutely essential as fire provides light, warmth, protection from wild animals, the ability to cook, the means for sterilizing instruments and working with metal and dries wet clothing and equipment. Carry at least two fire making implements such as a flint and steel (recommended), butane lighter, waterproof matches (or ordinary matches in a waterproof container), or magnifying glass. Also learn fire making techniques using naturally available materials. Always dress warmly when leaving on a hunt.

A waterproof jacket is advisable but if you consider it too bulky to carry with you include a sheet of durable plastic (or a couple of garbage bags) in your first aid kit with which you can build a shelter or cover yourself with to help keep you dry if it rains or if there is heavy dewfall. If you become wet you will lose body heat very quickly and will be far more prone to hyperthermia so at all costs try and remain as dry as possible.

Although food is not a priority in short term survival it does provide energy and is a morale booster. Carry a few teabags (or coffee), some sugar, a few packets of soup, Smash (add water to make mashed potatoes), a little salt, and a couple of energy bars. If you are out hunting you will be armed and can shoot something for the pot to provide yourself with fresh meat.

A multi-tool pocket knife is an essential item for any survival kit as it has literally hundreds of useful applications. A small knife sharpener would be useful but not essential.

Warm clothing can be shed if it is too hot but can be available if the weather turns cold or wet.

An ordinary compass (not a GPS that relies on batteries which could go flat) would be a valuable aid in finding direction a small torch (fitted onto a headband) would be very useful in the dark.

As far as medical supplies are concerned the following are recommended to be carried with you:

- Two first aid dressing to cover wounds and help control bleeding.
- A haemostat to help control severe bleeding.
- A few assorted plasters.
- Three sachets of Rehydrate powder – to replenish essential electrolytes lost during excessive sweating, vomiting and / or diarrhoea.
- Six tablets for diarrhoea (e.g.)
- Six tablets for nausea and vomiting (e.g. Valoid or Stemetil)
- Ten tablets for mild pain and fever (e.g. Disprin)

Your own personal medications:

- If you are a diabetic - enough insulin and extra sugar or glucose sweets.
- If you have a heart ailment (high blood pressure, low blood pressure, angina etc.) – carry enough medication with you for your specific ailment.

If you are allergic to bee sting or other have other allergies of which you are aware include injectable adrenaline available in pre-measured doses in your survival kit.

When selecting survival tools look for those which can serve more than one purpose. An example is shown in Figure 1. This tool has a small button compass, whistle to attract attention, a signaling mirror, a flint for striking a spark and a waterproof compartment for keeping small items such as matches, fish hooks, water purification tablets or some other useful item.

All the items mentioned in this article can be fitted into a hip pouch (apart from the water containers), are lightweight and can be life saving. Every responsible hunter should ensure that he has just such a kit riding on his hip before he departs into the field. He will then be in a position to deal with an emergency should it arise.

A useful survival tool should have more than one function.

The contents of a basic survival kit.

All the items mentioned in the “bare bones kit fit into this small hip pouch.

An intermediate level survival kit

If your bush trip is going to be more than of just a day's duration or if the area you will be hunting or operating in is remote then you should upgrade your basic kit so that it contains additional items.

The survival kit is packaged into a stainless steel container which can itself be used to carry water in and used as a cooking pot.

The shiny lid can be used as a signalling mirror.

The contents include the following:

- Water purification and acquisition kit.
- Fishing kit.
- First aid lit.
- Fire making kit.
- Shelter making materials.
- Knife, wire, snare, torch, chord.

• Survival blanket.

• Basic food items.

• Navigation aid.

•HINT: *When you open the kit make sure you keep the insulation tape. It can have a number of uses.*

The contents of this kit will be shown on the following pages. How to use the various items will be discussed in detail in later chapters. For extended bush trips an “Expedition survival kit” should be considered which would contain all the elements of the intermediate survival kit plus additional medical items, a small tent, a machete, water filter and additional food items.

An “Expedition survival kit” requires a rucksack.

FIRE MAKING KIT

1. Butane lighter
2. Striker
3. Waterproof matches (10)
4. Firelighter balls
5. Candle (re-lighting) (2)
6. Container

8. Bandages

9. Antiseptic swab

10. Medicines for:

Pain

Allergy

Nausea & vomiting

Diarrhoea

1. Insect repellent

2. Sterile gauze

3. Alcohol swab

4. Burn gel

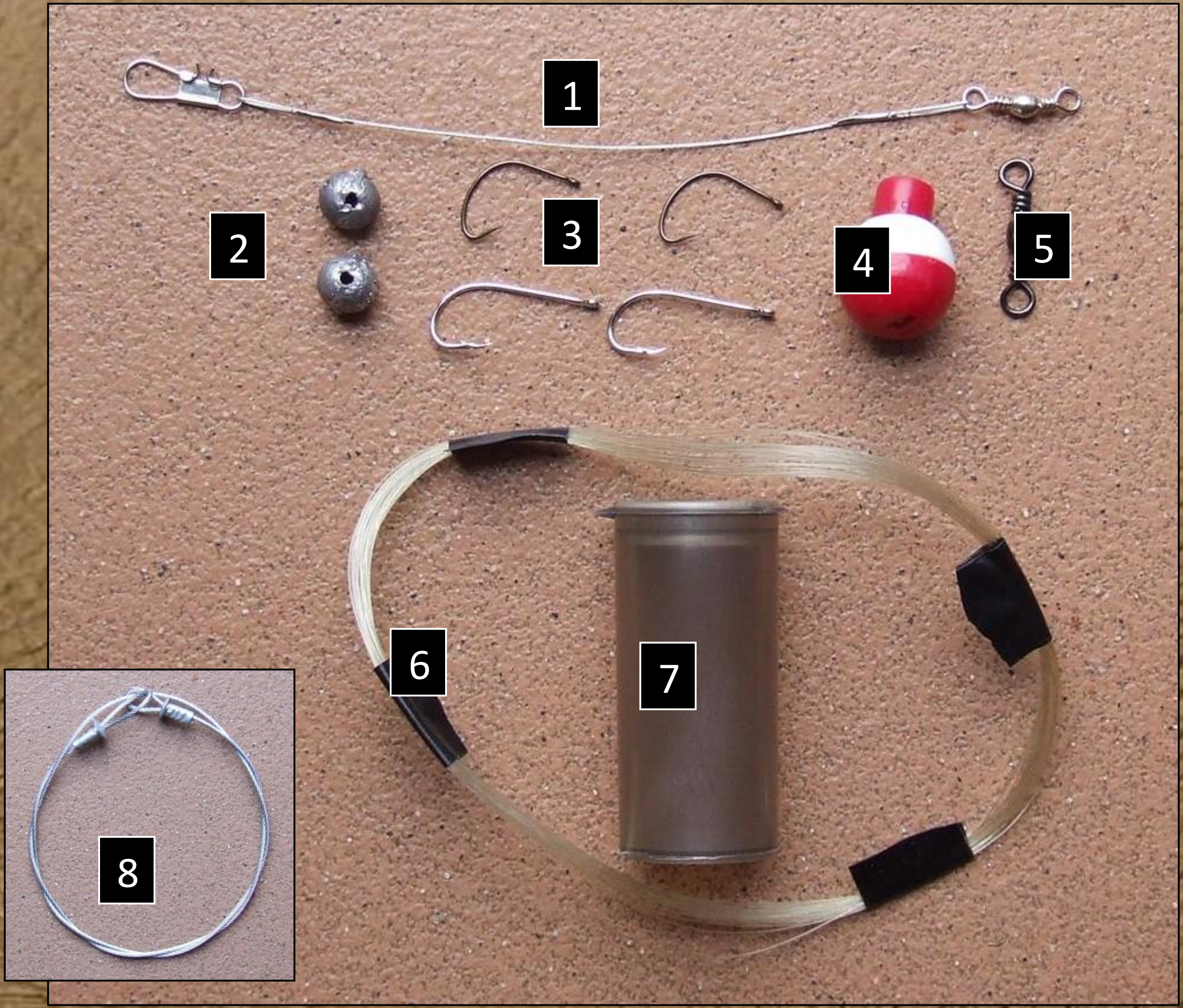
5. Rehydrate (electrolyte replacement)

6. Water purification tablets

7. Plasters

FIRST AID KIT

FISHING & FOOD ACQUISITION KIT



1. Leader
2. Sinkers (2)
3. Hooks (2 small, 2 large)
4. Float
5. Swivel
6. Fishing line
7. Container
8. Snare

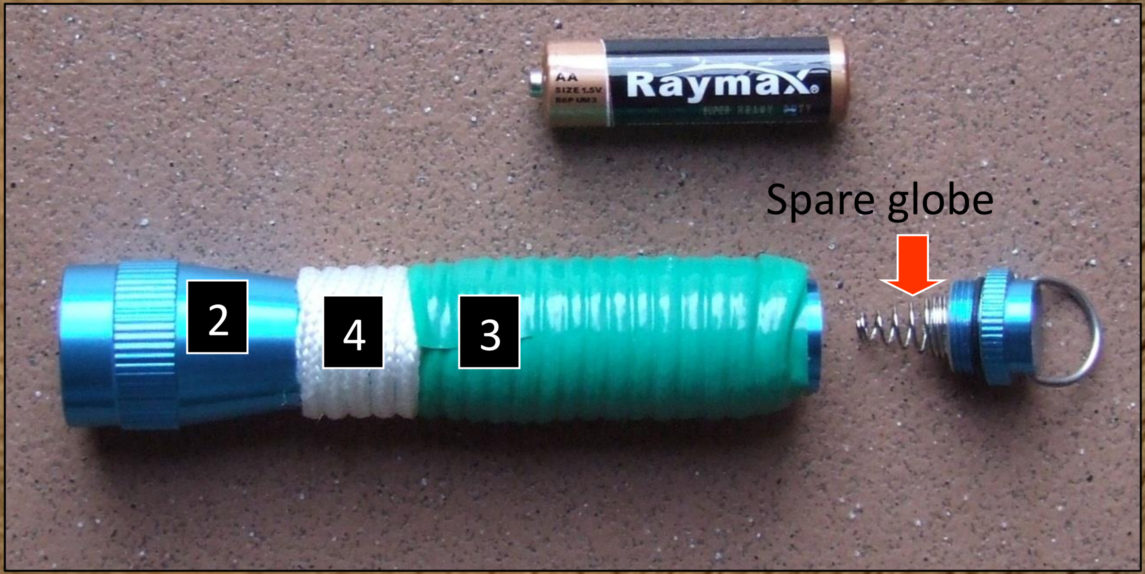
UTILITY ITEMS

1. Multi-tool knife (11 tools)

2. Torch with spare globe and battery

3. Insulation tape (used to seal container and wrapped around torch)

4. Extra chord (wrapped around torch)



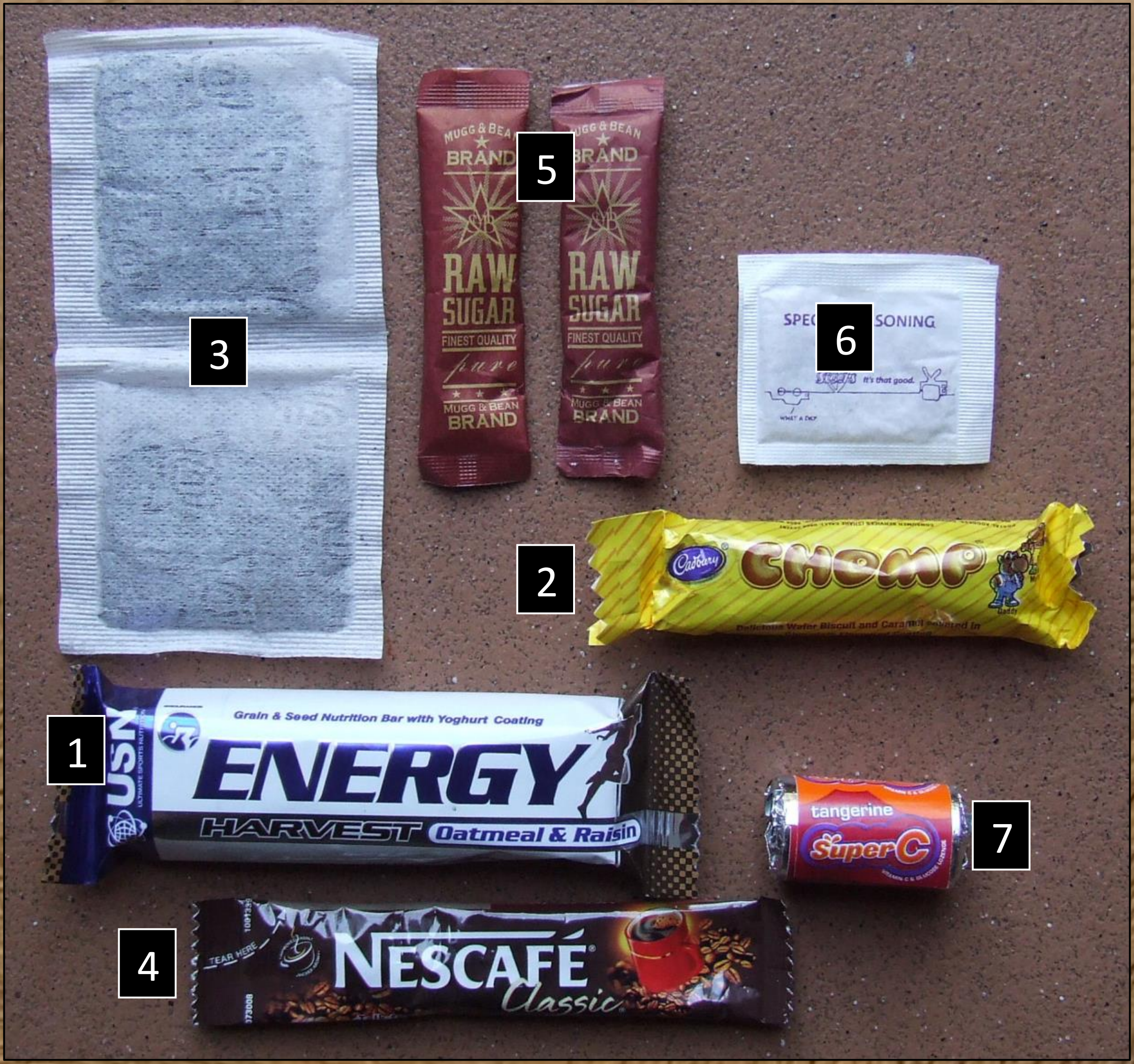
SHELTER KIT

1. Utility chord (3.5m)

2. Garbage bag

3. Survival blanket

FOOD ITEMS



1. Energy bar
2. Chocolate
3. Tea bags (2)
4. Coffee sachet (1)
5. Sugar sachets (2)
6. Salt sachets (2)
7. Glucose sweets

NAVIGATION & SIGNALLING

1. Fire kit
2. Torch
3. Button compass
4. Survival blanket
5. Garbage bag
6. Mirror

COOKING

1. Fire making kit
2. Cooking pot and pan (survival kit container)
3. Knife

Irrespective of the size of a survival kit it must provide you with the means to make fire, collect and purify drinking water, make shelter, provide basic essential medical care and obtain food.

It is important to regularly check survival kits to replace items which can expire such as medications and food.

When going to the bush for whatever reason carry your survival kit with you. It is of no use left in your base camp or vehicle.

Water

Water is essential for survival – without it you will die but bad water can kill you as well. As a survivor you will constantly be on the lookout for water that is safe to drink. Maintaining physiological water balance is a challenge for the survivor – especially in arid, hot and humid climates when water loss through sweating is speeded up.

It is a wise and true assumption that all water found in the natural environment must be regarded as contaminated and most probably is. The clarity or even the taste of water is not an indication of it's purity. Many microorganisms are too small to be seen with the naked eye and water which might appear to be clean can be highly contaminated with dangerous pathogens.

What are some of the warning signs that we can look for which can indicate contaminated water?

- A bad smell.
- Dead fish or animals in or near the water.
- Algae growing in the water.
- An absence of vegetation in and around the water.

Look for warning signs of contaminated water. These dead fish are a sure sign that there is something wrong with the water.

There are many waterborne diseases which can in themselves be fatal or cause symptoms which can further complicate problems associated with dehydration (see table on the following page).

Water is contaminated by animals and people who have the disease urinating, defecating or washing in the water. Animals dying in the water can infect it with *Salmonella* bacteria. It must be remembered that some disease causing waterborne organisms do not respond to chemical purifying agents.

Water can also be poisoned by poachers.

Industrial and agricultural chemical pollution of water is also a serious problem. Some heavy metals such as copper or mercury can accumulate in body tissues and eventually cause serious, even lethal, diseases.

In the bush, removed from the availability of quick acting and effective drugs, the simplest of infections can prove fatal. Consider the full implications of developing a mild case of diarrhoea. This problem causes a rapid and unpleasant dehydration of your system; it makes you feel uncomfortable, lowers your morale and generally makes a safe standard of personal hygiene difficult to maintain.

DISEASE	CAUSE	SYMPTOMS
Typhoid	The most serious of the *Salmonella* infections. Acquired from ingesting food or water contaminated with *Salmonella typhi*.	Headache, fever. Initial constipation followed by diarrhoea. Systemic toxaemia. Internal bleeding. Possible death if not treated.
Cholera	Caused by *Vibrio cholerae*	Violent diarrhoea. Vomiting. Rapid dehydration. Cramps. Low blood pressure. Possible death.
Bilharzia (Schistosomiasis)	*Schistosoma* species with freshwater snails as intermediate host.	Ulceration and blockage of urinary tract. Ulceration of gastrointestinal tract. Bladder carcinoma. Lack of energy. Fever. Mild dysentery. Cerebral granuloma. Epilepsy.
Amoebic dysentery Bacillary dysentery Leptosporosis Giardiasis	Caused by *Entamoeba histolytica* *Shigella spp.* *Leptospirosis spp.* With wildlife as intermediate hosts.	Severe diarrhoea with blood. Dehydration. Colic (cramps) and severe dysentery. In severe cases death can occur within 48 hours. Flu-like symptoms with fever, chills, headache and muscle pains. Severe forms lead to meningitis, jaundice, kidney failure, hemorrhage, heart damage and death.
Hookworms	Larvae enter through the skin or by drinking contaminated water.	Adult worms lodge in gastrointestinal tract, causing anemia, lethargy. May enter the bloodstream and cause pneumonia.

Water requirements

Even when resting in the shade the average person loses over 1 litre of water each day through breathing and urination. Exertion increases water loss through perspiration. Depending on ambient temperature and level of activity, average water requirements will be 3-6 litres per day. Effects of dehydration are indicated in the table below.

1-5% water loss	6-10% water loss	11-12% water loss
Thirst	Headache	Delirium
Discomfort	Dizziness	Swollen tongue
Lethargy	Dry mouth	Twitching
Impatience	Tingling in limbs	Deafness
Lack of appetite	Blue shade to skin	Darkening vision
Flushed skin	Slurred speech	Lack of feeling in skin
Elevated pulse	Difficulty in breathing	Skin starts to shrivel
Nausea	Inability to walk	Inability to swallow
Weakness	Blurred vision	Death

Overheating, excessive sweating and lack of fitness can result in heat stroke and / or dehydration. It is essential that you always carry sufficient water with you and that you exercise water discipline in the field. Body water can be conserved by reducing level of activity, resting in the shade, not talking or smoking, and keeping the mouth closed. Sucking a small round stone, or chewing a piece of bark or a leaf (not from a poisonous tree) will alleviate thirst by stimulating saliva production.

Running out of water in the bush is a serious situation. Sweating will lead to further body water loss and if this cannot be replenished dehydration will result which could have fatal consequences

Where to look for water

It is sometimes extremely difficult to find water in the bush but the task will be made easier by following certain guidelines and looking for the right signs. Remember the following:

Study the "lie of the land". Water will always gravitate to low lying areas so make for lower country.

Vegetation is more lush or greener close to water.

Observe the behaviour of local wildlife and birds – they also need water to survive and will invariably lead you to it.

Listen for the sound of water birds and frogs.

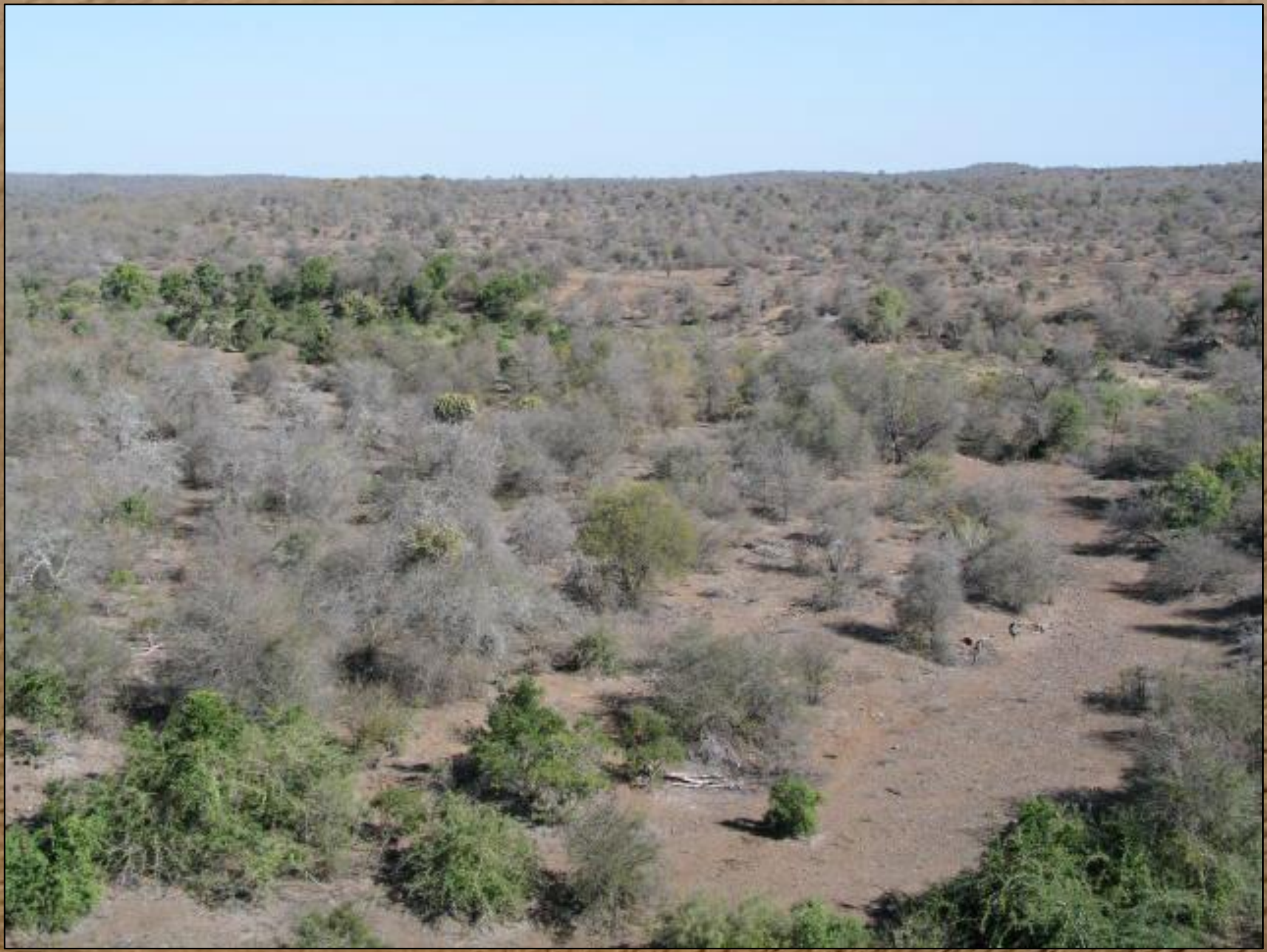
Cliffs often have water seepage at their base.

Follow game paths – they often lead to water.

Before you descend from your vantage point, examine the ground below you for game paths. A convergence of these paths is almost certain confirmation of water. Do not become demoralised if you find that there is no water in the stream or river you have targeted. Many watercourses have a strong flow of water under the sand whilst others have isolated pockets of water beneath the surface.

Good sources of water are to be found at converging streams/rivers, rock barriers across river beds and the outside bank of a bench in the stream/river. Look for evidence of animals digging for water in the river bed and for butterflies that often congregate around damp soil.

When digging for water be patient as it sometimes takes awhile for water to seep into the hole.



Don’t be disheartened by the sight of a dry riverbed. Green vegetation indicates moisture and by digging at the right place you may find water.

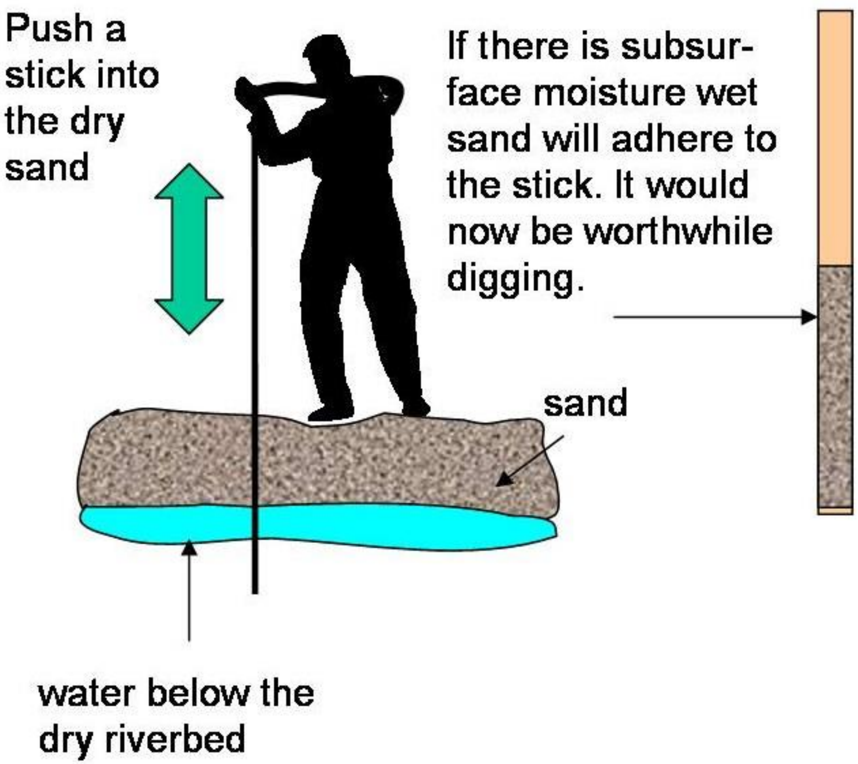
All water found in the wilds, irrespective of how clean or pure it may appear, must be regarded as suspect and treated accordingly.

Methods of obtaining water

There are various sources of water. Some may be unpleasant but should not be ignored in a survival situation. Learn to accept whatever water the bush has to offer.

- **Digging**

Climb to a vantage point and study the lie of the land. Follow the natural drainage lines and mark the areas which have lush or green vegetation – which is a good indication of surface or underground water. To check for water select a smooth dry stick about a meter long. Thrust it down as far as you can in the sand, withdraw it and examine the end for dampness. Sand adhering to the stick as it is removed indicates dampness and is worth further investigation (i.e. digging).



When digging for water be patient as it sometimes takes awhile for water to seep into the hole.

- **Animal/bird/insect indicators**

Many birds, animals and insects are water dependent and periodically make their way down to water to drink. One can safely conclude that the presence of water dependent species is a sure indicator of water in the area.

Butterflies often drink from moist patches of soil which can indicate subsurface water. Water dependent animals will drink daily. If you follow them (at a distance) they will lead you to water.

Water birds (ducks, geese, herons, cormorants, kingfishers), seed eaters, guineafowl and double banded sand grouse (below right) drink or associate with water on a daily basis and will lead you to water. Double banded sand grouse fly to the nearest water at sunset and if you take note of the direction in which they fly and walk on that bearing you should find water.

Vegetation

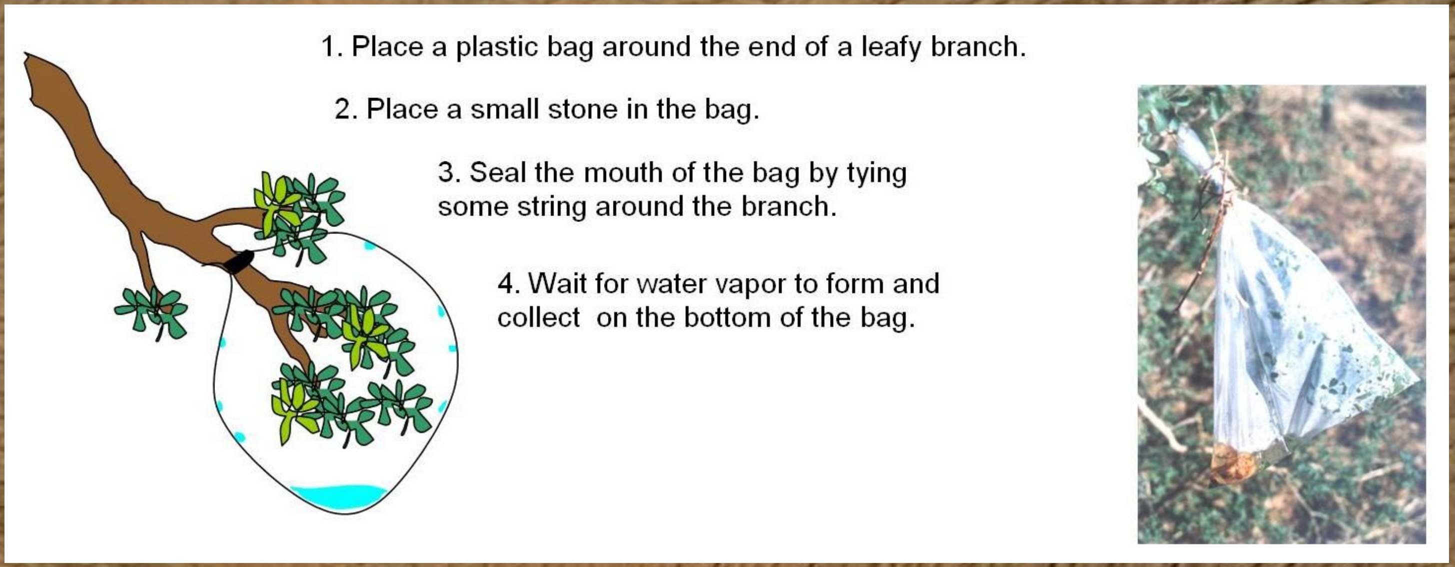
- **Dew**

This is nature's way of providing water for animals and insects which are too small to travel long distances to water. A good supply of water can be collected after a heavy dew by dragging any sort of cloth through wet grass or over a metal surface early in the morning and then wringing it out over a container or directly into ones mouth.

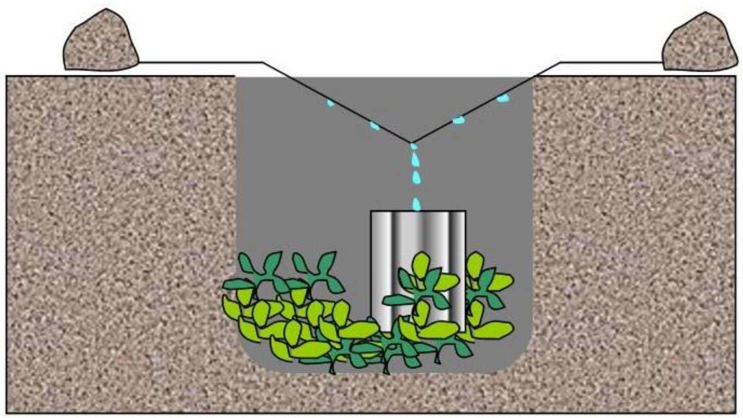
Dew is not always a nightly occurrence. Hot days and cold nights make for good condensation in the form of dew. Smooth surfaces which get cold quickly are good collectors of dew (e.g. aircraft wings, motor vehicles). If plastic or groundsheets are available they can be spread out, anchored and sloped towards the centre to collect dew. Low-lying areas appear to create better conditions for condensation.

- **Vegetation and solar stills**

Method 1: A plastic bag is tied tightly over a thickly leafed branch. Ensure that one corner of the bag is lower than the branch so that it acts as a collecting point. Moisture from transpiration will be trapped in the bag, condense and run down to the collection point.



Method 2: Dig a hole about a meter deep. Place a container at the bottom in the middle. Pack the hole with freshly cut vegetation. Cover the hole with a plastic sheet. Seal the edges with sand. Place a weight in the centre. Water given off by the vegetation will condense on the underside of the plastic, run down to the centre and collect in the container.



1. Dig a hole.
2. Fill with fresh green vegetation.
3. Insert a container to catch water.
4. Cover the hole with plastic sheeting.
5. Seal edges of plastic with sand.
6. Weigh centre of plastic down with a small stone.
7. Wait for water vapor to condense and drip into container.

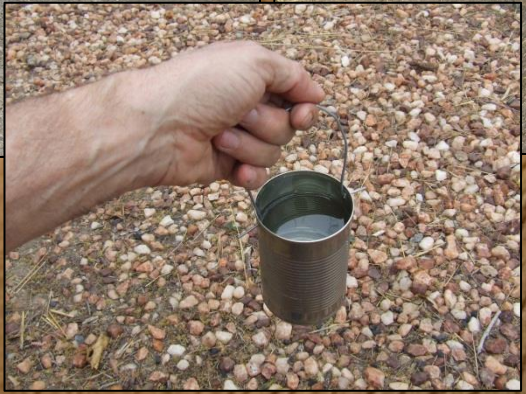
Construct the solar still in a sunny area preferably in damp soil if it is available. Replenish fresh green vegetation periodically.

Depending on the moisture content of the vegetation and how often you replace it will determine how much water you get. It is not much – usually 25 – 50ml in a couple of hours.

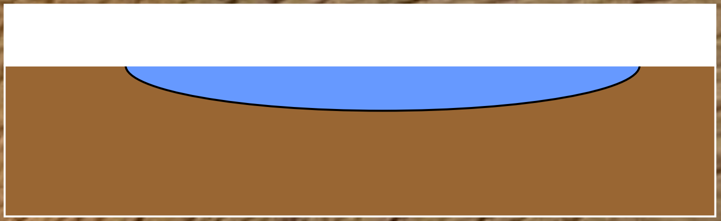
An improvised water filter (left) with a solar still in the background

- **Collecting rain water**

Use any receptacle to catch up rain water. Groundsheets or sheets of plastic can be spread out and formed into a depression to form a small dam. Soak up wet vegetation with a cloth and squeeze water into a container or use a container to scoop up water.



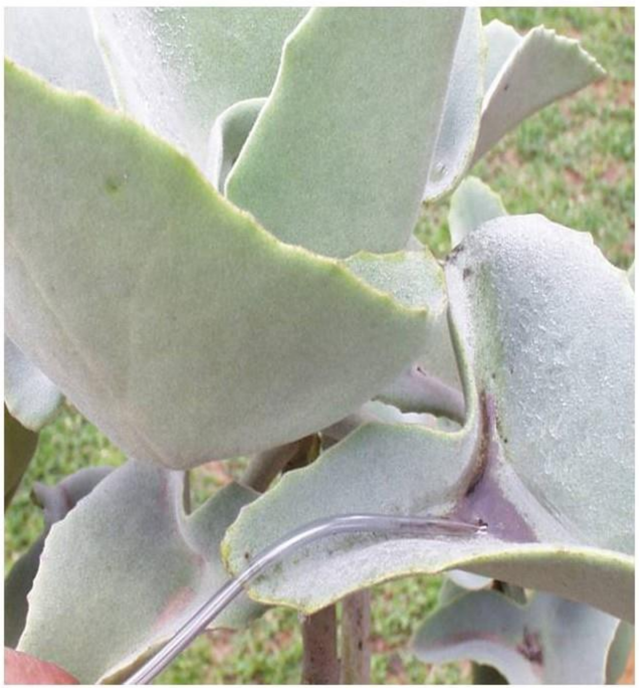
1. Dig a depression in the ground and line it with plastic if you see an approaching rain storm.
2. The plastic sheet creates a reservoir to catch rain water. You will be surprised at how much water you can collect in this way within a few minutes.

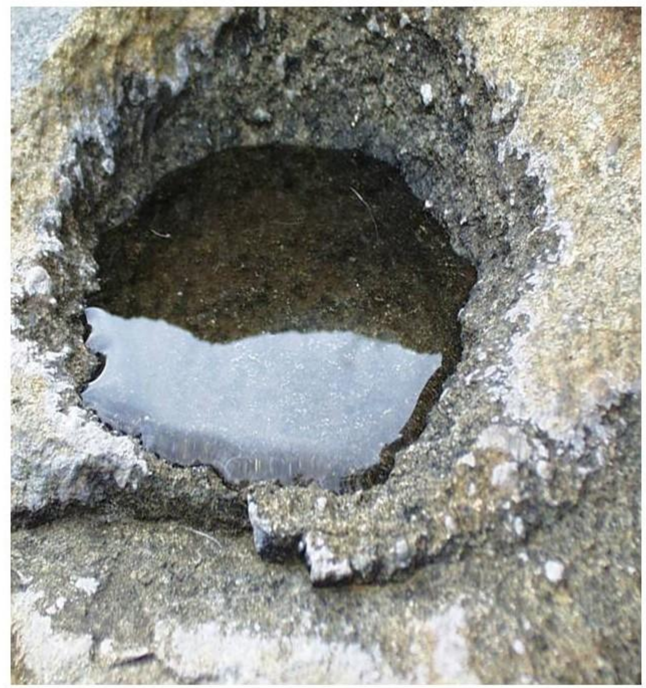


Even in dry arid areas dry rivers may suddenly start flowing from rain which might fall in the area – sometimes quite far from your actual location.

- **Water in plants and in hollow rocks**

After rain water is often found collected in the cupped leaves of certain plants. Many wild, edible fruits are available at certain times of the year which can provide moisture. You should familiarise yourself with plants and fruits which occur in your area which have survival value. Water can also be collected after rain in rock hollows.





Going to extremes

What would you as an individual do to survive? It is quite scary to see what people will do to save their own skins. Some will turn traitor and sell out on their own comrades or even family. Cannibalism is not unheard of. You might recall the account of a rugby team that crash landed high in the Andes mountains and resorted to this extreme to stay alive. Well there is extreme and there is extreme. Some extremes cross over the bounds of what might be called "civilized" but there are other extremes which may in the correct context be regarded as an acceptable way of staying alive. People dying of hunger resort to eating animals, reptiles and insects that they would, under normal circumstances, not even consider. When hunger pangs are gnawing away at your stomach and you feel yourself growing weaker by the minute then the sight of a juicy puff adder or fat scorpion may become all the more appealing – something which might have appeared repulsive in terms of a food item in times of plenty may suddenly take on a new attraction. Dying of hunger would by all accounts after the first few days of hunger pangs appear to be less traumatic than dying of thirst because it takes longer and the symptoms are more subtle to begin with.

Dying of thirst however is another matter. It can occur within the short space of 36 hours. The symptoms are intense. A raging thirst, swollen tongue, cracked lips, headache, hallucinations, and coma. To be lost in the wilds of Africa – especially in dry areas or during the dry months of the year can be a terrifying experience compounded by a lack of or absence of water. There are many who have succumbed to thirst and are now part of the dust of Africa. When entering the African bush always make sure you are well hydrated to begin with and take enough water with you. But as we all know things can and often do go wrong.

If you are a hunter armed with a firearm or bow and you find yourself in a desperate situation of being lost, not being able to find water and are succumbing to the consequences of dehydration there is one recourse of action which may save your life as it has of hunters in the past. There is one source of water which is often overlooked which may just make the difference between dying or surviving to tell the tale. This water source is found in one of the large stomachs of ruminants such as kudu, wildebeest, impala, eland, cows and so on. This large sac known as the rumen is one of four stomachs possessed by animals which “chew the cud” the other three being the reticulum, omasum and abomasum.

Armed with a rifle or bow you should be able to shoot a ruminant. The rumen is most easily accessible from the left side. When normally field dressing a carcass the rumen tends to balloon out when the abdominal cavity is opened. If you are desperate for water, need it urgently and do not have the strength, time or inclination to field dress the carcass to remove the internal organs, lay the dead animal on its right side and make a cut through the skin behind the ribs. The rumen will lie immediately below the skin. Cutting through the wall of the rumen will reveal a mass of green, wet vegetable matter comprised of chewed grass, forbs and leaves. Here is your life saving water source. Place this vegetable matter in some cloth material (shirt, towel, handkerchief) and squeeze it out over a container or directly into your mouth. Yes the liquid emerging will be olive green in colour and will smell rather offensive but it is water – life sustaining water and we are talking here of extreme survival. You can easily extract 5 litres of fluid from the stomach of an impala sized animal – perhaps even more. In larger animals such as gemsbok, and kudu you should be able to get as much as 15 litres of life saving liquid from the rumen. The hardest part is to get your mind around drinking the stuff (Figure 5) but if you are desperate enough and thirsty enough you will drink it and save your life in the process. If you do have the time you can further filter and / or boil the water to render it safer to drink or pass it through some filtering system (e.g. sand) to make it more palatable.

You can contrive some sort of condensing apparatus to get pure water from it but the wherewithal may not always be available. Obviously if you have water purification tablets (all good outdoorsmen should have some in a survival kit) you can add these to the “water” to purify it.
Rumen water can save your life. When you emerge from the ordeal take a course of antibiotics and a course of de-worming medication. You may pick up some parasites from the rumen fluid but this can be sorted out and successfully treated at a later stage. The important thing is you will have survived and found a source of water when you needed it most.

The rumen emerges (left). It is full of chewed plant material with a high water content (right)

The rumen contents is placed in a cloth and squeezed out over a container. The liquid is green and has an unpleasant smell but may be life saving. If time and the situation permits the liquid may be filtered and boiled to make it safer and more palatable to drink.

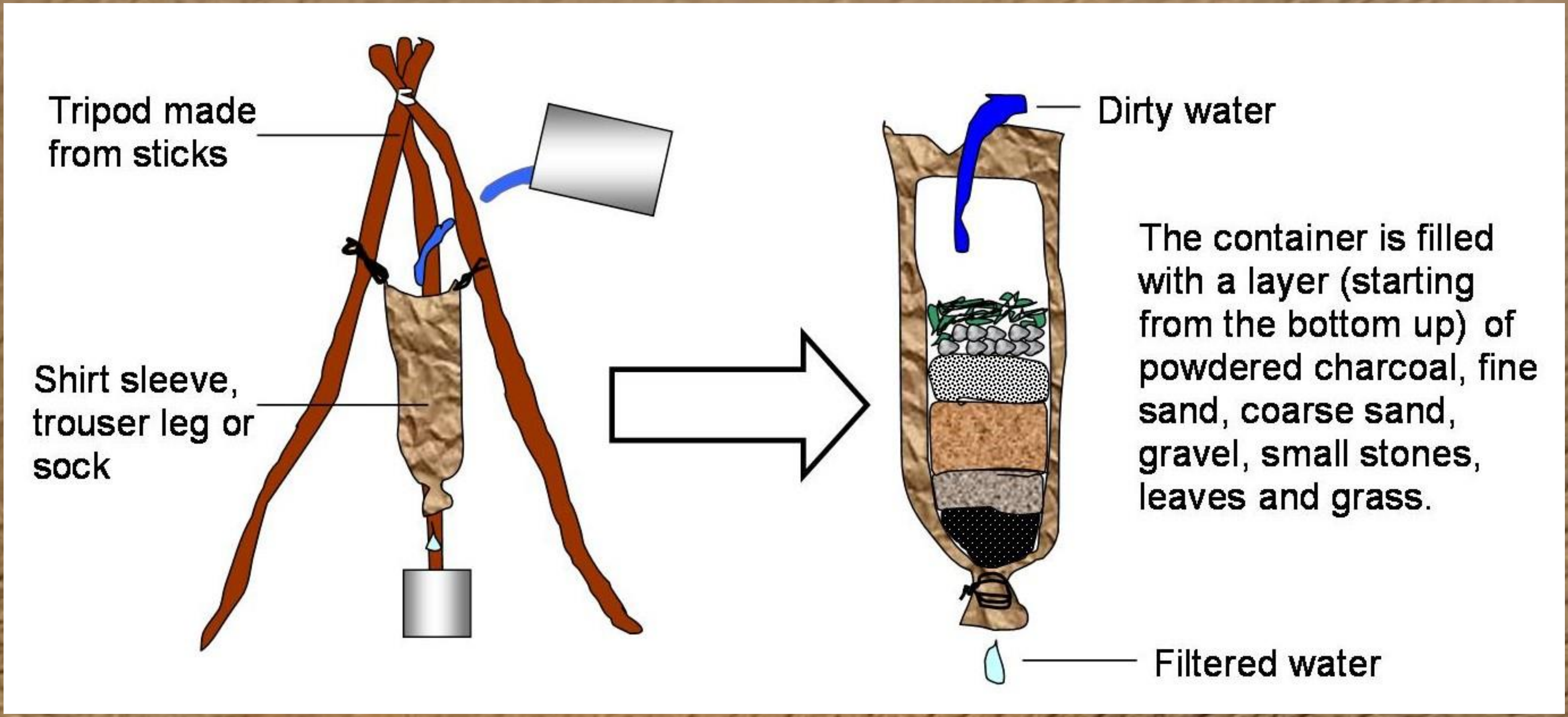
Purifying water

<u>All</u> water obtained in the wild must be regarded as contaminated and must be purified. It only takes a single drop of contaminated water to make you very ill – possibly with lethal consequences, remembering that diseases like cholera, amoebic dysentery, giardiasis, bilharzia, and leptosporosis (to name but a few) are all water borne.

Water is purified in one of four ways:

- By boiling (for at least five minutes)
- By adding purification tablets or chemicals
- By distillation
- By micro-filtration

Filtering water before drinking can make it more palatable but **will not purify it**. It will just remove suspended solids. A simple but effective filter is illustrated on the next page.



An improvised water filter

Once water has been filtered you should add water purification tablets and then allow the water to stand for at least half an hour before drinking it.
If you have not been rescued after three days and you have used up all your water purification tablets you MUST boil any drinking water for <u>at least</u> five minutes (longer if preferably) before drinking it to kill any pathogens in the water. Something useful to know is that you can boil water in a plastic container if you do not have a metal one. The heat of a fire may deform the plastic but will not melt it as long as there is water in it.

Although the plastic container (left) is being distorted by the heat of the flames it is not melting allowing the water it contains to be boiled.

Is urine drinkable?

A survival situation could become critical enough for a person to consider drinking urine to stay alive.

Is this possible? Would there be any benefit from drinking urine or could it make the situation even worse?

To answer these questions we must have a look at the composition of urine. Remember that urine is a product of excretion and will contain elements that the body is trying to dispose of so there are undesirable fractions which we would not want to ingest.

Substances which are excreted are *urea, creatinine, phosphates, sulfates, nitrates, uric acid* and *phenols.* These substances are end products of metabolism and must be excreted. They would damage the body if they remained in the body fluids. Some substances which are still useful to the body such as amino acids, electrolytes and needed water, are reabsorbed. The final quantity of urine formed is normally about 1ml per minute. Normal daily urine output will depend on the amount of intake of fluids and the concentration of electrolytes in the blood.

When a person is well hydrated urine is dilute. When a person is dehydrated urine becomes concentrated and is reduced in volume.

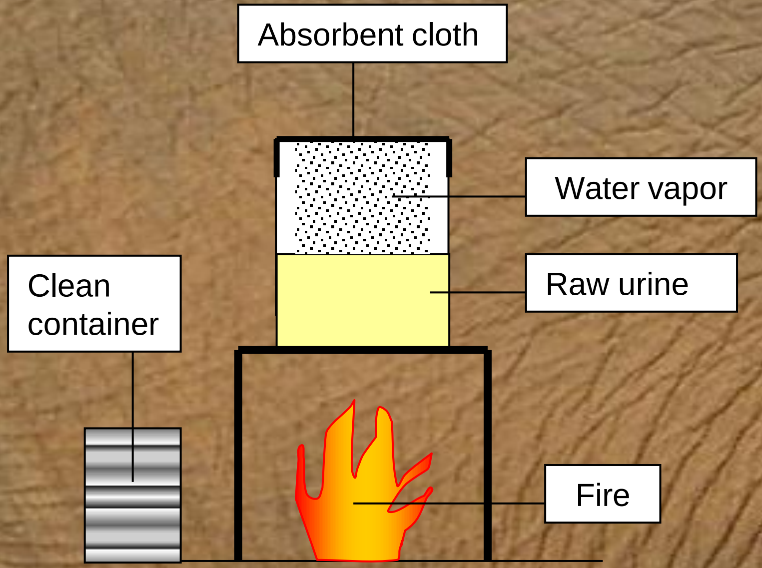
In an emergency one might out of desperation be tempted to drink urine. This would however exacerbate the situation for the following reasons. Urine is a hypertonic solution. In other words the concentration of salts in urine is higher than that of the blood and because of the principles of osmosis, water will move from an area of low concentration to high concentration. In other words water will be “sucked” out of the body into the gastrointestinal tract leading to further dehydration. To offset dehydration hypotonic fluids must be ingested which will replace lost fluids in the body.

Urine should not therefore be drunk as it is going to make the situation worse. The waste products in urine will also cause further problems if ingested. Yet urine contains life saving water, what could be done to make that water available? How could we process the urine to produce drinkable water?

The answer to this dilemma is illustrated on the next two pages.

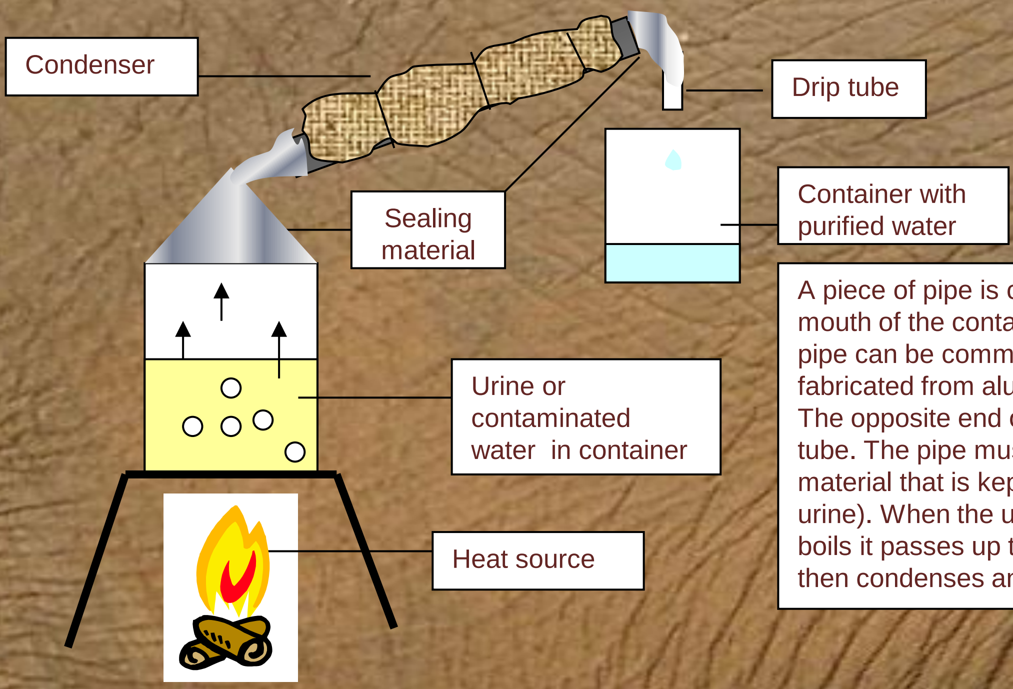
Urine is placed into a container over a fire and brought to the boil.

Cover the mouth of the container with a clean absorbent cloth. As the urine boils pure water vapor will be given off and will begin to wet the covering cloth. At regular intervals remove the cloth and squeeze it out into a clean container. Replace the cloth and repeat the procedure for as long as vapor is being given off.



This fluid is now reasonably safe to drink if the cloth, and your hands, were clean when you squeezed the liquid out of it into the container.

A second method requires more ingenuity but can provide very pure water from urine or contaminated water.



A piece of pipe is connected at an angle to the mouth of the container of contaminated fluid. The pipe can be commercial pipe or it can be fabricated from aluminium foil or baked mud. The opposite end of the pipe is fitted with a drip tube. The pipe must be wrapped with some material that is kept damp (use dirty water or urine). When the urine / contaminated water boils it passes up the condenser and is cooled. It then condenses and drips out of the drip

Food

When thrown into a survival situation one of the first questions that either passes through the minds of the survivors or is verbally expressed is: "What are we going to eat?"

This is a valid question but it is not always the most critical need to be addressed – the possibility of rescue, water availability, adequate shelter from inclement weather, treating injuries or illness and so on are often far more critical issues which will have to be given priority - especially in the short to medium term remembering that we can go without any food for quite a long time.

To stay healthy and to remain active we do however need a regular intake of food.

To remain healthy man requires a balanced intake of food consisting of proteins, fats, carbohydrates, minerals, trace elements and vitamins. A person in a static situation, avoiding any physical exertion will need 70 calories an hour to maintain a basic metabolism.

Mans best sources of food in a survival situation is from animals, because they provide immediate access to protein which has all the amino acids the body requires. Dependence on plant foods means that a wide range of plant food will have to be eaten if the body's protein requirements are to be met. A diet deficient in carbohydrates and fats forces the body to produce protein at the expense of other needs.

In order to produce this protein the body has to burn up its own tissues. Mans digestion is also limited in that he cannot digest cellulose – which forms the basic structure of plants and many vegetables – without cooking.

Assuming however that you have made the mistake by not taking any emergency food with you or that your rations have been depleted then you have to ask and answer the question: "What could we eat?"

The first principle which must be accepted and implemented, if it comes to life or death decisions, is to put pre-conceived mindsets quickly to rest. If you have ever said "I will never it worms!" – now is the time to change your attitude.
There are times when nature supplies food in abundance and there are times when food is very scarce and scarcer if you choose to be fussy! Ask people what they would eat if they were lost in the bush and the most common answer will be: "I will eat nuts and fruit and berries and fish and hunt". This is the voice of the inexperienced and naive speaking. Easy to say but easier said than done.

Starving to death

Man has an amazing capacity to go without food – the longest a human has been able to survive without food is 74 days. Most however die within 60 – 70 days.

The first 72 hours: After 48 hours the feeling of hunger subsides. The body begins to mobilise its own fat and protein resources to maintain bodily functions and weight loss is fairly rapid.

1 – 4 weeks: Body metabolism slows down to counter the low energy supply which causes tiredness, apathy and weakness. Temperature drops.

4-6 weeks: This is the critical time. There is a risk of heart, kidney and brain failure.

6-10 weeks: Death will occur in this period as a result of heart failure or the person falls into a coma and dies. Towards the end the person has trouble speaking and seeing and experiences pain in the head and limbs.

Sources of food

Plants

Plants provide the easiest means of collecting food because it is static. One has however to acquire a detailed knowledge of any given area so as to know what plants are available and edible.

The reason certain plants are chosen for food are suitability (not poisonous), availability, and accessibility, ease of preparation, taste and sustaining power.

As a general rule all plants and fruits eaten by monkeys can be safely eaten by man. Be very careful when testing plants for edibility. You do not want to risk the possibility of diarrhoea or poisoning to add to your problems.

To test a plant or fruit for edibility conduct the edibility test as shown.

Powdered (activated) charcoal is a very good antidote because it absorbs poison. As a safety precaution it is wise to have a quantity of powdered charcoal on hand when testing plants for edibility. If feelings of discomfort are experienced, mix water with a good quantity of the powdered charcoal, and swallow immediately. Charcoal will neutralise most poisons but is ineffective against mushroom and ergot poisoning.

EDIBILITY TEST

Rub a little of the juice or sap of the plant on a tender area of your skin (e.g. inside of upper arm or wrist or stomach) Wait 15 – 20 minutes

Skin blisters, becomes red, swollen, burns or itches

Discard the plant and regard the plant as inedible or suspect

No unpleasant effects on the skin test

Now place a small amount of the sap or juice on your fingertip and touch the base of your tongue

If you experience a bad reaction or unpleasant taste spit it out immediately

Taste agreeable or pleasant

Eat a small amount and wait for at least 1 hour

You experience ill effects

No ill effects

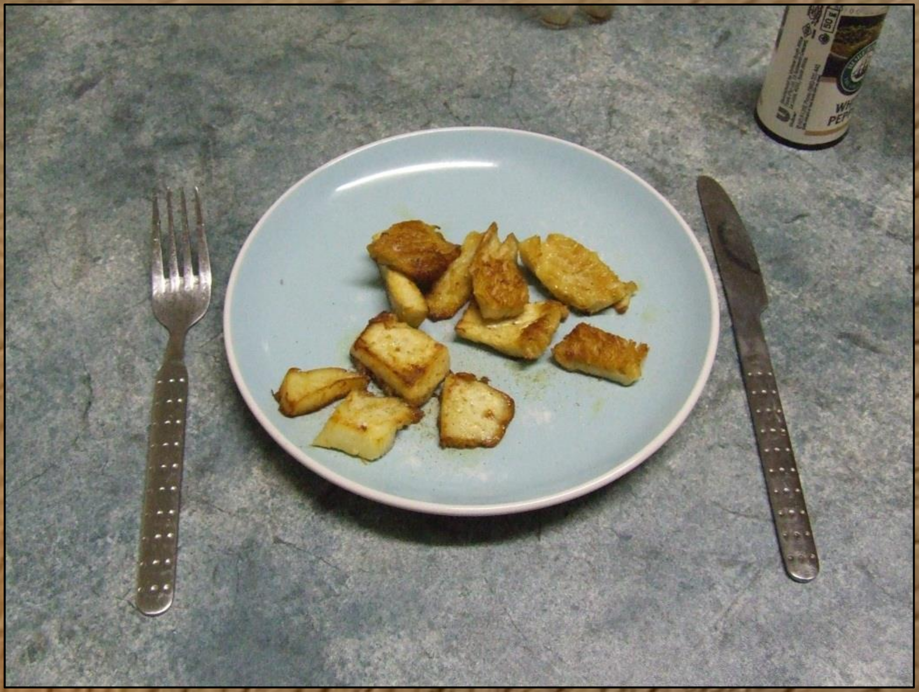
Eat small amounts with periods of waiting in between until you are sure the plant/fruit is safe to eat

Parts of plants which can be eaten are roots or tubers, leaves, flowers, fruits, and legumes. Some plant ashes can be used as salt substitutes and beverages such as tea and coffee substitutes and potent fermented drinks can be prepared from certain plant species.

We will discuss some edible plants in a later chapter.

Mushrooms

Unless you are thoroughly familiar with mushrooms your safest bet is to ignore them. There is no simple rule to identify edible mushrooms and a mistake could cost you your life. Even edible mushrooms can cause severe discomfort to people sensitive to certain types of fungi.



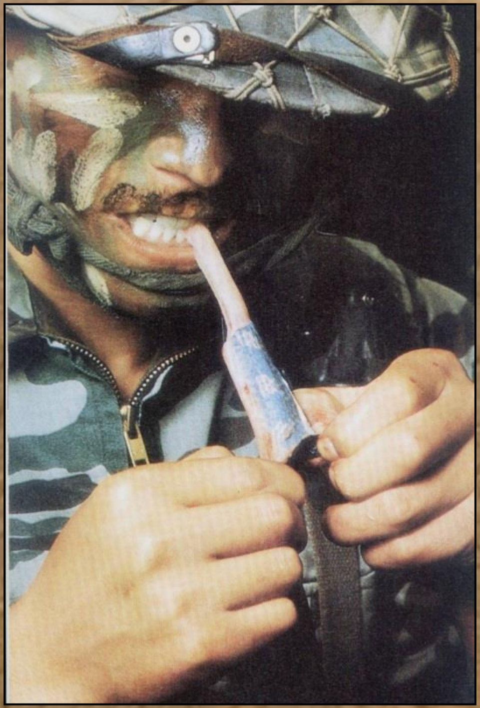
Birds

All birds are edible but avoid carnivorous species because their meat is rank. Birds can be caught with traps or shot with bow and arrow, firearm or catapult. Keep a look out for bird nests. Eggs and fledglings can provide a nutritious meal.

Birds eggs – a highly nutritious source of food.

Reptiles and amphibians

Snakes are actually quite tasty, having white flesh rather like a chicken. To prepare a snake, cut its head off and slit it's stomach. Skin it and cut into small pieces. Boil or roast in the embers of a fire. The eggs of reptiles are an excellent although somewhat hard to find source of food. Cook snakes very well as some of them carry parasites which if they lodge in human lung, start eating away at lung tissue and are extremely difficult to treat. The photo on the following page illustrates these parasites.



Snake parasites (left) can pose a serious threat to human health if they establish themselves in human lungs.

Frogs are edible but some toads such as this leopard toad on the right can secrete toxins from glands in their warty skin.

Frogs are relatively easy to catch. Skin and gut them, then boil or roast. Some frogs / toads have toxins in their skins which they exude when threatened to discourage predators. Large bullfrogs have plenty of nourishing meat.

Insects

Termites, grass hoppers, locusts, mopane worms and many other types of insects are a good source of food and are generally readily available and accessible.

Examples of insect foods, mopane worms (top left - fresh), and bottom left (dried) and termites (right).

Honey

Anyone in a survival situation who finds honey is very fortunate as it is one of the most nutritious foods known to man. If you are allergic to bee stings don't risk being stung by them it is too dangerous. The best time to rob the hive is at night when the bees can be smoked out. Use a lot of green material to generate the smoke.

The tiny mopane bee (right top) is a very small gnat-like stingless bee species native to Africa – especially in areas where the mopane tree grows. They can be extremely bothersome during hot weather when they are attracted to human sweat and may attempt to crawl into one's eyes, ears and nose. Mopane bees produce a small amount of dark, delicious edible honey which is not as sweet as that of honey bees. They make their nests in hollow trunks with a small wax tube as the opening to the outside (right bottom)

Fishing

Fish are an excellent source of food and are readily available. There are a number of ways in which they can be caught:

Conventional ways using hook, line and sinker.

Poisoning water (because of the ecological ramifications this should only be done in extreme survival situations)

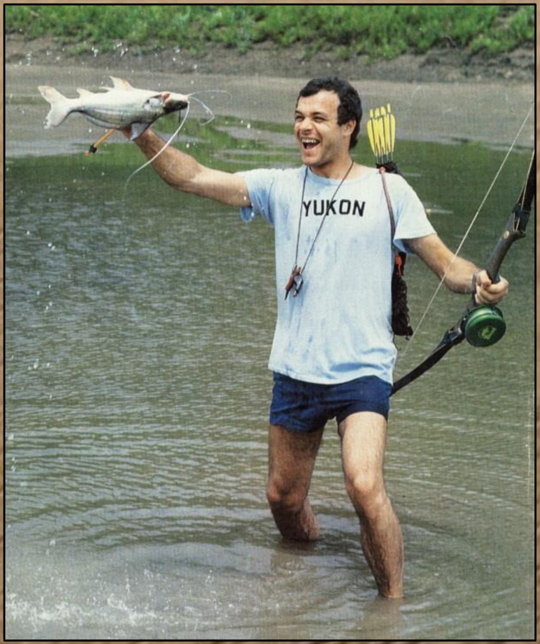
By hand – when rivers or ponds are drying up in the dry season

Using bow and arrow or spear.

Throwing rocks

Using nets and traps

Using explosives (detonators, hand grenades, thunder flashes etc.)



Fish are an excellent source of food and can be obtained using conventional and not so conventional means.

Trapping

The principles of trapping include good reconnaissance; correct siting of traps and sound construction. Trapping is only justified in a life or death survival situation and even then is governed by moral constraints. The ethics of trapping include the following:

Check traps regularly (twice a day).

Use the most humane techniques available to you.

Remove traps when you intend moving on.

Don’t be wasteful.

Set traps in areas where there is a lot of sign of animal movement such as along game paths leading to and from water. Keep the traps simple – they work better. The wire noose is one of the most effective. Complicated traps have a greater chance of malfunctioning. Don’t only think of trapping larger animals. Trapping insects can provide you with food but can also be used as fishing bait.

The wire snare – a favourite tool of poachers – is very effective if set in the right place but should only be used in serious survival situations otherwise you might find yourself falling foul of the law. They can also cause unacceptable suffering and if you do set them you must visit your snares regularly to kill animals quickly.

A simple elastic band (left top) can be used as an effective weapon to stun lizards for food. Burying a tin in the ground (left bottom) is a good way to capture small mammals (like mice) and insects. A mouse trap (bottom) is an excellent piece of equipment to be included in a survival kit. It is small, light and highly effective.

Useful survival tools that can help you acquire food in a survival situation include a knife, fishing kit, a catapult, mouse trap, parachute chord and wire. The availability of food is not only important for our bodies to function at optimum levels but is also critical for morale. Morale drops precipitously when there is no food to eat.

There is little that can not be eaten in a survival situation and often what we could never have even considered eating turns out to be quite palatable.

Mopane worms, fresh lizards,
"mabungu larvae" hmmmm…
You might surprise yourself.

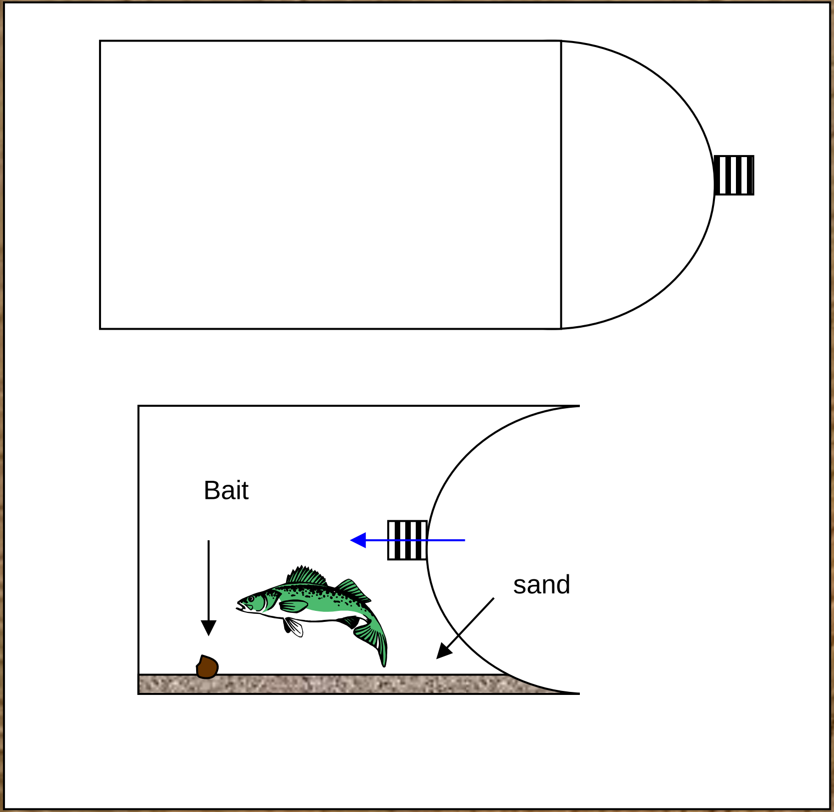
Stealing from predators

One can also obtain food by chasing smaller carnivores off their kills. Large predators if having already fed well will often move off the kill when approached, allowing you to scavenge what remains, but be careful.

Smaller predators such as caracal (that killed the springbok above left) and cheetah can easily be chased off a carcass. Dangerous predators like the lions feeding on large prey (such as this elephant) may eat their fill and leave plenty behind for the hungry survivor.

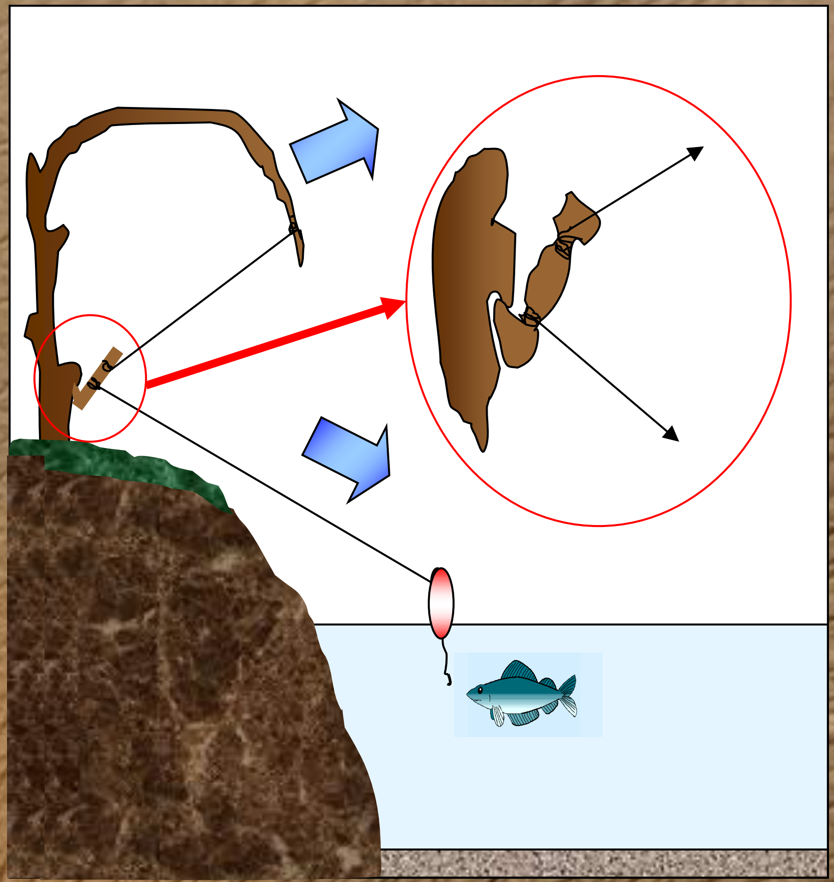
Some simple ways to catch fish

In a survival situation it is important to conserve your energy and to utilize techniques for acquiring food and water which are energy efficient. If you are fortunate enough to find yourself in an area where there are rivers, lakes or dams your survival experience could turn out to be a very pleasant time indeed. Fish are high in protein and an excellent source of food and glue. The glue issue we will look at in a future article but let's concentrate on two methods to catch fish.



Take a 2 liter plastic bottle and cut the top third of the bottle off. Invert the top third of the bottle into the lower two thirds to make an inverted funnel. If you have packaging tape or duct tape you can seal the join with this but it is not really necessary. Now place some sand on the bottom of the bottle to weight it down in the water and any type of bait you may have available such as old food, offal, bread crumbs, insects etc. Place in quite water where there are no strong currents and check occasionally. Small fish which in themselves are edible and make good bait to catch larger fish, will swim into the neck of the bottle (attracted by the bait) and will be unable to swim back out.

Find a suitable, springy branch on the river bank. Construct a trigger as shown which notches into the trunk of the tree or in a corresponding notch
in a peg hammered into the ground. Line is attached to either end of the trigger. One end is fastened to the springy sapling and the other to a float (optional) and a hook in the water. The hook can be baited with a shiny object, old food, insects, worms, crabs or a small fish. When a larger fish takes the bait and pulls the trigger notch out of the recess the sapling springs up hooking the fish and keeping it on line until you visit the trap line. Hint: the sapling must not be too thick as it will then require a lot of force to dislodge the activate the trigger. Also set the trigger notch lightly into the recess so that it can be activated easily by a fish.



Birds are a good source of food – high in fats and protein. The fact that they fly and can easily avoid man under normal circumstances makes catching them the challenge. There are many types of bird traps and here we will look at one example.

One of the characteristics of a good trap or snares is simplicity – the more elaborate and complicated a trap the more likely it is to fail in operation. A good example of a simple yet effective trap for catching a bird was the Ojibwa bird trap.

Materials

A minimum of materials is required and all easily found or made in the bush.

- A stick about 6cm in diameter and about a meter long.
- Some string, fishing gut or self made cordage about a meter long.
- A stick about 1cm in diameter and about 15cm long – this is the perching stick.
- A fist sized rock.

That's it!

Construction

STEP 1. Bore or burn a hole about 7—8mm in diameter through the larger stick about 10cm from the top.

STEP 2. Sharpen one end of this stick so that it can be forced or hammered into the ground.

STEP 3. Bevel the one end of the perching stick so that it can be inserted into the hole made in the larger stick.

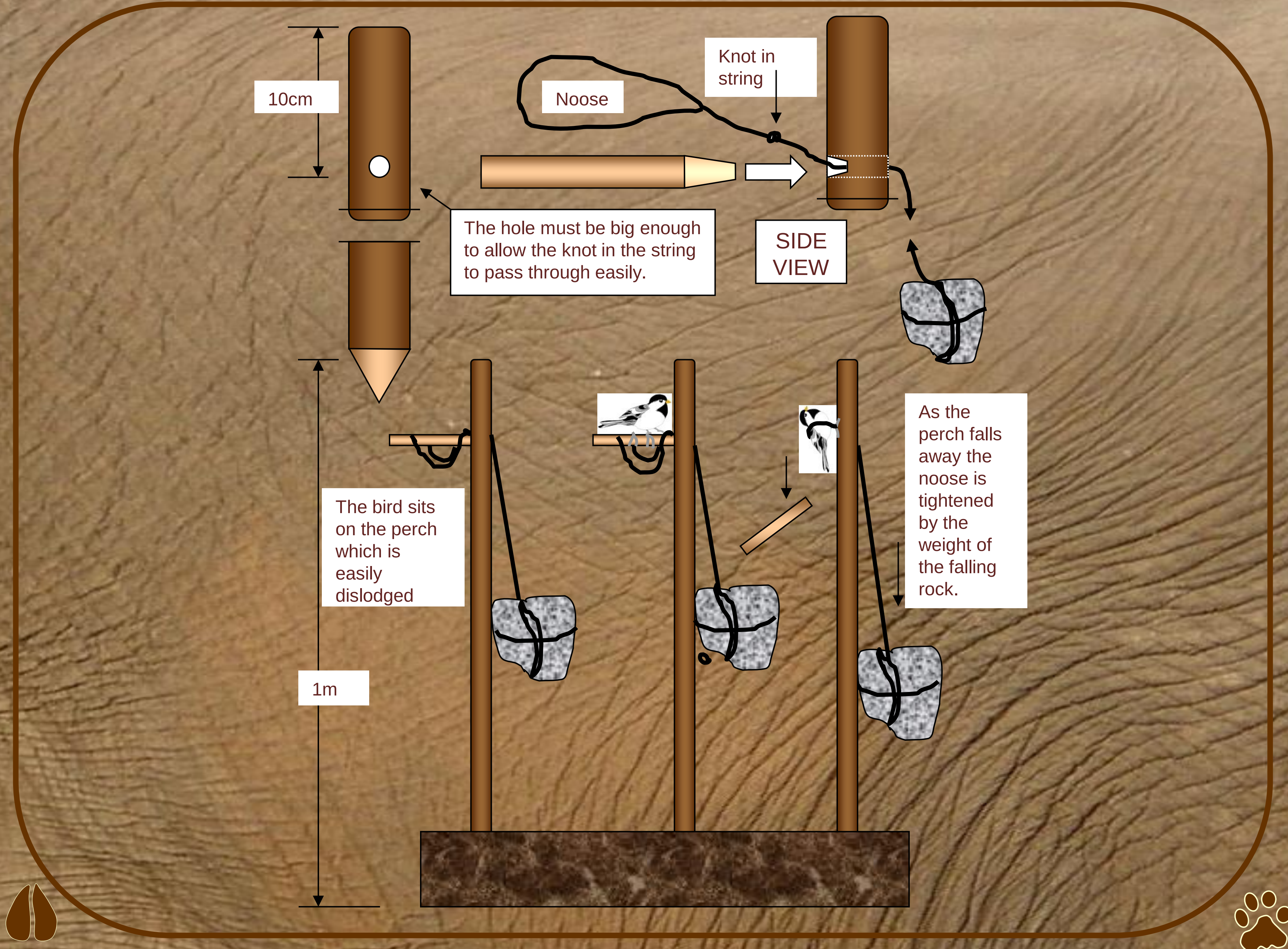
STEP 4. Pass the string or chord through the hole. Make a small noose on the one end and a knot as shown in the diagram. Tie the other end to the rock.

STEP 5. The perching stick is lightly inserted into the hole of the larger stick so that the knot in the string is squeezed between the hole and the perching stick with the weight of the rock supplying the necessary tension.

STEP 6. Lay the noose carefully onto the perch. Make sure it slides closed easily.

Setup and operation

You must have done your homework before setting up the trap. Use areas where there are lots of birds. Good places are around waterholes, rivers, dams and potential feeding sites. You can lure birds to the site with appropriate bait such as seed (obtainable from grass for example) or old fruit.


10cm
Noose
Knot in string
The hole must be big enough to allow the knot in the string to pass through easily.
SIDE VIEW
The bird sits on the perch which is easily dislodged
As the perch falls away the noose is tightened by the weight of the falling rock.
1m

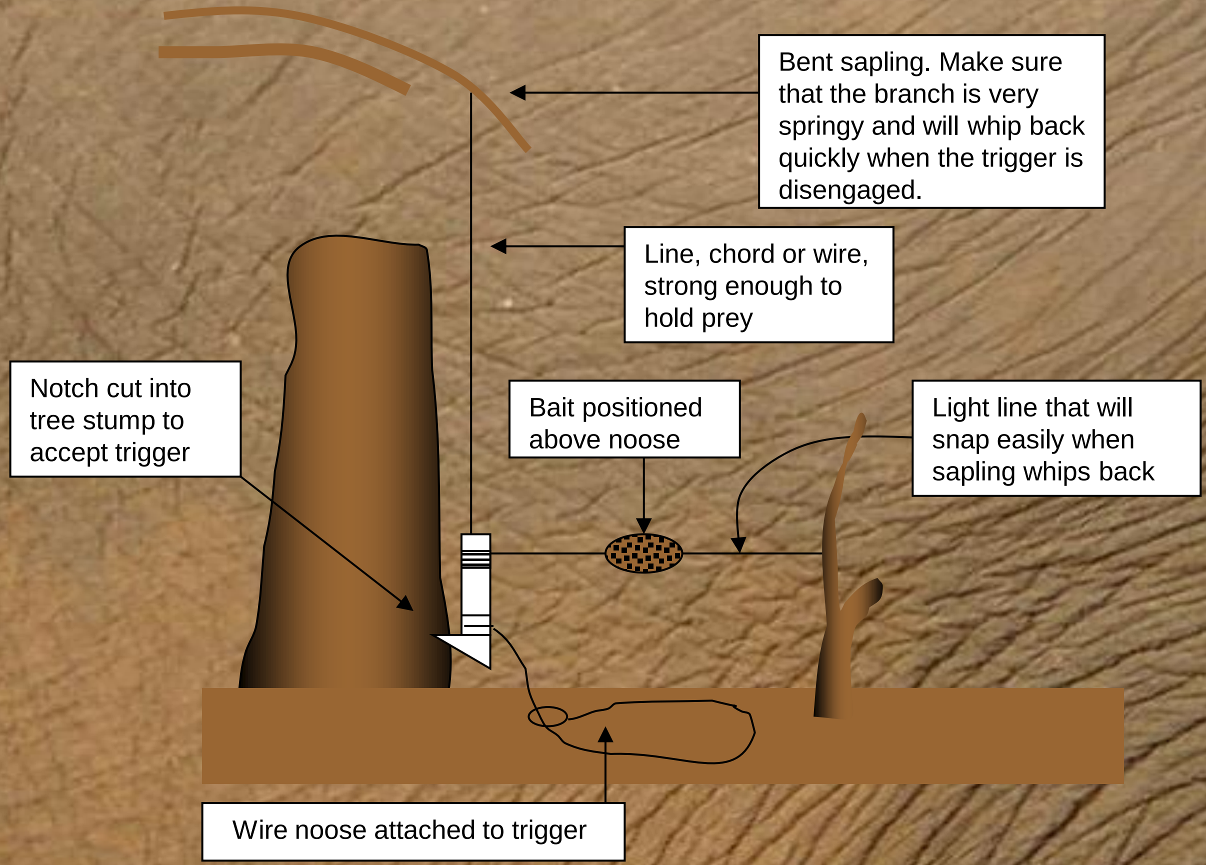
Baited snare

An un-baited snare or trap depends primarily on it's positioning and placement for success. The choice of site is thus critical for there is little or no incentive for an animal to approach, enter or investigate an un-baited trap. That is not to say that an un-baited trap is not effective. Many different types of traps / snares use no bait whatsoever yet can be deadly effective. It is however their positioning that determines their level of success.

Baited traps work differently in that some incentive is added to lure the animal into or close to the trap to activate some trigger mechanism which will cause the trap / snare to be activated and so entrap or ensnare the animal.

Bait can take on many forms. It can be food in the form of live prey, meat, fruit or whatever makes up part of the diet of the intended prey. The bait can be an animal of the same species – often of the opposite sex. Sexual attractants can be used. Shiny objects will attract certain species. The lure can be a salt or mineral lick. The subject of baits - natural and synthetic will be discussed in depth in future articles.

The trapper can more or less narrow down the type of species by choosing specific sites and by using a bait that is likely to attract the species he is after



Baited snare

Fire

Fire! When man first discovered how to make fire it was a great leap forward because it changed so many things and gave him an extra edge in the struggle for survival. Fire was not unknown to early man. Fires caused by lightning were a common occurrence but to actually know how to make fire and use it in a controlled way was a development on a par with the invention of the wheel and the splitting of the atom.

Hunters and people who choose to expose themselves to the unpredictability of the wild outdoors would do themselves a great favour by becoming fire craft competent.

Being able to make and use fire can be a life saving skill.

Fire can be put to so many useful purposes as we will discover in this chapter.

Uncontrolled fire can be a terrifying killer as anyone who has seen or experienced a bush fire or a fire in cultivated plantations will attest to. Fire “tamed” and under control however is a friend of inestimable value.

Uncontrolled wild fires can be terrifying and life threatening.

A controlled fire is one of the best friends you can have in the wilds.

How fires work

For fire to happen three things have to come together at the same time and at the same place. For the fire to continue burning all three components have to be continuously present otherwise the fire will die.

The three parts which make fire possible are the gas oxygen, a source of ignition (heat) and fuel to burn (see Figure 3). If any one of these three components is missing the fire will not ignite to begin with or if one of the three is removed from a fire which is already burning it will splutter, fizzle and die.

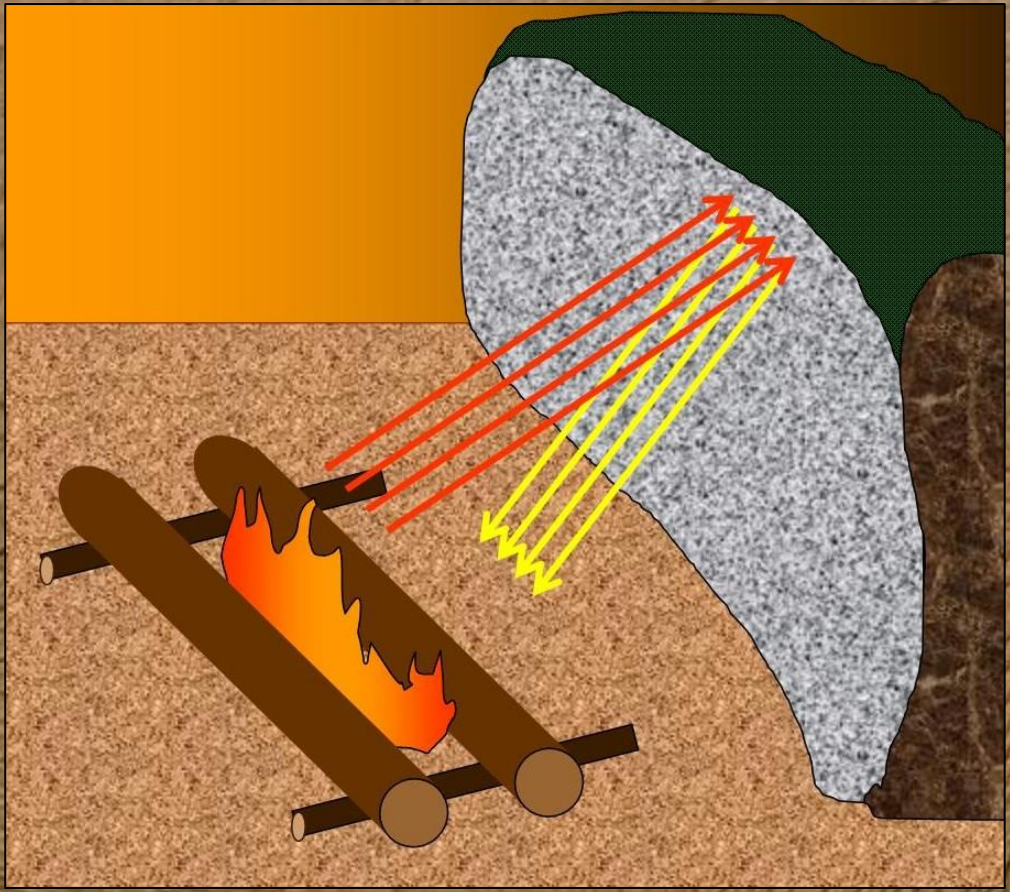
To the outdoorsman there is generally enough oxygen available (in the atmosphere), as well as some form of combustible fuel. The challenge in lighting a fire is therefore to provide some sort of ignition which will be hot enough to begin burning the fuel.

The three components of fire – fuel, oxygen and a source of ignition.

We will investigate some of the ways in which we can ignite a fire beginning with the most obvious and then looking at some improvisations. To begin with: whenever you go into the outdoors make sure you have got some sort of fire making device in your survival kit. I usually carry two fire making devices. Fire is so critically important that having a backup is a wise precaution. It is also a very good idea to carry firelighters (or a piece thereof) and a piece of candle in your survival kit.

Always have at least two fire making tools in your survival kit. In this instance a lighter and a flint and steel. An empty lighter is also useful as it can still generate a spark to light tinder.

Before even attempting to make a fire, some preparation is required. The place where the fire is to be made should be cleared of combustible material. It should be surrounded with rocks or heaped sand to prevent the fire from spreading and getting out of control.



If it is very cold build your fire close to some reflective surface such as a sand bank, or rock face so that heat will be reflected back to you to keep you warm. You can also build a reflector with logs or rocks . Sleep between your fire and the reflector. This will be the warmest spot and will also afford a measure of protection from wild animals.

It is important now to collect all your fire making materials. You need tinder, kindling and fuel. Tinder is any material which will glow from a spark. Fine kindling will ignite readily from a glowing piece of tinder and coarser kindling is any dry wood about the thickness of a matchstick that is readily ignited with an open flame or by a *large* quantity of glowing tinder. Kindling is the middleman between the tinder and the fire's main fuel source, so it needs to burn long enough to fulfill this function. The main fuel for the fire will be thicker twigs to get the heat up and finally logs of dry wood. Fuel should burn slowly enough to conserve wood generate plenty of heat and leave an ample supply of long-lasting coals. Softwoods burn more intensely, quicker with more smoke and with less heat than hardwoods but hardwoods are harder to ignite. Hardwoods generate better and more long lasting coals. "Feather sticks" illustrated are a useful way of getting a fire to burn more easily. All the required material should be collected *before* any attempt is made to light the fire. Too many attempts at making fire fail because the fire maker does not have the necessary material at hand.

When we "build" a fire the tinder is laid down first then light kindling followed by coarser kindling. Add small sticks once the kindling is burning followed by thicker sticks and small logs once the sticks are burning strongly. Don't pile on too much fuel too soon as this will smother the fire.

“Feather sticks” (above) help to get a fire to burn more easily. To build a fire you need tinder (top right), kindling (centre right)and fuel (right bottom).

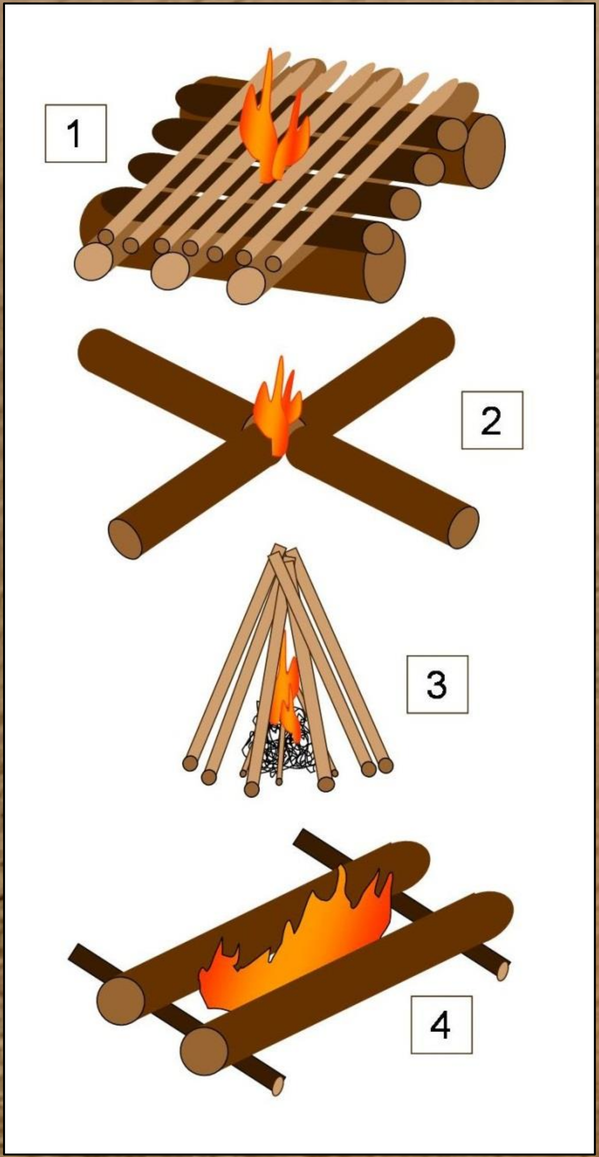
Laying a fire

Criss-cross firelay: Layers of logs are packed at right angles to each other. This fire generates a lot of heat and settles into a deep layer of coals. Uses up a lot of fuel quickly.

Star firelay: Thick logs are fed slowly towards the centre. This is an efficient way to use wood sparingly and avoids the need to break up unwieldy logs. Generates moderate heat. Provides a stable platform for cooking utensils.

The tepee or wigwam firelay: This is shaped like a tent. Flames lick up through the central chamber as they would up a well ventilated chimney. The fire burns quickly, gives off a lot of light and heat but uses up a lot of fuel and is not very stable.

Long-log firelay: Large logs are laid parallel to each other. A good method for warming open fronted shelters during cold weather. Provide plenty of space and a stable platform for cooking utensils.



Ways of packing a fire:

1. Criss-cross firelay.
2. Star firelay.
3. Tepee or wigwam firelay.
4. Long-log firelay.

Lighting a fire

But how do we get the fire lit in the first place? Let's begin with the obvious.

Using a lighter or matches

Lighters work well and you can get good quality types like "Zippo" that will not blow out in the wind like cheaper ones will. Matches are OK if you can keep them dry. If they get wet they are next to useless. Make sure you keep them in a watertight container. You can also "waterproof" them by dripping candle wax onto them. Matches are also difficult to light in strong wind. I have seen people use up a whole box of matches without being able to get a fire lit.

Left: Waterproofing matches.

The methods which are more unconventional include the following:

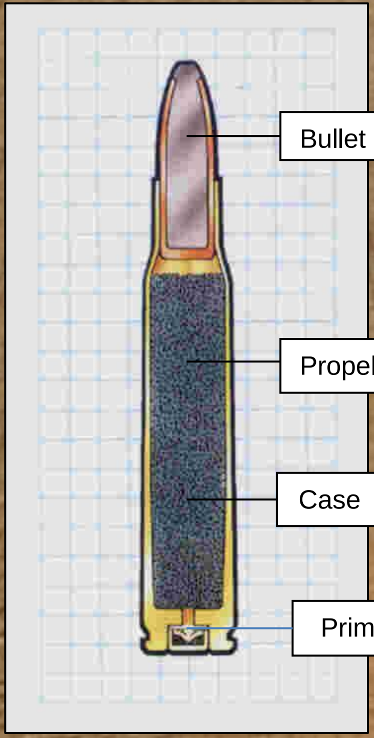
Using flint and steel and magnesium

The flint and steel are very useful and can work under windy and even wet conditions. Magnesium is shaved off and a spark is struck on the magnesium shavings using the edge of a knife. The spark ignites the magnesium shaving which burns with a hot flame which in turn ignite the tinder.

Using a magnesium stick and striker (flint and steel)

Using propellant from a cartridge
Remove the bullet from a cartridge or file a small hole into a case to remove some of the propellant. This ignites readily from sparks struck from a flint and steel or by focusing the sunlight onto it from a magnifying glass (the lens from of a pair of binoculars, camera or telescopic sight can also be used).

Look at a cross section of a cartridge and it will soon become apparent what we have at our disposal.



What we have available as an excellent fire starting material that is relatively easy to ignite is the propellant or powder in the cartridge case. How do we get it out and how can we ignite it? To get to the propellant we must remove the bullet. To do this bend the point back and forth to distort the brass of the cartridge neck. Once this is done the bullet pulls out easily by hand.

Now get all your fire making materials together – tinder, kindling and fuel. Carefully lay the fire in such a way that the propellant is under the tinder.
The propellant can be ignited in a number of ways.

The bullet of the cartridge is worked lose and then removed (left). A quantity of propellant is then poured out ready for use. The bullet can be replaced in the case mouth to keep the remaining propellant from falling out or becoming wet.

You do not have to be afraid of the propellant exploding – it does not. All it does is burn with a very hot flame which should be more than sufficient to get even damp tinder burning. If you work carefully you can get enough propellant out of a medium calibre rifle cartridge such as a 30-06, to start a few fires.

The propellant ignites easily. It can be ignited with an ordinary match, by a spark produced by shorting out a battery, or by a spark struck from a flint or by focusing the rays of the sun onto it through a magnifying glass.

Igniting propellant by directing sparks from a flint onto it (left) and by focusing suns rays onto it (right).

Using a battery and steel wool

Connect the ends of two thin "strings" of steel wool attached to the poles of a battery (4.5 Volts or more is required) and the steel wool will glow brightly enabling you to ignite tinder.

Using jumper cables

Perhaps you have been stranded somewhere in a vehicle. Remember that there may be a cigarette lighter in the car. The battery is also a source of ignition. Clamp two lengths of wire into the jaws of jumper cables and connect the other end of the cables to the terminals of a car battery. When the pieces of wire touch a strong spark will be produced to light tinder with. In petrol engines another way to start a fire is to remove a spark plug then reconnect it to the lead. Wet some material with petrol obtained from the fuel tank or by disconnecting a fuel line. Use some insulating material to hold the plug and crank the engine. The plug will make a spark which can be held on the material that has been soaked in petrol or other flammable liquid. The burning cloth (held preferably with a pair of pliers or on a stick), can now be introduced into the kindling prepared beforehand.

Fire bow

By rapidly twirling a stick of hardwood onto another piece of softer wood using hands or a bow, enough friction can be generated to produce a hot coal which can be introduced into fine tinder and blown gently into flame. Strong downwards pressure must be applied to the stick as it is rapidly rotated. This is not an easy technique and requires a lot of practice.

To work successfully a fire bow must be made of the right type of wood. The correct technique requires lots of practice.

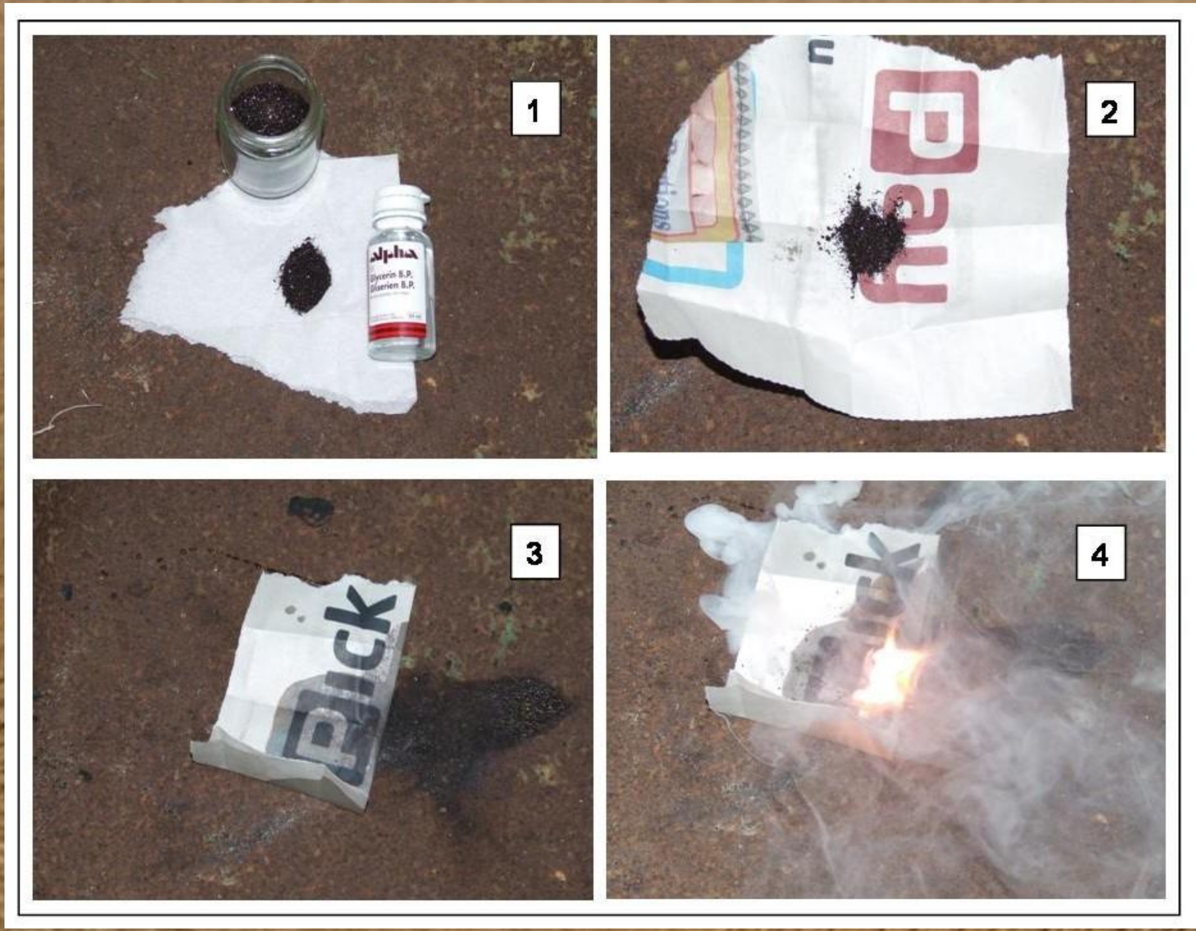
Magnifying lens and parabolic reflectors

By focusing sun rays through a magnifying glass it is relatively easy to get tinder to start smoldering and then gently blown into flame. Parabolic reflectors (from a torch, headlamp, or even the polished metal on the base of a cool drink can) can be used to focus sun rays and ignite combustible material at the focal point.

Making fire using a magnifying glass (far left), using the polished surface of a metal can that has a reflector shape, and using the reflector of an old torch (above).

As unlikely as it may seem fire can even be made from ice by shaping the ice into a lens shape and then focusing the rays of sun through it. The same can be done using a plastic bag filled with water. The shape of the bag is manipulated into a lens and the suns rays focused through it.

Fire from ice (above) and from a plastic bag filled with water (right).



Chemicals

Mixing certain chemicals in the right proportions can result in spontaneous combustion. An example is a mixture of potassium permanganate and glycerin will combust spontaneously when mixed. Place the potassium permanganate crystals in some paper, add a few drops of glycerin, quickly wrap the mixture in the paper. Within a few seconds the paper will begin to smoke and then burst into flames.

Napalm fuel

Lighting a fire under ideal conditions can be easy. Lighting a fire under adverse conditions can be almost impossible and isn't it ironical how often survival situations seem to coincide with adverse conditions.

Once again preparation is an important facet of survival. Be prepared for when the situation arises.

One way to prepare for fire making is to manufacture what is referred to as "napalm fuel". Although this is not in the strictest sense a firelighting technique as the fuel itself has to be ignited it is extremely useful for getting other fuel (such as wood – even if it's wet) to burn.

This concoction has the following advantages:

It is made from readily available components.
It has an indefinite shelf life.
It is long burning.
It is easy to light even at high altitude where the air is thin and the oxygen content of the atmosphere is low.
It is sticky and can be stuck onto cooking utensils and lit.

Components:
Napalm fuel is made up of a combination of coal (or anthracite) granules (or powder), commercial washing powder, and commercial floor wax. All these materials are readily available and relatively cheap.

Shelf life:
All these products have an indefinite shelf life so napalm fuel can be stored for long periods and is ready for use when required.

Burning duration:
When lit, napalm fuel burns for a long time. Experienced Andes climbers have reported that one litre of this fuel is enough for one person for ten days – for heating water and cooking.

Easy to ignite:
Fuel, especially if it is damp or wet is difficult to ignite. Napalm fuel will however ignite with ease if lit with a naked flame (lighter or match) and will burn even if it is drizzling. Another plus for this fuel is that it burns at high altitudes where normal fires and even gas fires burn sluggishly because of low atmospheric oxygen.

Sticky properties:

Because of it's sticky properties it is easy to coat cooking utensils with the fuel. So if you wish to boil water you paste some fuel on the bottom and sides of the pot and light it. Because there is no air gap between the fuel and the utensil heat is transferred directly to the utensil to heat it. It is therefore very efficient.

Making napalm fuel:

If you do not have coal granules / dust make some by crushing and grinding larger pieces as shown below. The finer the coal dust the better.

Now weigh out roughly equal parts of coal granules / dust, commercial washing powder, and ordinary floor wax

Take an old pot (not your wife's best cooking pot!) and place the furniture wax in the pot and place it over a low heat so that the wax melts to form a liquid. To this add the washing powder and the coal dust (the order does not matter). Stir gently until the three components are thoroughly mixed. You now have napalm fuel. Place it in a container (glass or plastic with a screw on lid) and store it until needed.

When you need some fuel scoop out the required quantity light it. You will be pleasantly surprised to see how easily it ignites and how long it burns.

One precaution – burn it in a well ventilated area as the fumes are smelly and can unhealthy to inhale.

When making a fire you may have to start it off with a tiny coal from a fire bow or spark from a battery. It is essential that you have tinder ready to place this tiny coal into. Enclose the coal in the tinder and gently blow through it. At first there might be only a small tendril of smoke. This will soon increase and as you continue blowing the tender will suddenly burst into flame. This is know quickly introduced into the tinder and coaxed into flame.

Transporting fire

Fire is so valuable that in a survival situation when you want to move from one location to another you may wish to "transport" fire. This can be done by carrying live coals in a tin or other suitable metal container or smouldering dung from a rhino, elephant or cow. Make sure the container has holes in the bottom so that the coal or smouldering dung does not die as a result of lack of oxygen.

Safety and ethical considerations

Many unplanned, potentially destructive and lethal bush fires start from a small fire made for cooking or warmth and not made safe when the person who made the fire moves on or does not manage the fire and keep it under control. Runaway bush fires can lead to loss of grazing and injury or death to wildlife, domestic stock and humans and destruction of infrastructure. It is essential therefore to make a fire “safe” before moving off. Ensure that the fire is properly extinguished by pouring water over it and then covering it with sand. Any logs that were still burning should be removed and the burning end immersed in water and then covered with sand. Leaving glowing coals is almost certain to result in a run away fire if the wind picks up and disperses glowing embers all over the place. It is also good environmental practice to dismantle a fire and leave “no trace” of it. In strong windy conditions a sheltered spot, out of the wind, should be chosen to build a fire.

Uses and dangers of fire

Light

The dark can be frightening. Fire provides light and if you can see your immediate surroundings it can dissipate some of the fear associated with darkness.. If you have light it also enables you to carry out practical tasks like repairing equipment or making tools for example.

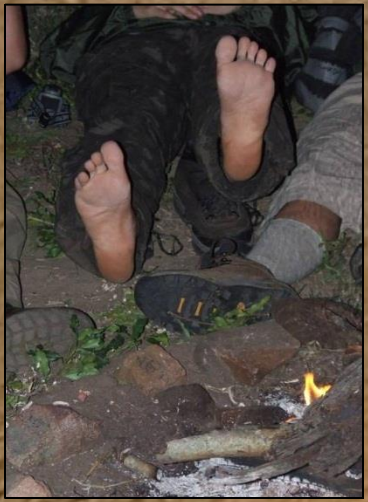
Protection

Fire can provide protection against predators. See Figure 2. Species such as lion, leopard and hyena will generally keep their distance from a big camp fire. Being able to see these animals as they hang around on the periphery of the firelight can warn you of their presence. A firebrand plucked from the fire and thrown in their direction can help to drive them off or keep them at bay. Take care however when doing this that you don't cause a dangerous bushfire. In dry, arid areas with little or no ground cover it can be considered. To use fire as protection against predators it is important that the fire is kept stoked. Make sure that you gather enough fuel before dark so that you do not run out of wood during the night.. If there is a lot of predator activity you can build two fires and position yourself between them. This will however require double the amount of fuel.

Firelight provides a sense of security and makes it possible to busy oneself with necessary tasks.

Fire can provide protection from dangerous predators

Warmth



Bushveld nights can become very cold indeed. Cold enough to cause death through hypothermia when body temperature falls below a critical point and causes major organs to shut down. In cold conditions fire is a lifesaver. I have slept in the bush at temperatures of -5^{0}C and am certain that I would not have survived the night without a fire. The effectiveness of a fire can be increased by choosing a sheltered site for it that is out of the wind and close to some reflective surface like a big rock or a wall built of logs. Position yourself between the fire and the reflective surface to keep both your front and back warm. Again make certain that you have enough wood or alternative fuel to last the night. If you suspect that there might be rain contrive some sort of shelter for yourself and the fire or look for a rock overhang or cave. It is important that you stay dry and prevent rain putting your fire out. Having fire affords you the opportunity of heating water to have hot drinks which elevates your core temperature and is very important in preventing hypothermia. In cold climates the warmth of a fire can also prevent frostbite. The warmth provided by a fire is morale boosting

Boiling water to purify it

Water must be boiled and kept boiling for a minimum of five minutes to kill common pathogenic organisms. To be safe boil it for at least ten minutes. If you wish to avoid losing water through the steam that is evaporating (it might be in short supply) place a cloth over the water container to trap the steam and reduce water loss. Here is a life saving hint. Many people think that they must have a metal container to be able to boil water. This is not so. You can boil water in a plastic container over a fire as long as the container is kept full. The plastic might distort but it wont melt as long as it contains water. Another alternative is that you can also boil water by putting stones in a fire, heating them and then removing them with wooden tongs (made from a branch of a tree) and placing them in the receptacle containing your water. Remove the stones from the water as they are cooled and replace them with hot stones from the fire. This process can also be used to make a stew or soup in animal skins.

Cooking

One obvious and extremely important use of fire is that it is used to cook food. Meat can be cooked on the open flames of fire or over a hot bed of coals. Stews, soups – whatever can be prepared over a fire. Smoke from a fire can be used to cook, smoke and preserve fish and meat. In a survival situation it is important that starch containing foods be cooked as, if eaten raw, they cannot supply us with energy as the complex sugars cannot be digested by the human digestive tract. They will provide fibre and moisture which are also important for a healthy diet but heat is needed to reduce the complex starches to digestible sugars which we urgently need to provide us with energy in a survival situation.

Sterilizing instruments

In a survival situation we might find ourselves having to carry out some basic surgical procedures like suturing or in extreme cases cauterizing a wound. It is important that all materials and instruments be sterilized by boiling them in water or as an alternative in the case of metal instruments heating them over an open flame. Water used to clean wounds should also be boiled.

Instruments which may need to be sterilized – knife, scalpel, suture needle, haemostats or scissors.

Light provides a sense of well being and “home”

The effect of fire on ones mental state is profound. Stick someone in the middle of the wilds in the dark and a sense of terror soon engulfs them making them feel very vulnerable. Build a nice big fire that provides warmth and light and the change that comes about is almost immediate and quite remarkable. It can best be described as a sense of having “come home”. Fire is synonymous with a sense of “home” – providing warmth, light, a place to cook, hot food and security. This effect of fire is hugely important.

Hardening points

In long term survival situations the survivor would have to make some sort of weapon for hunting purposes and for self protection. In the absence of metal, or suitable flint for flint knapping arrow or spear points (and of course possessing the skill of flint knapping) arrow or spear shafts made of saplings or wooden staves can have their points hardened by placing them in a bed of hot ash from a fire or by rotating the points in a flame to displace moisture from the plant tissues.

Hardening the points of a wooden spear or arrow by inserting them into the hot ashes of a fie.

Smelting

Fire can be used to heat and smelt metal so that it can be beaten and shaped into useful forms to create weapons (arrow points, spear points, knife blades etc.) and tools (pick heads, ploughs, hoes etc.).

The skills associated with the making and uses of fire are fundamental to bushcraft but as with most things in life there are negative aspects which should also be taken into account. The advantages of fire far outweigh its disadvantages but we should be aware of the dangers of fire at the same time as we exploit its benefits.

Dangers

Uncontrolled and runaway bush fires can be deadly and it important that campfires are always kept under control otherwise what could have been a friend can end up being a killer. A campfire itself or anything heated on it such as hot liquids, food or implements should be handed with care to prevent accidental burns. Fire creates light and warmth which attracts insects, which attracts frogs and toads, which attracts snakes. Scorpions are also attracted to fire. When walking around a campfire keep your eyes open for dangerous snakes and scorpions. They often also shelter in the wood that you use for your fire so take care when collecting wood and placing wood on the fire. It is also advisable to wear closed shoes around a fire – this protects you not only from standing on hot coals but also being stung by scorpions or bitten by venomous spiders. Wearing long trousers made of strong material such as denim will also reduce the likelihood of being bitten by a snake or in a worst case scenario limit the depth to which venom can be injected. Lastly there are stories of animals like hippopotamus and rhino being attracted to fire. This might happen occasionally but it could not be regarded as a hard and fast rule. The best way to avoid this is to site your camp on terrain which is not readily accessible to these species. If you camp on a riverbank next to a river containing a healthy population then the chances are pretty good that you might have an unwelcome nighttime visitor.

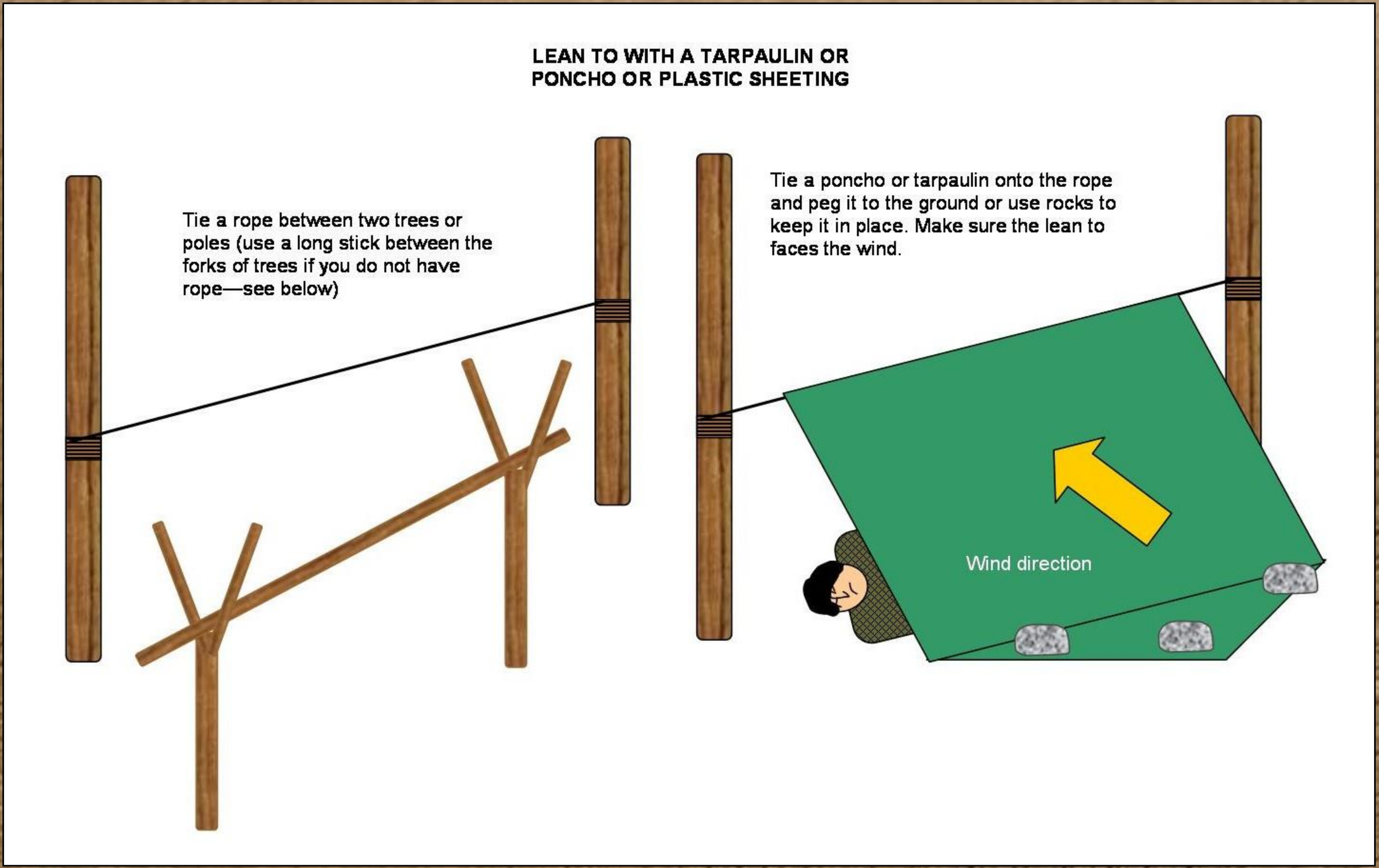
Dangers of fire: Insects are attracted to light which can in turn attracts scorpions, frogs (that come to catch the insects), and snakes (that come to catch the frogs). Reptiles are also attracted to the warmth of a fire when it is cold. Fire can cause serious burns either directly or by spilling hot liquids heated on the fire. A run away, out of control fire can be lethal.

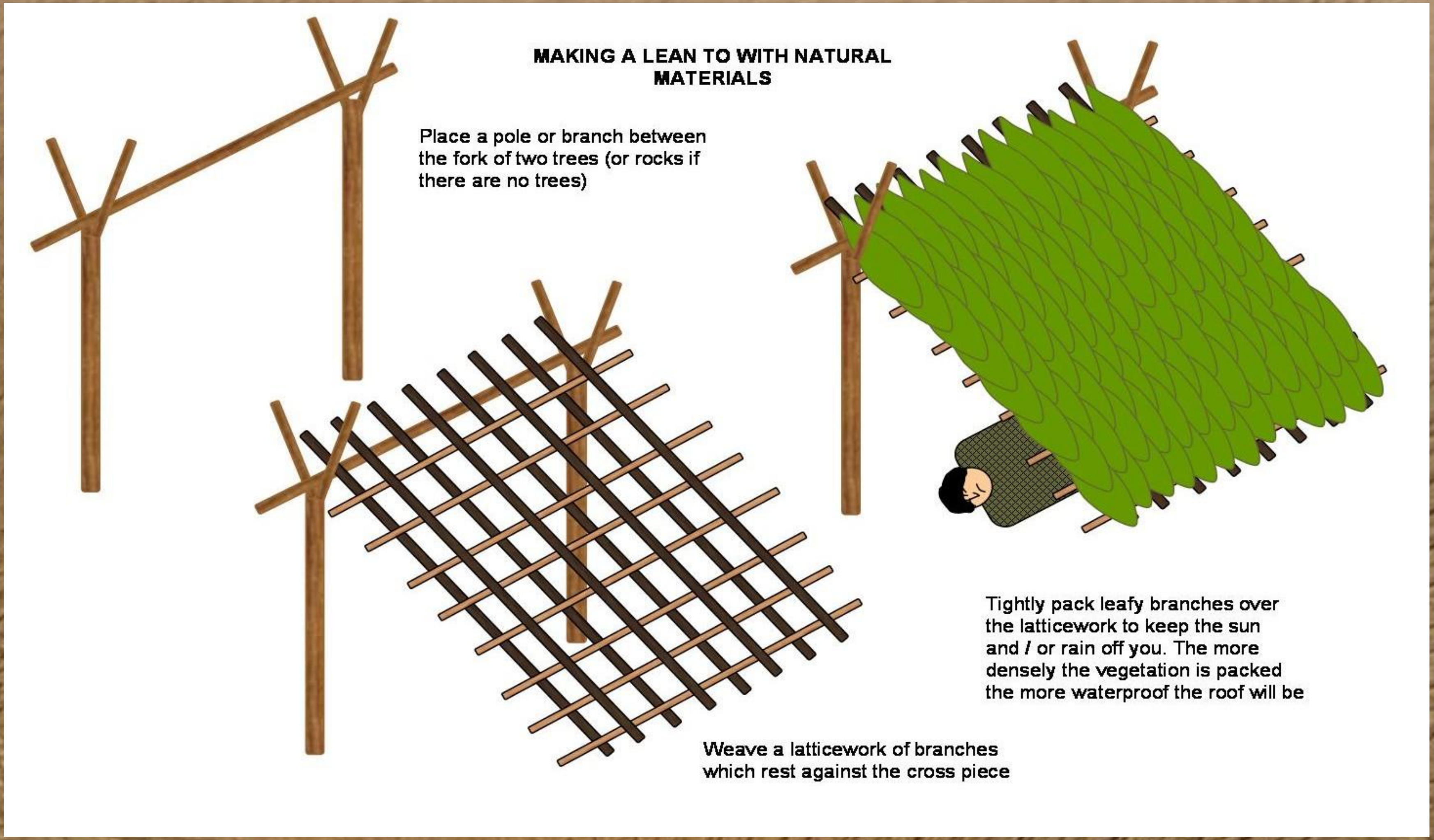
Building shelters

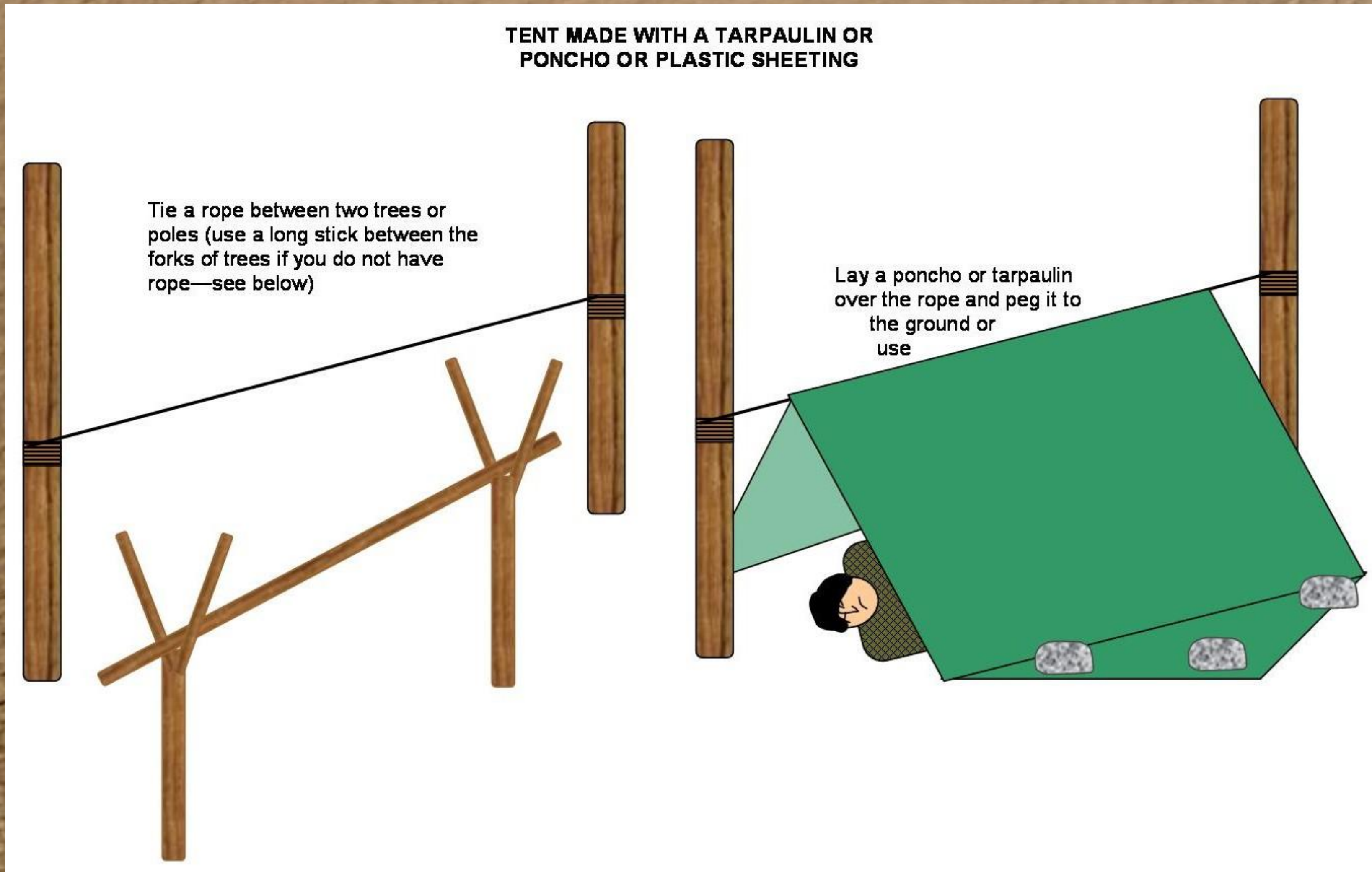
Getting out of the wind, rain, and sun, and being able to rest and sleep, is vital for survival. The better you use your shelter, the more comfortable you will be and the more rest you will be able to get. Being rested is essential for your physical health as well as for your psychological well being which determines how sensibly and logically you think, and how strongly you are resolved to survive. A lean-to shelter is probably the easiest and quickest shelter to build and is suitable for most terrain. It should be erected on a sheltered, level site and built so that the roof faces into the wind or rain.

It is more effective if it is built close to some natural feature (such as a big rock, or bush) which provides additional protection. The following pages show examples of shelters that can be made using naturally available materials. Natural topographical features such as rock overhangs, caves, hollows and dense bush can also provide shelter from the elements.

In cold weather avoid valleys and depressions as cold air sinks at night. Rather make or find shelter on mid-slopes where it will be appreciably warmer.

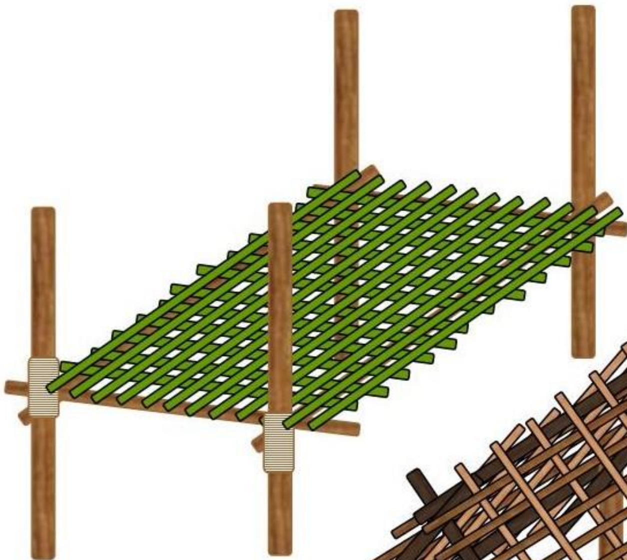

LEAN TO WITH A TARPAULIN OR
PONCHO OR PLASTIC SHEETING
Tie a rope between two trees or poles (use a long stick between the forks of trees if you do not have rope—see below)
Tie a poncho or tarpaulin onto the rope and peg it to the ground or use rocks to keep it in place. Make sure the lean to faces the wind.
Wind direction

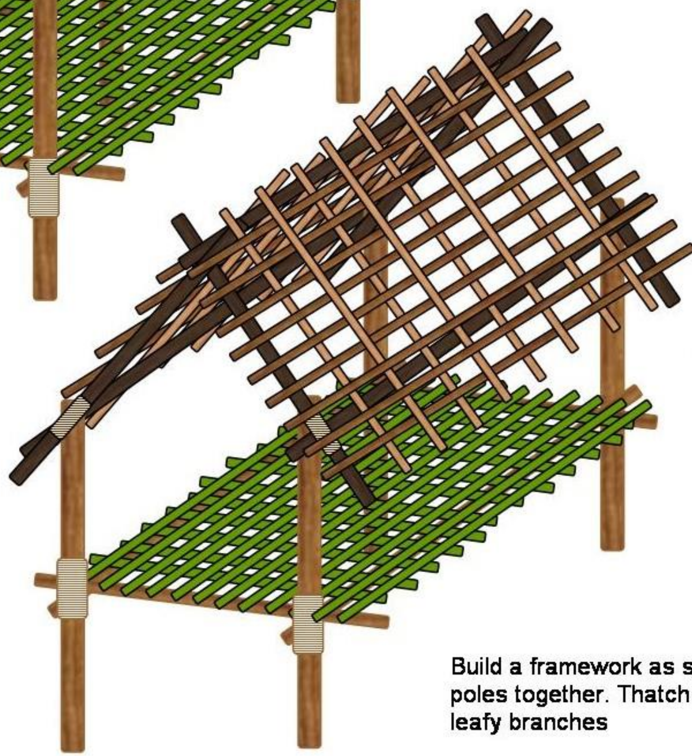

MAKING A LEAN TO WITH NATURAL MATERIALS
Place a pole or branch between the fork of two trees (or rocks if there are no trees)
Tightly pack leafy branches over the latticework to keep the sun and / or rain off you. The more densely the vegetation is packed the more waterproof the roof will be
Weave a latticework of branches which rest against the cross piece


TENT MADE WITH A TARPAULIN OR PONCHO OR PLASTIC SHEETING
Tie a rope between two trees or poles (use a long stick between the forks of trees if you do not have rope—see below)
Lay a poncho or tarpaulin over the rope and peg it to the ground or use

JUNGLE SHELTER (LONGER TERM)

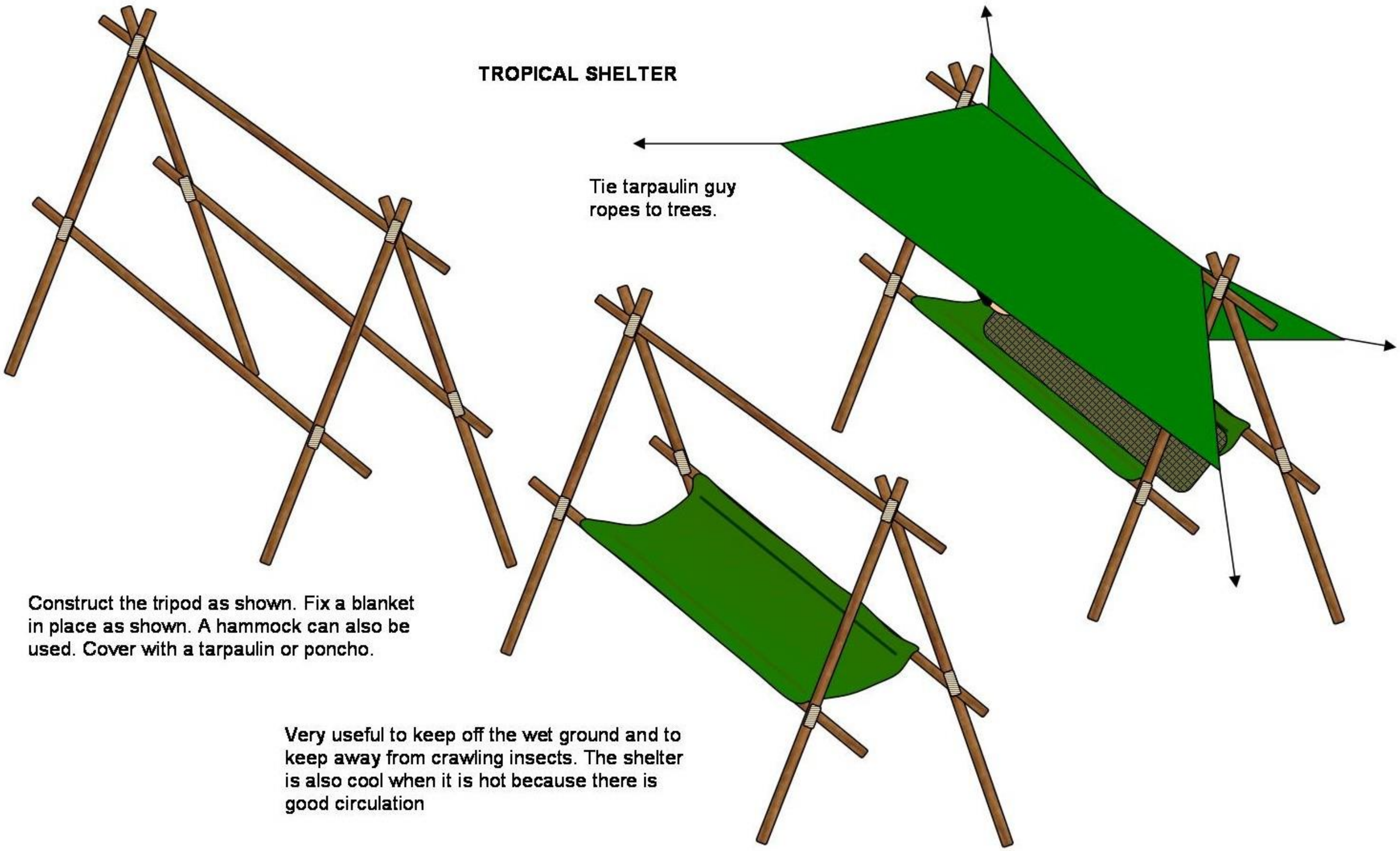
Very useful to keep off the wet ground and to keep away from crawling insects. The shelter is also cool when it is hot because there is good circulation





Build a framework as shown by lashing poles together. Thatch with grass or leafy branches

TROPICAL SHELTER



If the night is fast approaching and you have not had time to find or build a shelter and you are in an area where dangerous game occurs you can do one of the following:

Move to high, rocky or uneven ground where it is more difficult for wild animals to approach you. Move off well travelled game paths.

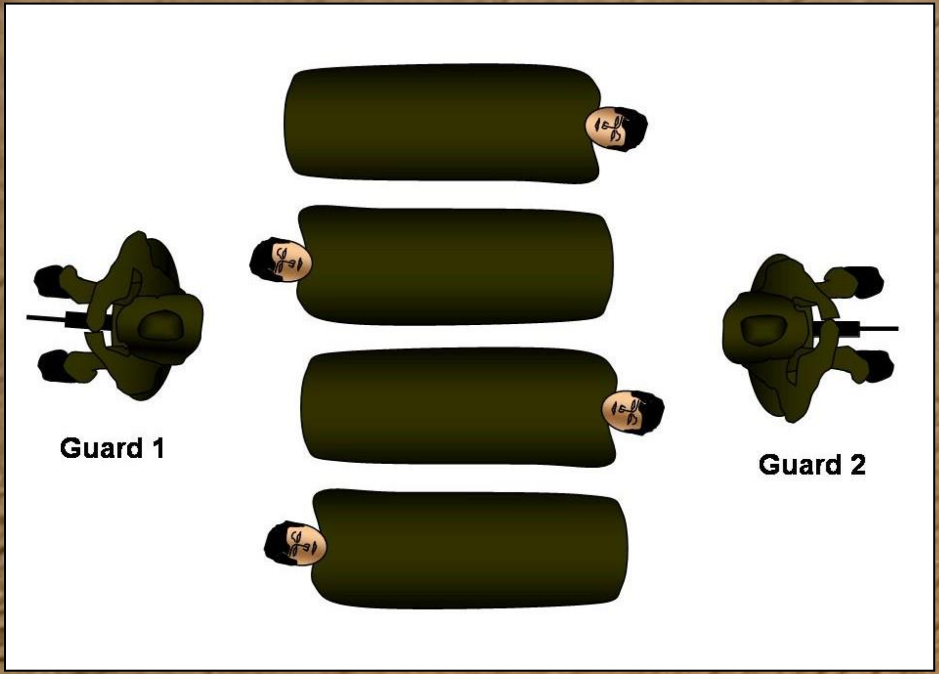
Tie yourself into a tree with your belt or rope.

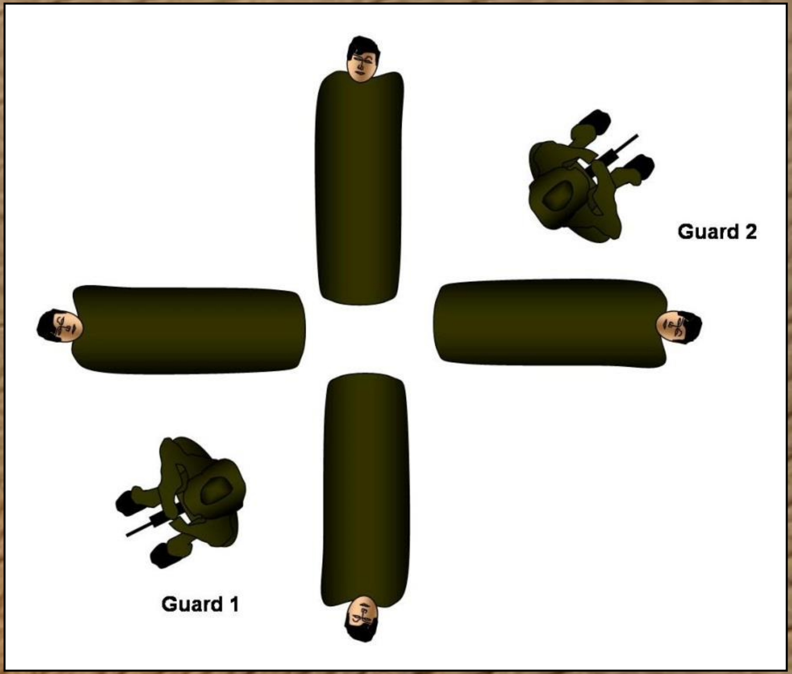
Don’t leave food lying around your campsites - it attracts insects and animals which could be problematic. Food should be stored in lockable / sealed bins or hoisted by ropes off the ground.

If there are more than two people in your party if possible always try and have two people awake at any given time as it is very difficult for an individual to stay awake whilst others are sleeping. There should also be an early warning system devised to wake people up silently should the need arise.

There are two suggested sleeping arrangements for sleeping out in the bush on the ground.

If there are only two people either sit up back to back or if you lie down lie head to foot. If you are on your own try and not sleep on the ground. If you have to choose a spot that will be very difficult for animals to reach or tie yourself up in a tree as mentioned on the previous page.





Dealing with wild creatures

It is a fact of life that rangers are exposed to natural hazards including wild animals, snakes, spiders, scorpions, bees, wasps, malarial mosquitoes, bilharzia, and diseases carried by insects and other vectors. All of these have the capacity for being potentially lethal.

The following general guidelines apply when dealing with dangerous animals: Avoid unnecessary confrontation if at all possible. Obviously if you are hunting you will be intending to approach animals to shoot them but don't take unnecessary risks. Remember you are responsible for the life of your client.

Basic principles

Irrational fear and panic can have lethal consequences.

Be careful of firing warning shots at animals which are threatening you. Shouting and making a noise is usually just as effective. A warning shot may ricochet and wound the animal. If the warning shot does not work you may not have the time to reload.

Never run – this is fatal.

Don't become over confident. If you are well informed about the possible dangers you can avoid trouble.

Learn to cultivate a combination of caution and curiosity. A healthy curiosity leads to an increase in knowledge, which diminishes irrational fear, but should always be accompanied by caution.

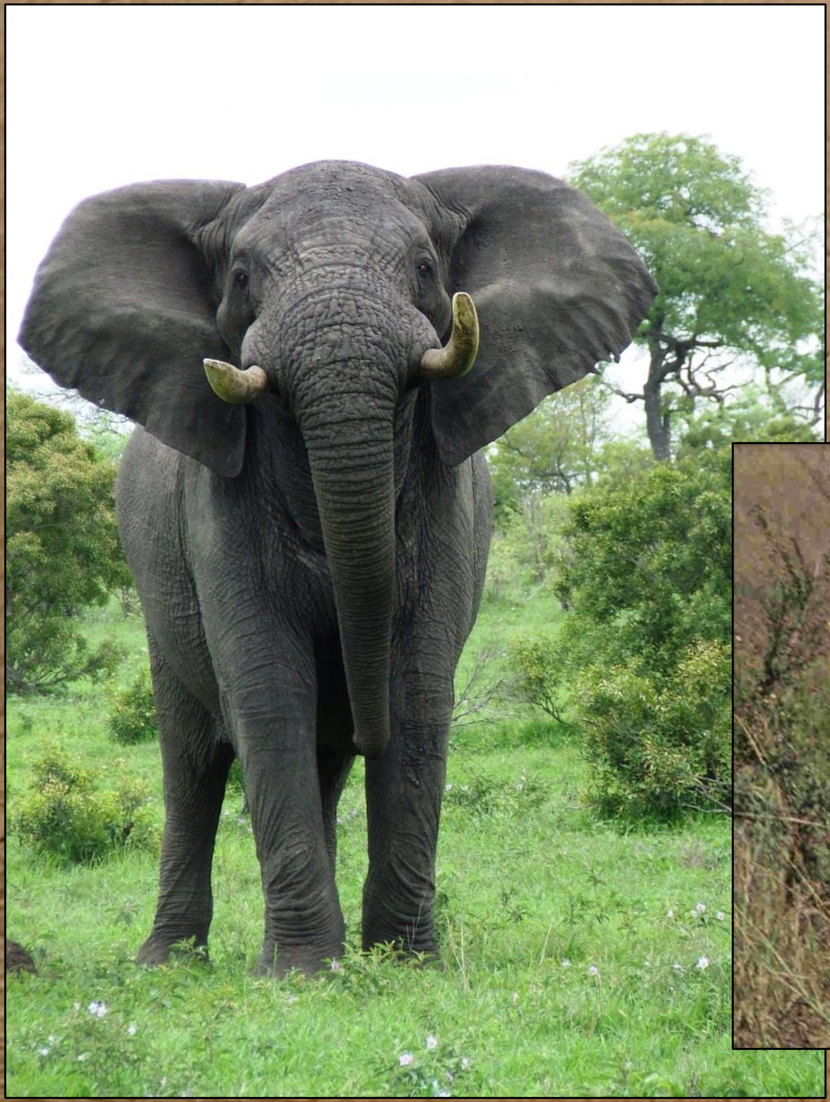
Natural fear/respect of wild animals is healthy as long as it is kept under control.

Learn to prepare yourself for a worst case scenario and rehearse in your mind how you will deal with the situation.

If an animal demonstrates threatening behaviour TAKE THE WARNING SERIOUSLY. Do all you can to defuse the situation.

Don’t run!

Running away from a wild animal is enticing it to charge.



Take threats seriously. Try and defuse the situation by backing off slowly. Don't turn your back on the animal. If it continues approaching stand your ground, shout at it, wave your arms and throw anything you can find at it.

Antelope and buffalo

Antelope are not normally dangerous and will avoid humans if at all possible. There are certain species which can cause serious injury or death under certain circumstances. If any animal is cornered or wounded, it will fight for its survival. Buffalo breeding herds are generally quite docile but bulls in bachelor groups or on their own can be dangerous.

Bushpig

Whilst not normally a threat to humans bushpig can become extremely aggressive if wounded or cornered, or when they have piglets.

Large predators

Large predators will generally move off during the day when approached by humans. Females can become extremely aggressive in defence of young. The timid nature of most large predators changes at night and they can become far more bold. When you are moving into the wind there is a danger of stumbling into large predators especially during the heat of the day. If suddenly disturbed large predators can quickly become aggressive. Exercise caution when moving through thickets, dense tall grass, near waterholes and rivers and when sign

indicates that there are large predators in the area.
Large predators such as lion can be dangerous when suddenly approached at close range, when they are feeding, mating or have young with them. Old, injured or sick animals will also be more dangerous and unpredictable. The outcome of a surprise meeting, especially in thick cover and at close quarters, is unpredictable.

NEVER run away when you encounter large predator. If you run, they will run you down, as predators instinctively charge and kill a fleeing animal.

Elephants

Elephants are unpredictable and should be respected. When approaching these animals make sure everything is in your favour or maintain a safe distance. Be especially cautious of bulls in musth and cows with young (breeding herds).

When an elephant gives a warning charge it is characterised by spread ears, loud trumpeting, and an approach which may end a few meters from the intruder, after which the elephant retreats. To run may prove fatal – stand your ground – shout, wave your arms, throw objects at the elephant. If the elephant stops then begin backing off slowly whilst facing the animal all the time.

A serious charge is characterised by ears flattened against the body, trunk curled up and no vocalisation.

Don’t take chances with elephant. Avoid getting into tricky situations and rather err on the side of safety. Elephants have rather poor eyesight but highly developed sense of smell and keen hearing.

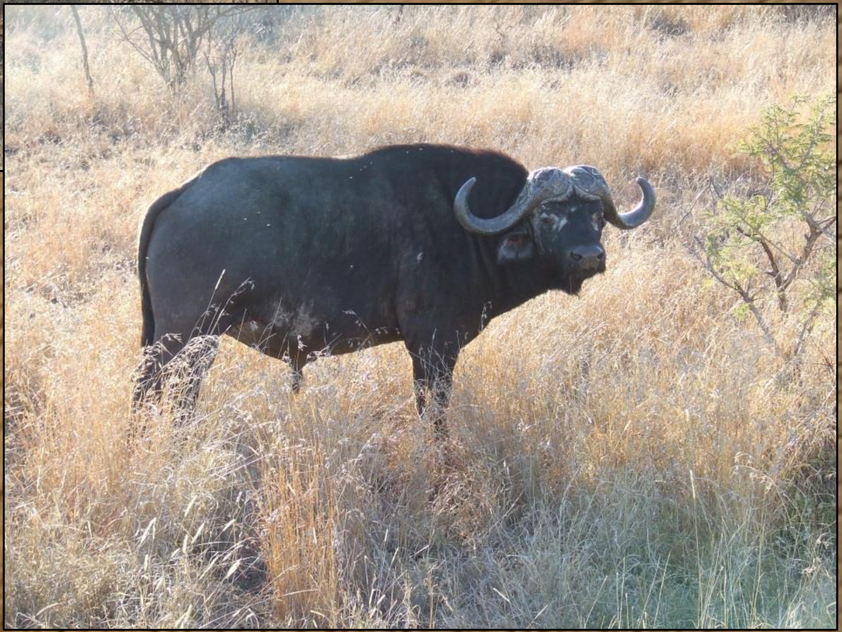
Hippo and crocodile

Both hippo and crocodile can be extremely dangerous in or near water. Stay off hippo paths leading to or from water and get off it as quickly as possible if you see a hippo approaching. Hippo account for more deaths in African than by any other species.

Entering water that is inhabited by hippo and / or crocodile is asking for trouble.


Hippo and crocodile can be extremely dangerous. Stay clear of them and be on the lookout when close to water. Don’t go into water I inhabited by hippo or crocodile.

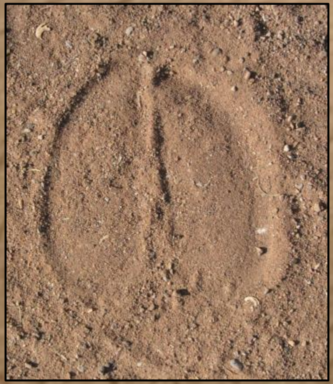
Steer clear of elephant breeding herds with young and……



…lone buffalo. Both are potential trouble.

When walking through the bush keep your eyes and ears open for animals or their signs. Also sniff the air regularly as you will sometimes become aware of the presence of an animal by smelling it.

Even large animals like elephant are sometimes difficult to spot



Buffalo

Spotted hyaena

Leopard

Lion

Black rhino

Tracks of dangerous animals to keep a lookout for.

White rhino

Hippo

Elephant

Leopard

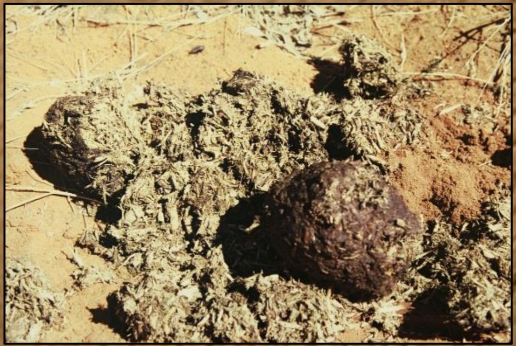
Lion

Elephant

Hippo

Scats of dangerous animals to keep a lookout for.

Hyaena



Black rhino

White rhino

Summary

Injuries or death resulting from confrontations with wild animals seldom occur as a result of an accident. It is usually the result of incompetence, or the failure to take adequate precautions, or of a decision taken either in ignorance or bravado.

Always try, as far as possible, to stay beyond the critical distance of potentially dangerous animals or move out of this area should you unwittingly find yourself too close for comfort. Any injury or death which results from a deliberate approach to within the critical distance (that distance at which a potentially dangerous animal attacks in self defence), constitutes negligence). Unwitting approaches will be minimised by avoidance of, or special vigilance in places where visibility is restricted. In such habitats immediate retreat to a safe distance will always be the rule in every close encounter.

The critical distance will vary from place to place depending on the species, type of habitat, time of day, mood of the animal, whether the animals are alone or in a herd, their activity, the presence of young, age, sex, social status, wind direction, nutritional status, water and food availability and so on.

The safest general rule is always err on the side of safety. The only justification for a closer approach to potentially dangerous animals if you are not hunting them is the presence of a substantial physical barrier between yourself and the animal / s (an elevated position, deep ditch, a stretch or body of water).

Mosquitoes

Malaria carried by the bite of a *Plasmodium* infected female *Anopheles* mosquito is one of the greatest killers in Africa. Dengue fever is caused by the *Aedes* genus. Occurring mainly in summer and especially during years of good rainfall malaria mosquitoes pose a distinct health hazard to rangers working in the field.

Mosquitoes feed from dusk to the early hours of the morning. It is advisable to sleep under nets and to use repellent. Fire and the smoke from burning cattle dung helps to keep mosquitoes away.

Malaria symptoms appear 10-12 days after the infective bite. Early symptoms include fever, chills, sweating and headache. Prompt treatment is essential even in mild cases, since irreversible symptoms may appear suddenly. If early symptoms are not recognised the victim may become critically ill with cerebral malaria.

Bilharzia

Bilharzia (*Schistosomiasis*) is found in shallow water that is stagnant or slow flowing. The parasite may penetrate the skin within minutes after you have come into contact with contaminated water. Water should be boiled or purified before using it for drinking or washing. Bilharzia infection can be a severely debilitating disease. Symptoms include persistent fatigue, bodily discomfort, fever and vague intestinal complaints. All water in the wilds must be regarded as contaminated – if not with bilharzia then with other pathogenic organisms.

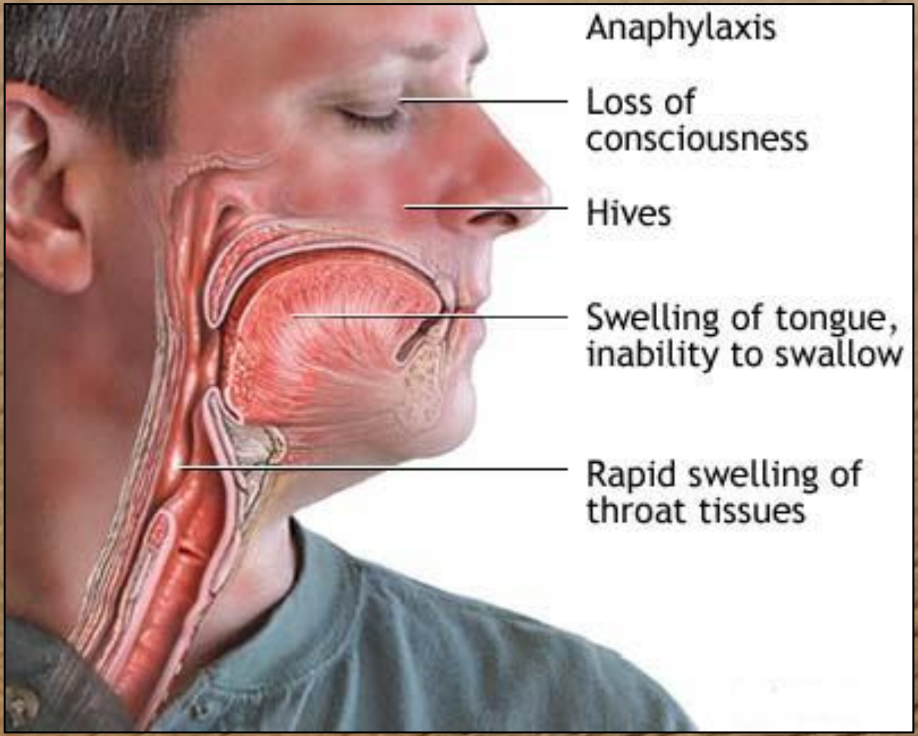
Bees, hornets and wasps

The great danger with bees and wasps is that some people are hyper allergic to their stings and can rapidly develop anaphylactic shock which, if not treated appropriately, can result in death within minutes. Avoid unnecessary contact with bees, hornets and wasps.

Ticks

Of the more than 70 viruses and disease carrying organisms transmitted by infected ticks, Q-fever, tick-borne relapsing fever, haemorrhagic fever, tick bite fever and tick bite paralysis are the most important conditions known to occur in humans.

The sting from a single honey bee can be life threatening to someone who is allergic to bee sting.



The condition on the right where the skin breaks out in very itchy red weals is an allergic response called "hives".

Ticks can often be seen on the tips of long grass where they are brushed onto passing animals or humans. Remove ticks by burning them off with a cigarette or smear them with grease, Vaseline, disinfectant or alcohol. Tick bite fever may develop about a week or two after the bite. Symptoms include listlessness, headache, fever and swollen glands.

Spiders

Most accidents occur when people lift objects or plants harbouring spiders. If the spider is hurt in the process, it will bite in self defence. When molested in their webs, they often sham death, rolling in a ball. If picked up (while shamming death), they will bite. Whilst most spiders pose no danger to man there are species that are of medical significance. Those which can be dangerous are the black widow (*Latrodectus* spp.), violin spider (*Loxosceles* spp.) and sac spider (*Chiracanthium* spp.). The former has a nerve (neurotoxic) venom and the latter two a tissue (cytotoxic) venom.

A black widow spider (left) and a six eyed sand spider (right)

The examples below are the results of bites from the brown recluse or violin spider – it results in tissue necrosis which takes months to heal.

Bites from sac spiders (left) – they also possess a cytotoxic venom.

The large and intimidating baboon spiders (below) are not venomous to man.

Scorpions

To avoid being stung by scorpions do not put your hand in a hole, tunnel or birds nest. Take care when picking up rocks or logs, and roll them towards you. Avoid picking up scorpions that appear to be dead. Do not allow your face to come too close to a scorpion, since they can squirt venom into your eyes. Check bedding and sleeping backs. Leave boots in an upright position during the night and shake out clothing and boots before putting them on in the morning. Don't walk around barefoot at night. Scorpions are often attracted to fire and other sources of light. Most scorpions can deliver a painful sting but the dangerous ones belong to the *Parabuthus* genus. They have a thick tail and small pincers whereas less venomous scorpions have thin tails and large pincers.

A highly venomous *Parabuthus mossambicensis* scorpion (right) and a mildly venomous rock scorpion (left).

Baboon spider holes (above) with one emerging from a nest. On the left is the oval shaped entrance to a scorpion burrow.

Treatment for scorpion stings

First aid for scorpion stings is generally symptomatic. It includes strong analgesia, either systemic (opiates or paracetamol) or locally applied (such as a cold compress). Hypertensive crises are treated with anxiolytics and vasodilators. Treatment of scorpion stings will be dealt with in detail in the

Treatment for spider bites

In the case of bites by brown recluse and widow spiders, prompt medical attention should be sought as in some cases the bites of these spiders may develop into a medical emergency

Treatment for non-poisonous spider bites include washing the bite with soap and water and ice to reduce inflammation. Analgesics and antihistamines may be used however antibiotics are not recommended unless there is also a bacterial infection present

Snakes

It is important for a hunter or outdoor person to be able to identify snakes and to differentiate between venomous and non – poisonous species. As long as you take the necessary precautions and exercise common sense the chances of being bitten by a venomous snake are very small.

Snakes prefer to flee when disturbed. Bites usually result from unwitting disturbance or contact or when escape is cut off. Most bites occur on the feet and lower half of the legs. Wear protective clothing on the legs. Keep alert and watchful. Look ahead and scan the path. Keep to paths and avoid long grass and other areas where visibility is limited. Step onto logs or rocks, not over them, because a snake could be lying on the other side.

Food stores, which may attract rodents and therefore snakes, should be kept away from sleeping areas. Wear shoes at night and use a torch. If you encounter a snake at close range – freeze. Snakes will strike at moving objects. Stand still and allow the snake to move away.

Never play or interfere with snakes. Be careful of snakes which appear dead. They can feign death.

Pick up rocks, logs or wood so that the underside faces away from you, leaving an avenue of escape open for a snake.

Never put your unprotected hand down a nest, burrow or hole.

TYPE OF VENOM	EXAMPLES	TYPES OF VENOM FANGS
Neurotoxic (nerve poison)	Mambas and cobras	Fixed (non-hinging) front fangs
Cytotoxic (tissue poison)	Adders	Folding (hinged) front fangs
Haemotoxic (blood poison)	Vine (twig) snakes and boomslang.	Back fangs
Non-nenomous	Python, mole snake, house snake	None. Kill by constriction.

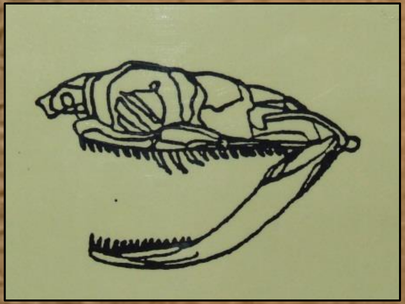
Examples of haemotoxic snakes: Boomslang (left), vine or twig snake (right). The fangs of these back fanged snakes lie approximately under the eye in the jaw.

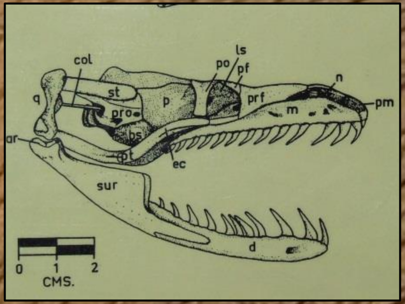




Examples of neurotoxic snakes: Black mamba (top left), green mamba (top right), Cape cobra (bottom left), snouted or Egyptian cobra (centre) and Mozambique spitting cobra (bottom right).


Examples of cytotoxic snakes: Boomslang (left), vine or twig snake (right). The fangs of these back fanged snakes lie approximately under the eye in the jaw.





Examples of fang arrangement: Back fanged (left), front fanged (centre), non-venomous (right), hinged front fang (not shown).




Examples of non-venomous snakes: Rock python (above left), brown house snake (above right) olive grass snake (bottom left) and a mole snake (bottom right).

Treatment for snakebite

The general treatment for snakebite, shown on the next page) is the same for all venomous species.

1. Stay calm.
2. Apply a pressure bandage as shown on the following page.
3. Get to a hospital or doctor. If you are in the bush on your own walk to the nearest help and request to be taken to a medical facility. Don’t run as this will speed up the spread of the venom.

Neurotoxic snakes

As above but you will have limited time to get to help. You may apply a tourniquet. This is dangerous and should be loosened slightly after 20 minutes to allow blood to reach the limb. If you have to give assistance to someone bitten by a mamba or cobra monitor their breathing closely. If they stop breathing apply artificial respiration. If their heart stops apply CPR. Get to medical help ASAP.

Bite from a cytotoxic snake (above left) showing swelling and blistering. Bite from a neurotoxic snake shows far less swelling (above right). Bite from a non-venomous snake – in this case a python is similar to that of a dog bite python (below left).

Haemotoxic venom

Apply general treatment and get to medical help. You have more time than in the case of a neurotoxic bite. Do not use a tourniquet.

Cytotoxic venom

Apply general treatment and get to medical help. You have more time than in the case of a neurotoxic bite. Do not use a tourniquet.

As soon as you possibly can apply a stretch bandage from just above the bite (arrow) wrapping towards the heart. You can then splint the limb (leg or arm) to immobilize it. Excessive movement will spread the venom more quickly.

To return to wounds click here

Rabid animals

Rabid animals are often characterised by unusual behaviour, which may include attacking humans or other animals, hiding in dark places, becoming extremely aggressive and showing a fear of water. Normally shy animals can suddenly lose their fear of humans. It an extremely serious situation if you are bitten by a rabid animal as there is a very high incidence of mortality. Avoid any animal suspected of rabies. A rabid animal should be destroyed and its brain sent away to a vet for analysis.

Environmental dangers

Environmental dangers include the following:

- Bushfires
- Lightning, hail and thunderstorms
- Flooding
- Excessive heat
- Excessive cold

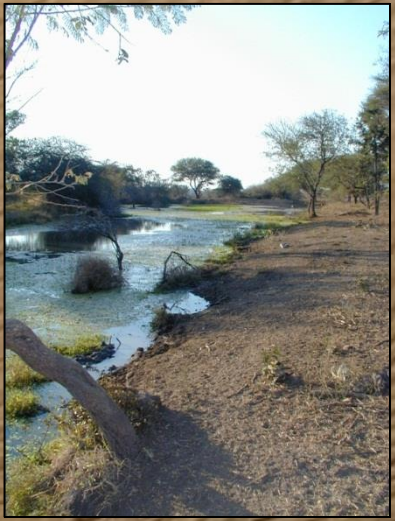
Bushfires

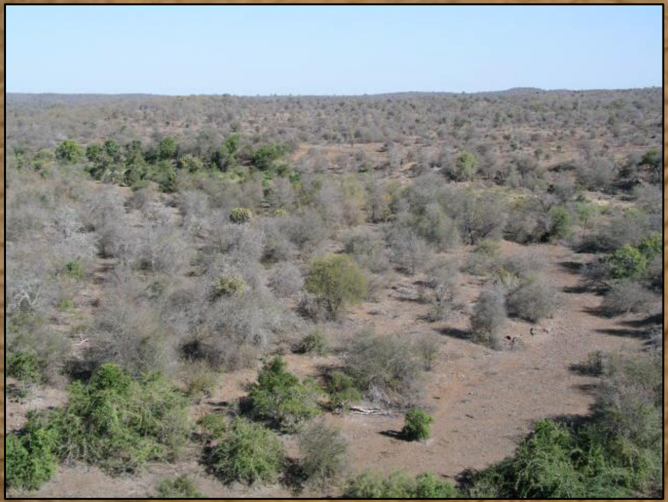
A wild, out of control bushfire can be terrifying and deadly. Driven by a strong win you cannot outrun it.

The first precaution is to be on the lookout for the first signs of a bushfire – a pall of smoke during the day or a glow on the horizon at night. Then check on the direction of the wind to determine in which direction the fire will move and get out of its path

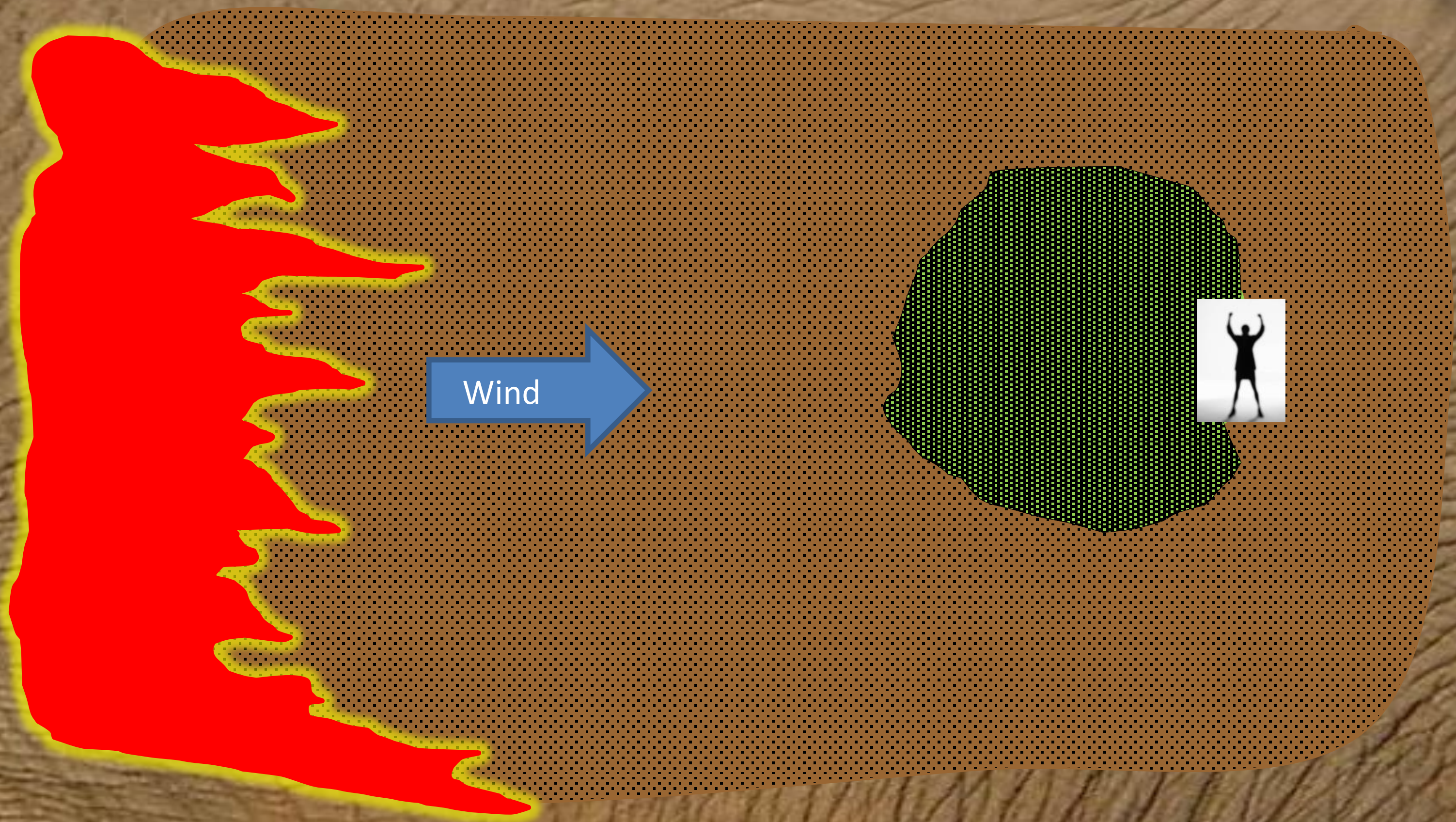
Move to areas where there is a low fuel load to burns such as in an area already burnt, a river or dry river bed, a road or onto large rock outcrops. If you are in an area where there is a high fuel load you will fry when the fire reaches you.

If the fire is approaching fast avoid walking up hills as fire travels very quickly up slopes. If you have water or find water wet yourself.





If you think that you are not going to outrun a fire before it reaches you or find a place of safety start a back burn and take shelter in the section that burns. Initiate the burn in an area where there is a relatively low fuel load.   Make sure you burn into the wind. Pick branches to be used as beaters to control the back burn. This is illustrated below. Click on button to start.



Lightning

Lightning – an awesome demonstration of the power of the Almighty! It is enough to make the bravest man quiver in his boots with fear and is a very real threat to life.

What is lightning?

Basically lightning is an electrical discharge between clouds or between the ground and clouds. Lightning can arc from the clouds to the earth and in the opposite direction as well. As air, dust and water molecules rub past each other in the turbulent maelstrom of a cloud, friction between the particles builds up static electricity which, once it reaches a certain thresholds will arc between two points of potential difference. The heating of the air caused by the electric arc produces an explosive sound we refer to as thunder.

Lets look at some of the awesome facts about lightning which will substantiate the awe and respect most people have for it and justifiably so.

- Thousands of bush and forest fires are caused by lightning.
- Most lightning strikes occur at the beginning or end of a storm.

Lets look at some of the awesome facts about lightning which will substantiate the awe and respect most people have for it and justifiably so.

- Lightning can reach a temperature of more than 30 000^{0}C which is four times hotter than the surface of the sun!
- The voltage in a cloud to ground strike can be in the order of 100 million to a billion volts at 100 000 Amperes !
- The distance over which a cloud to ground lightning channel can arc is from 3,2 – 16km long with the average being in the order of 9,5 km.
- There are approximately 8 640 000 lightning strikes around the world per day which is about 100 strikes per second.
- Lightning is the number one cause of storm related deaths and is the most dangerous and frequently encountered weather hazard.
- 20% of all victims die from the strike and 70% of all survivors suffer serious long-term effects.

A thunderstorm is rain or hail accompanied by thunder and lightning and strong, gusting winds. Thunderstorms usually develop when there is sufficient heating of air near the earth's surface which rises in a very unstable atmosphere. Thunderstorms are a violent example of atmospheric convection, with uplift and cooling of air, and subsequent cloud formation. As the cloud forms, water vapour changes to liquid and/or frozen cloud particles. This results in a large release of heat that takes over as the principal source of energy for the developing cloud. Once the cloud starts to form by other forces, this release of heat helps keep it growing. The cloud particles grow by colliding and combining with each other, forming rain, snow, and hail.

When the droplets become heavy enough to fall against the updraft, precipitation begins, which may be short-lived but very heavy. Having reached its final stage of growth, the towering cumulonimbus cloud may be several miles wide and often 10,000 meters or more in height. High level winds shear the cloud top into the familiar anvil shape. When the sun illuminates these cloud towers, they appear as huge white mountains and when moving several abreast they may form a squall line .

Once precipitation begins the updraft which initiated the cloud's growth weakens and is joined by a downdraft generated by the precipitation. This updraft-downdraft couplet constitutes a single storm "cell". On the ground the updrafts and downdrafts of air are felt as rapid gusts of wind. Most storms are composed of several cells that form, survive for about half an hour, and then die. New cells may replace old ones, and it is possible for some storms to continue for several hours.

Lightning always accompanies the thunderstorm. Lightning arises from a discharge of electrical energy which has built up within the cumulonimbus cloud as a result of repeated separation and splitting of water and ice particles in the turbulent conditions that prevail. Although air is a fairly good insulator, eventually the separation of electric charge becomes so great that the insulation breaks down and a lightning strike results. Lightning discharge may occur entirely within the cumulonimbus cloud or between the cloud and the ground. The lightning strike causes a rapid heating of the surrounding air, resulting in a sudden expansion and contraction of air that is heard as thunder.

Close to the lightning strike the thunder may be heard as a short loud crack.

Further away, the thunder rumbles or echoes, because sound from different parts of the lightning strike are not all heard at the same time. One can work out how far away the lightning strike was by counting the time taken for the thunder to arrive. A 5 seconds difference is roughly equal to a distance of 1,6km. An approaching thunderstorm is usually characterized by a drop in barometric pressure, sultry heat and still air initially and is followed by cooling air and strong gusting winds. Large thunderstorms with the massive buildup of cumulonimbus cloud may even be seen from space .

On the left vertical buildup of massive cumulonimbus clouds heralds the approach of a thunderstorm which could in all likelihood be accompanied by dangerous lightning, heavy rain and hail. On the right an approaching squall.

Towering cumulonimbus clouds are associated with powerful thunderstorms accompanied by heavy rain, hail, wind, thunder and lightning…they are DANGEROUS!!

Lightning injuries are most common in areas of frequent thunderstorm activity. There are no really accurate reporting methods of lightning caused injuries or deaths even in the most advanced countries. Lightning does not, as a rule, enter the body, but flashes over the exterior.

Some of the charge may however leak into the body via eyes, mouth or ears. Burns are usually superficial and generally caused by the heating up of objects in contact with the skin such as jewelry, wristwatches, and belt buckles. Severe burns caused by lightning are uncommon but serious when they do occur. Clothing can be literally blasted from the body. The symptoms of lightning associated injuries is discussed below:

MINOR TRAUMA

Temporary deafness
Temporary blindness
Temporary loss of memory
Rupture of the eardrum
Confusion.
Numbness in the extremities.

Prognosis: victims generally recover but some may have some significant and long lasting after effects.

Treatment: monitor breathing and heart function. Rescue breathing or CPR is often necessary and is the priority. Burns can be treated, if present, once heart and respiratory function have been stabilized.

Burns can be treated by cooling them off in cold running water and then covering them with a sterile dressing. An excellent product called Burnshield, consisting of a cooling, antibacterial gel impregnated into gauze material, can be applied directly onto burns. If the patient is unconscious but breathing they must be placed into the recovery position.

SERIOUS TRAUMA

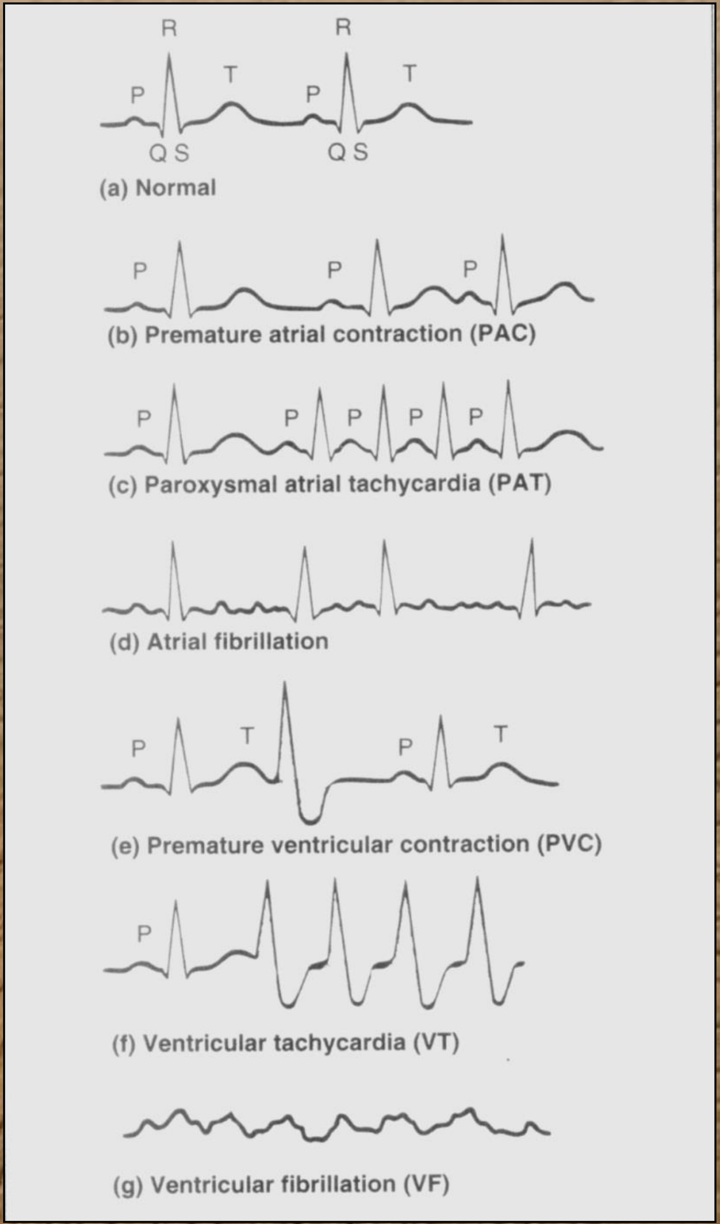
Burns.
Cardiopulmonary arrest.
Direct brain damage.
Blunt trauma to the brain.
Blunt trauma to internal organs.

Prognosis: The chances of recovery are poor. Cardiopulmonary arrest (the victims stops breathing and the heart stops beating) is most often the primary event and the most life threatening. In certain animal studies it has been shown that respiratory arrest is prolonged and leads to secondary hypoxic (lack of oxygen) cardiac arrest. Neurological symptoms are common but variable.

Blood pressure instability and cardiac arrythmias can last for several days in patients on supportive therapy. Arrythmias are abnormal heart rhythms would can lead to heart failure Types of arrythmias which can be induced by lightning are shown in Figure 1). If the heart goes into atrial or ventricular fibrillation a defibrillator will be required to restore normal heart rhythm. A sharp blow to the sternum prior to commencing CPR can sometimes help (in the absence of a defibrillator) to restore regular heartbeat. Burns are usually superficial. If they are deep however this is an indication of electrical passage through the body and carry a poor prognosis. “Feathering” burns are due to an intense shower of electrons across the skin from the lightning strike.

Treatment: Immediate CPR is required as heart and respiratory function will have stopped. Always begin evaluation of a lightning strike victim with the ABC of first aid giving priority attention to an open airway, breathing and heart function. In serious lightning trauma the victim might also have to be treated for burns, fractures / dislocations (caused by falling or intense muscle contractions), and blunt trauma to the head or internal organs when the victim is hurled against objects by the force of the shock wave.

There are several mechanisms of lightning injury. The most severe is a direct strike, either on the victim or on some object the victim is holding such as a golf club, rifle, tripod or umbrella.



A “side flash” occurs when lightning hits a nearby object and jumps to the victim. Ground current injures the victim when lightning strikes the ground nearby and it spreads to the person. Rarely, people maybe injured or killed indoors while using the telephone or taking a shower. Burns may occur from jewelry, clothing or other heated material. Finally, blunt injury and trauma may occur secondary to the shock wave from a lightning strike or from a resulting fall.

Lightning injury differs from commercial high-voltage electric injury in several important ways:

- Duration of current flow in lightning injuries usually is brief (much less than 1 second), while it is often prolonged for several minutes in alternating commercial electric current injury.
- Lightning is direct current; most commercial electrical current is alternating.
- Lightning produces a significantly greater temperature and current than high-voltage electricity; however, duration of contact influences the type and severity of injury to a larger extent than current strength.
- Lightning injury often has a component of flashover, which diverts current around the body rather than through it; commercial electric injury does not. Consequently, myoglobinuria, renal failure, and compartment syndrome occur much more rarely from lightning injury than from commercial electric injury.

- Lightning also has a shock wave component that can cause injury; this usually is not a factor in commercial electric injury.

As lightning follows the shortest route between contact points of the human body, it may involve vital structures in its path. Almost every organ system is vulnerable.

Cardiovascular and respiratory effects
Lightning can affect all organ systems, especially the cardiovascular system. The primary cause of death following lighting strike is cardiopulmonary arrest. Changes in the heart rhythm (asystole or heart stoppage) may occur, but the heart will usually quickly resume its normal rhythm. ECG abnormalities are common but generally resolve. A paralysis of the respiratory center is more common and can last much longer than the stoppage of the heart. If artificial respiration is not immediately initiated, the person will die of hypoxia or lack of oxygen. Vascular instability is another type of lightning injury which results in cold, pulse less and mottled extremities. This condition usually resolves over several hours.

Central and peripheral nervous system

Central nervous system injuries are common. Transient confusion, paralysis and amnesia are likely. Coagulation of the brain, subdural haematomas or collections of blood surrounding the brain, and bleeding within the brain are possible with direct strikes. Swelling of the brain is another outcome. There may be global brain damage and neurologic devastation secondary to anoxic brain injury if respiratory arrest is not immediately treated. Paresthesias (pins and needles sensations) may affect areas of the victim's body. Possible chronic sequelae include amnesia, movement disorders, dementia and decreased reflexes. Paraplegia can be secondary to brain or spinal cord injury from lightning strikes. There may also be neuropsychiatric complications such as depression, anxiety, memory deficits, and post-traumatic stress disorder.

Dermatologic effects

Burns are another possible effect of lightning. Most lightning burn victims have first or second degree burns. Third degree or full-thickness burns are much less common but can occur associated with metal objects such as jewelry. Lighting can also produce a reddish-brown feathery skin lesion which disappears in a few days.

An interesting phenomenon termed flashover may protect victims from the damaging effects of lightning. Because electric current normally travels along the outside of a metal conductor, most lightning energy actually may be conducted around the outside of the victim's body, vaporizing moisture on the skin and blasting apart clothes and shoes. This dissipation of electric energy in flashover produces less injury than would similar levels of electric current flowing directly through the body. When current does enter the body, it passes through tissues with the least resistance. Nerves, blood vessels, muscle, and connective tissue have high fluid and electrolyte content and are affected most commonly.

Factors that appear related to a fatal outcome are leg and head burns and immediate cardiopulmonary arrest.

Ophthalmic (eye) and otologic (hearing) effects
About one half of all lightning victims will have some type of eye damage, usually corneal injury. The most common serious eye injuries are cataracts which can occur from a few days to several years after the lightning strike

Other eye injuries include retinal bleeding, retinal detachment and optic nerve degeneration. There may also be transient autonomic nerve disturbances which can result in dilated or contracted pupils even without concurrent head injury. The ears are also commonly affected with over 50% of lightning victims having ruptured ear drums. Transient hearing loss and tinnitus (ringing in the ears) affect most survivors of lightning strikes. Chronic ear infections and partial hearing loss occur in 47% of patients with initial ear injury. Vertigo or dizziness has also been reported.

Musculoskeletal effects

The victim of lightning strike may have injury either directly from the lightning strike or from being thrown by the blast. Blunt trauma occurs when a person is thrown by a massive opisthotonic (muscle contraction) contraction caused by the lightning strike.

Contusions and fractures may occur along with muscle and ligament tears. In rare cases, a compartment syndrome or swelling within section of an extremity may result from lightning damage requiring a surgical release to prevent further tissue destruction.

Post-lightning trauma treatment

The main cause of death is cardiopulmonary arrest. Most victims survive if they receive prompt cardiopulmonary resuscitation. If a group of persons are victims of a lightning strike, those that appear “dead” should be immediately attended and CPR begun. The person who is moving around or screaming will almost always survive and should not require immediate attention if there are others who are lying motionless and appear dead. CPR should be started on those not breathing or without a pulse before an ambulance is called. After a lightning strike, the heart will often resume beating while the respiratory drive will be paralyzed for hours. Prompt CPR may prevent secondary hypoxia, brain damage and death. Artificial or assisted ventilation may need to be continued for hours but can result in a good outcome. It should be noted that the presence of dilated pupils should not be used as an indication of brain damage because these findings can be induced by the lighting strike without head injury. The victim should also be kept immobilized if not in immediate danger because of the possibility of cervical spinal injury. Finally, lightning victims do not carry an electrical charge and can be touched immediately following a strike.

Precautions

Lightning can never be prevented but you can reduce the chances of being struck by taking the following precautions:

- Don't be near the tallest object in the area – move away from tall solitary trees, towers or any tall structure – especially power lines. In flat areas which do not have any tall objects don't make yourself the tallest feature!

- Get off high ground like ridgelines and mountain tops – search for low ground, ditches or trenches. If they are water filled take cover in shrubbery or trees of uniform height in low lying areas.

- Avoid open spaces.

- Stay away from metal fences and other metallic objects. Lightning can hit a fence a long way from you, travel along the fence and then into you if you are touching the fence. Remove any metal objects from your person such as rings, bracelets, wristwatches etc.

- If you are in a group do not huddle together. Leave a space of at least ten meters between each other.

- Avoid metal shelters. If golfing, put the clubs down and get off the course.
- Sheltering in a vehicle with windows closed is a good option. Keep your hands in your lap.
- Remember that a storm as far as 60km away can still reach you with a lightning strike.
- Stay off all bodies of water in thunderstorm conditions.
- Stay out of the bath and shower.
- Remember that lightning can be transmitted through fence lines, telephone lines, power lines, tree roots, TV aerials and lines, computers, concrete and steel reinforcement rods. In severe storms stay away from electrical appliances and telephones.
- Return to your vehicle or camp – preferably before the storm reaches you.

Risk categories

- 85% of all lightning casualties are children and younger people falling in the age group 10 – 35 who are engaged in outdoor recreation and work activities.
- Lightning in remote terrain creates dangerous conditions. Hikers, campers, backpackers, hunters and fishermen are particularly prone.
- 70% of all lightning caused fatalities and injuries occur in the afternoon.
- Golfers and other sports players who are out in the open at the time of a thunderstorm run a high risk of being struck by lightning.

The dangers of extreme weather

Extreme weather, natural disasters and associated phenomena are the cause of many deaths around the world each year.

The fact remains that as humans we can only survive within a fairly narrow range of tolerance. Regulation of body temperature becomes impaired or even lost when body temperature falls below 28^0C or rises above 41^0C. Consider then a heat wave when ambient temperature is above body temperature of 37^0C. The individual has to use outside means to keep body temperature from rising – sitting in cooler shade, fanning oneself or immersing oneself in cooler water, drinking cold fluids etc. If these means of artificial cooling are absent, body temperature can rise to lethal levels. The reverse is also true for in cold, frigid weather, the individual, without adequate clothing, shelter, food and water intake can soon become a victim of exposure and hypothermia.

Understanding weather and having an appreciation for the power of nature when it unleashed, is something every person should cultivate for, personal survival, when subjected to these natural forces, can become extremely difficult if one is not equipped with the right kind of knowledge to prepare for and deal with the harsh realities of weather extremes and natural disasters.

Outdoor and overland travelers, rock climbers, mountaineers, hikers, guides, hunters, campers rangers, foresters and all those, who on a regular, or, for that matter, infrequent basis expose themselves to the elements would be wise to study up on weather and how to predict it . Being aware of impending changes in the weather enables the wise traveler to be prepared. Being prepared can make all the difference of surviving in relative comfort or not surviving at all.

Normal body temperature is 37^0C. The range of body temperature compatible with survival is 25 – 44^0C (about 76 – 112^0 F). However when temperature falls to 28^0C (about 83^0F) or increases to 41^0C (106^0F) the ability for the body to control temperature is lost and external methods must be employed to help restore body temperature to normal.

Exposure to extremes of temperature can be lethal . Extreme cold – temperatures below minus 50^0C – make survival difficult without adequate clothing shelter, hot food and hot drinks. This soldier in Stalingrad understands the enemy of cold.

Surviving in the cold

The following steps can be taken to surviving extremely cold conditions:

- Dress in layers – this traps heat and insulates you better.
- Avoid depressions and low lying areas as cold air sinks – move to higher ground.
- Make a fire and ensure that you have enough firewood to last the night.
- If your clothes are wet get out of them – especially if there is a wind blowing. Put on dry clothes (if you have them). Dry wet clothes over a fire.
- Drink warm fluids and hot food if possible.
- Keep moving to stay warm.
- Massage your extremities to improve circulation.
- Huddle together with a companion (if you have one) to share body heat.
- Try and find shelter – a thick bushy / grassy area / cave / old hut where you can get out of the wind. Remember that wind effectively increases the cold – this is known as the "wind chill factor".

Surviving in the heat

If the ambient temperature goes up into the high thirties or low fourties you must take precautions against getting heat exhaustion or heat stroke which could be fatal. Take the following precautions to survive the heat:

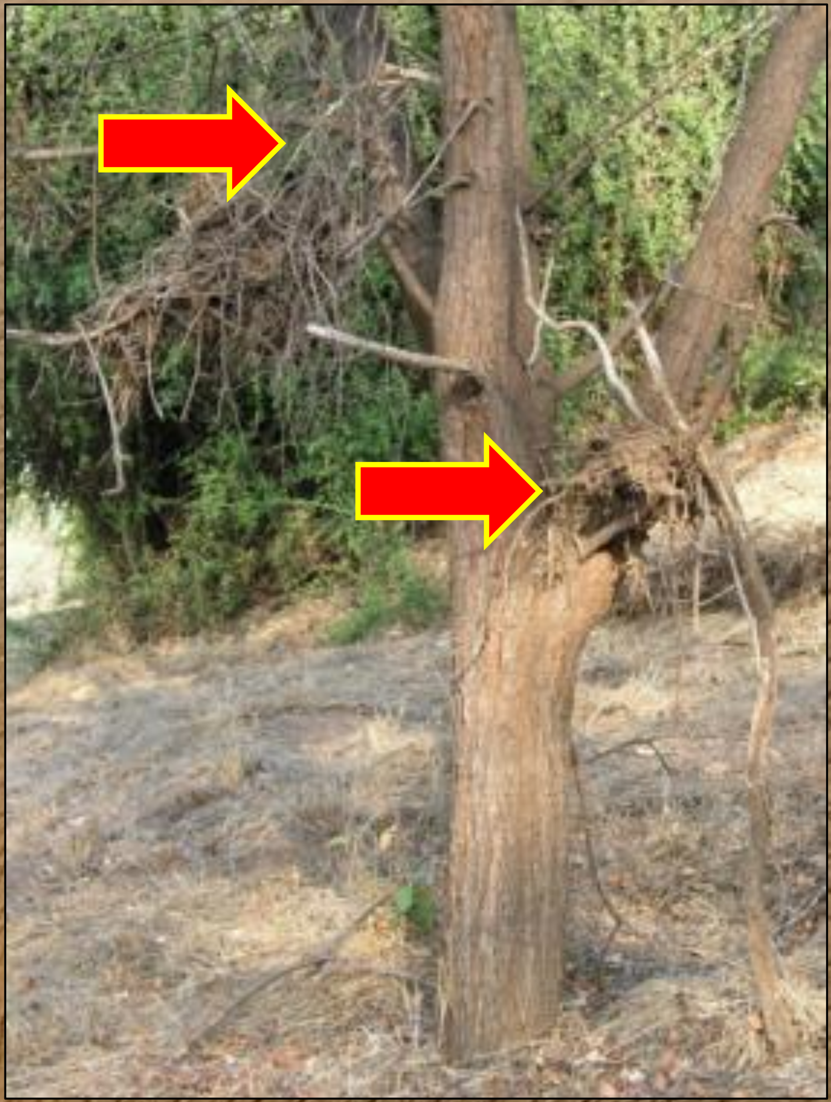
- Confine activities to cooler hours of the day
- Stick to the shade and rest in areas where you expose yourself to cool breezes.
- Drink lots of water or fruit juices. Tea, coffee and alcohol are diuretics, they increase your urine output and can speed up dehydration.
- Wear light clothing which covers your body. Exposing bare skin to sunlight can cause sunburn and cause you to overheat.
- Wear a hat to keep the sun off your head.
- If you are active rest frequently.

Floods

Floods are usually caused by torrential downpours of rain. They can turn dry riverbeds into raging torrents literally within minutes. Floods can also be caused by dam walls or levee's breaking.

If you are in the bush and see large storm clouds in the distance, see lightning and hear thunder or if you find yourself in a heavy rainstorm the most important thing to do is to move out of drainage lines (dry riverbeds, small streams, dongas etc.) and get to higher ground.

It is also unwise to camp too close to drainage lines, as a storm (not even close to you) can dump millions of cubic meters of water into a catchment area and flood all the drainage lines within hours. In the photo on the right you can see where flotsam has been deposited in a tree indicating a flood level of well over 5 meters.



Unless there is a life threatening and extreme emergency justifying you doing so do not attempt to cross a flooded river. If you absolutely have to then use the river crossing techniques described elsewhere in this CD.

Attempting to cross a flooded river by vehicle if the level of the water is greater than half the depth of the tyres (i.e. hub depth) is also extremely hazardous.

Using knife and axe

Knifecraft

A good knife is one the most useful “bush and survival tools”. Its usefulness is, by and large, determined by the user and his skill in the maintenance and use of it. A knife is also a dangerous weapon and can inflict serious injury both on the user and on others if safe practices are not adhered to. In this series on “Knifecraft for the bushman” we will look at a number of aspects dealing with knives such as the choice of a good knife, how to sharpen and maintain a knife, how to use a knife safely and effectively.

Knives are one of the oldest tools known to mankind. The earliest knives were made from hard rock (flint) such as obsidian by the process of “flintknapping” or “percussive flaking” whereby slivers of rock were flaked off using other rocks or antlers. Sometimes the small pieces flaked off were also used as tools. A very sharp edge could be obtained on the right type of material and were used as scrapers, for skinning and for self protection. The same basic technique was used for making arrow and spear points

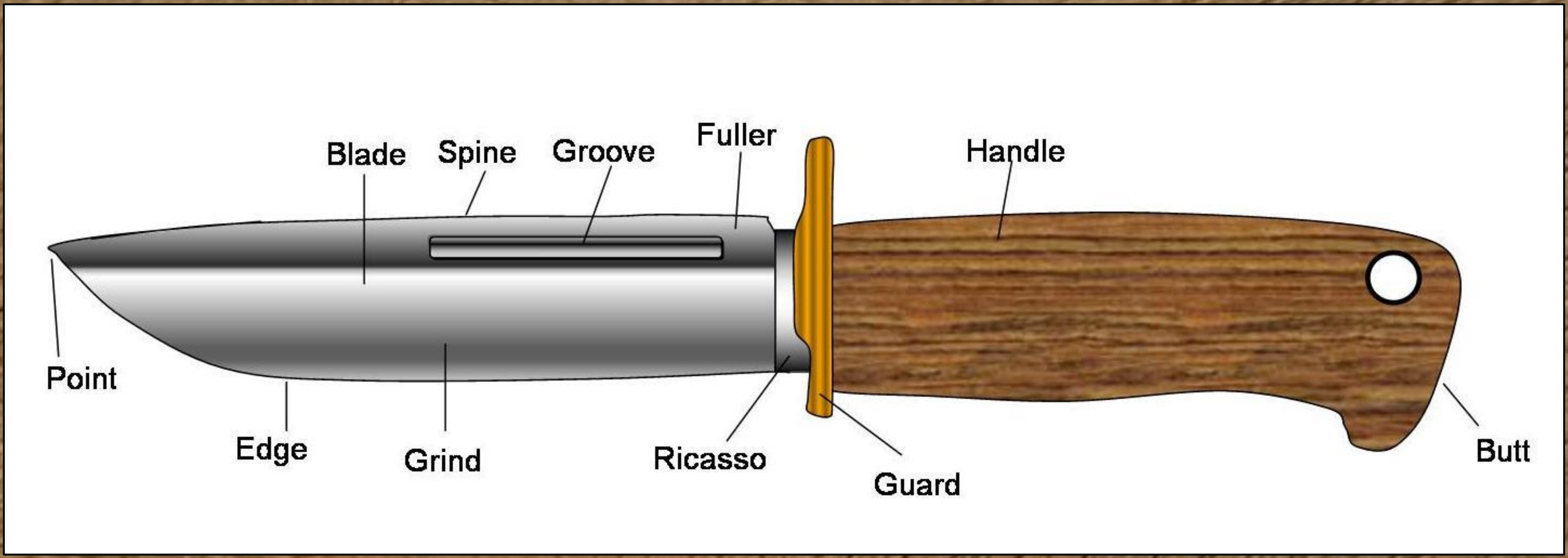
With advances in metallurgy, stone and bone knives were gradually replaced by a succession of blades made from copper, bronze, iron and ultimately steel

There are many different knives for different purposes. There are knives designed, for example, for skinning, for throwing, for self defence or combat, for survival and for general use.

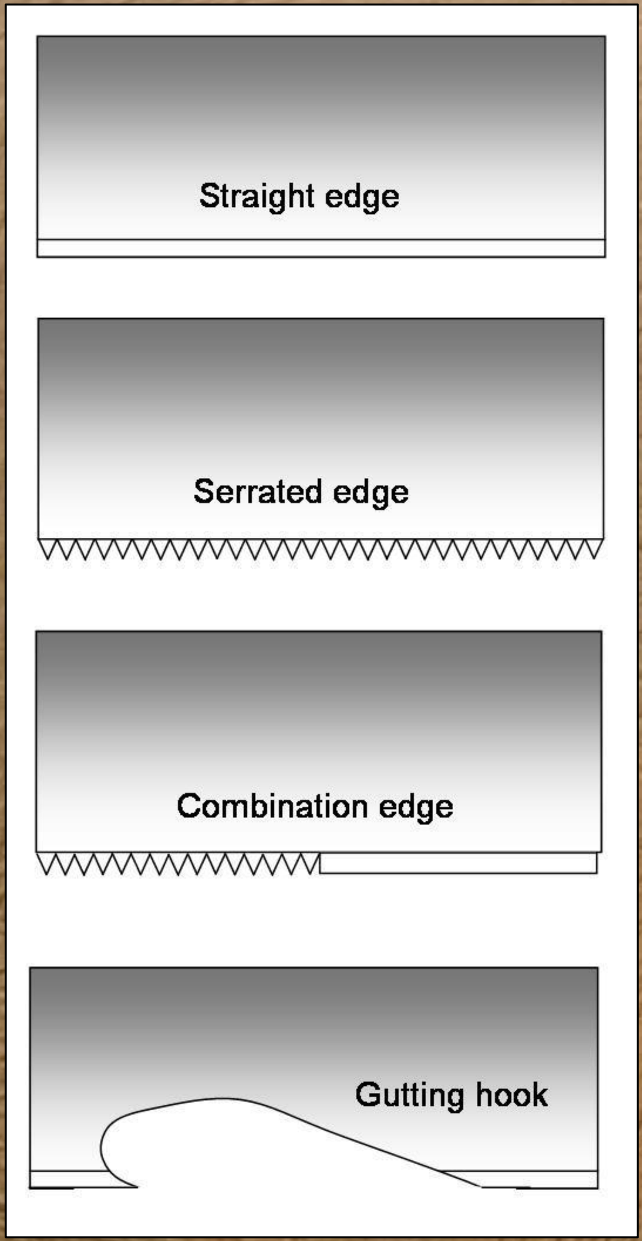
Before we depart on the journey of learning about knifecraft it is a good idea to familiarize ourselves with the different parts of a modern knife.

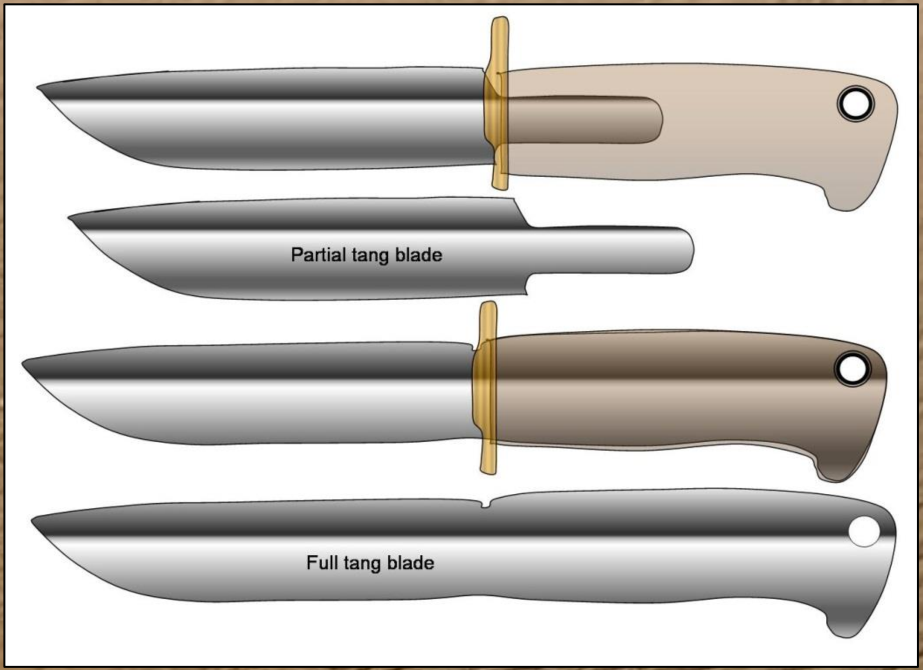
The blade edge may be straight or serrated or have a combination of straight and serrated and may even include a gutting hook. The tang may extend partly into the knife handle or all the way through. The latter is generally a stronger design.

As a guideline a general purpose bush knife should have a blade at least as long as the width of the palm. You are looking at a blade length of about 10 cm. A blade that is too short limits its usefulness and a blade that is too long becomes unwieldy and difficult to work with – especially for finer or more delicate jobs.



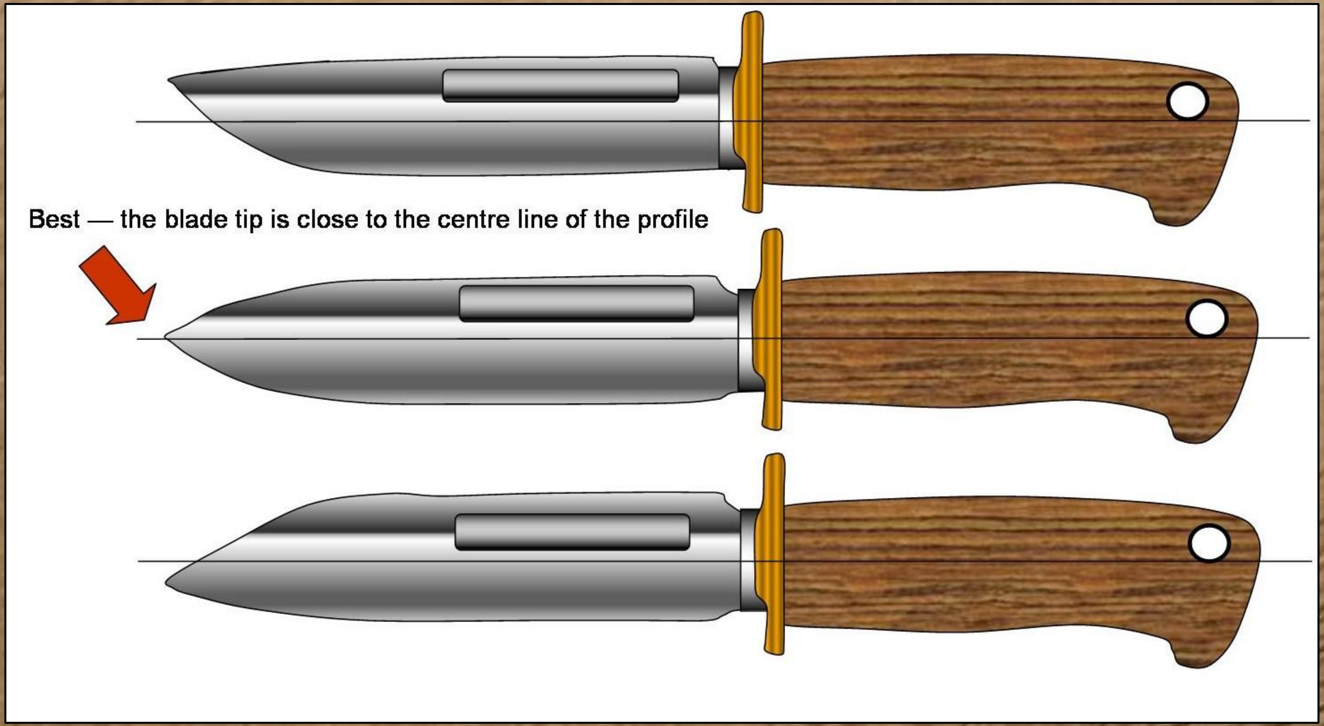
Parts of a knife





Types of blade edges (left) and tangs (above).

A general purpose bush knife should have the blade tip close to the profile centre line of the handle and should have a sturdy (thick) spine that can be hammered on if necessary.

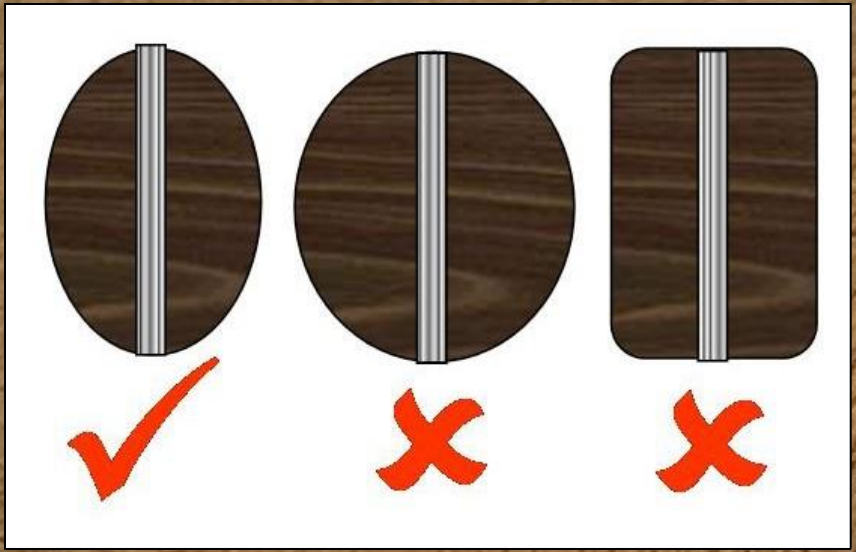


A double edged blade is not a good option for a general purpose bush knife as it limits its uses.

Your bush knife should have a blade of good quality carbon steel with a width of 2, 5 – 3 cm and thickness of 2,5 – 3 mm. Blades with these dimensions are lightweight yet do not break easily. The steel should be soft enough to be easily sharpened to a shaving edge with common sharpening tools yet hard enough to not allow the edge to dull too quickly.

Knife makers whose blades are made with these characteristics include, amongst others, Solingen (from Germany), Mora (from Sweden) and Sheffield (from England). Remember that the stainless steel blades have the advantage of not rusting easily but have the disadvantage of not being able to be used in the flint and steel fire lighting method that is possible with an ordinary carbon blade.

The best cross section shape of the handle is one that is oval. A round handle is more difficult to grip and a handle with square edges will quickly cause blisters.



Skinning knives

One critical issue is the strength of a knife which is non-negotiable.

A knife without a guard allows it to be deeply and safely seated in a sheath.

The knife handle should be about as long as the breadth of your palm. Slightly longer is better than shorter as you must be able to get a good and firm grip on the knife handle. It should also be thick enough to fill your palm when the hand is closed. A handle that is too thin or too thick causes blisters quickly and also results in hand fatigue. An oval cross section for the handle is preferable to a rectangular or round shape. The oval shape gives a good indication of the direction of the cutting edge and results in fewer blisters when compared to handles with rounded or angular corners.

A guard on a general purpose bush knife can be more of a hindrance than a help as it is in the way and limits the knife's uses as it gets in the way. It also prevents it being seated deeply in a sheath. Some people prefer to have one as they are afraid that the hand will slip forward resulting in injury. Unless the knife is used for stabbing this is unlikely to happen. This however is a matter of preference for the individual to decide.

Top row: Fixed blade knives
Middle row: Folding / locking blade knives
Bottom row: Utility multi-tool knives

A knife with a variety of folding blades which lock into place
is an extremely valuable survival tool.

Knife safety

It goes without saying that knives are potentially deadly weapons and can inflict serious or fatal injury either by accident or by design. Many accidents caused with knives are caused through recklessness or ineptness and a good bushman should learn how to use knives safely and effectively. The hands (see Figure 1), upper legs and abdomen are the parts of the body most commonly injured during knife accidents and usually occur when the object being worked on with the knife or the knife itself slips and cuts or impales itself into a body part. In a hunting or survival situation a knife inflicted injury can have serious consequences.

Some basic rules to apply when working with a knife include the following:

Always, if practically possibly try and work with a clean knife and clean hands. In the event of an accidental cut there is less chance of the wound becoming infected.

Don’t run with a knife that’s blade is exposed.

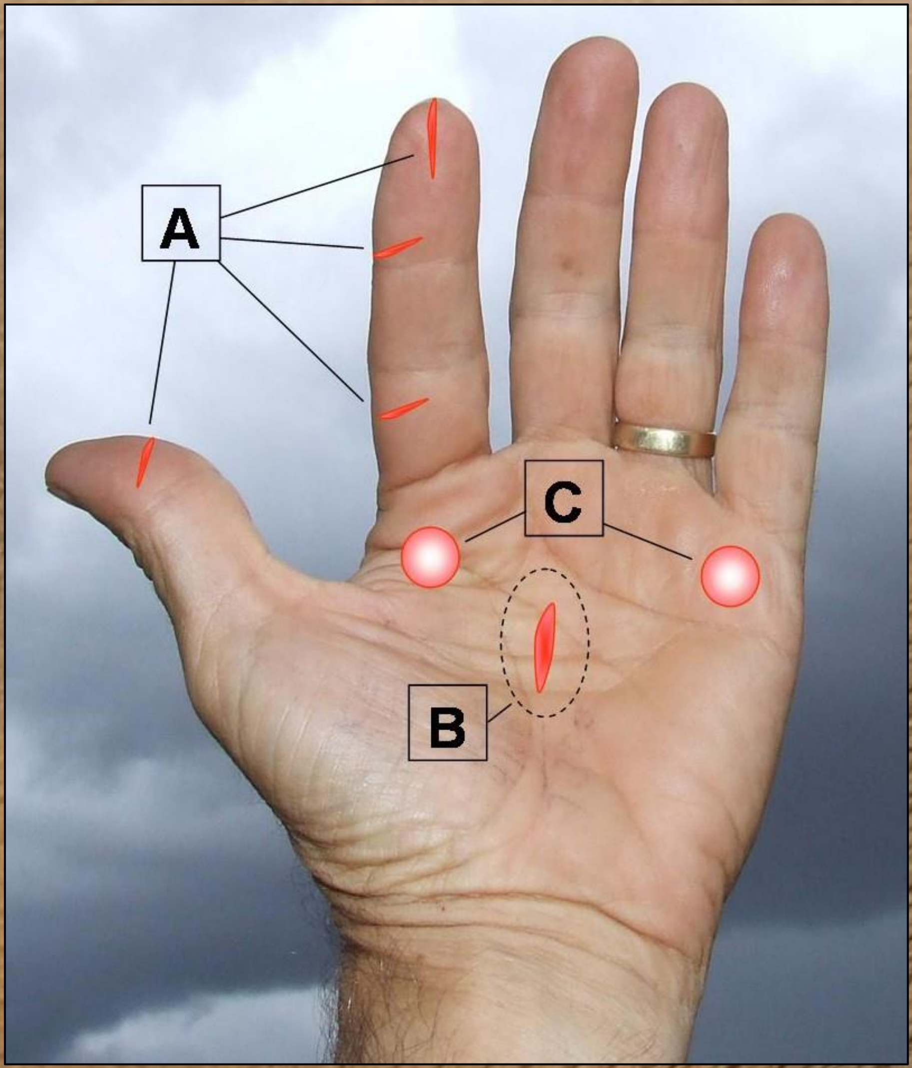
Always try and work in such a way that knife strokes are directed away from your body.

Don’t play the fool with knives.

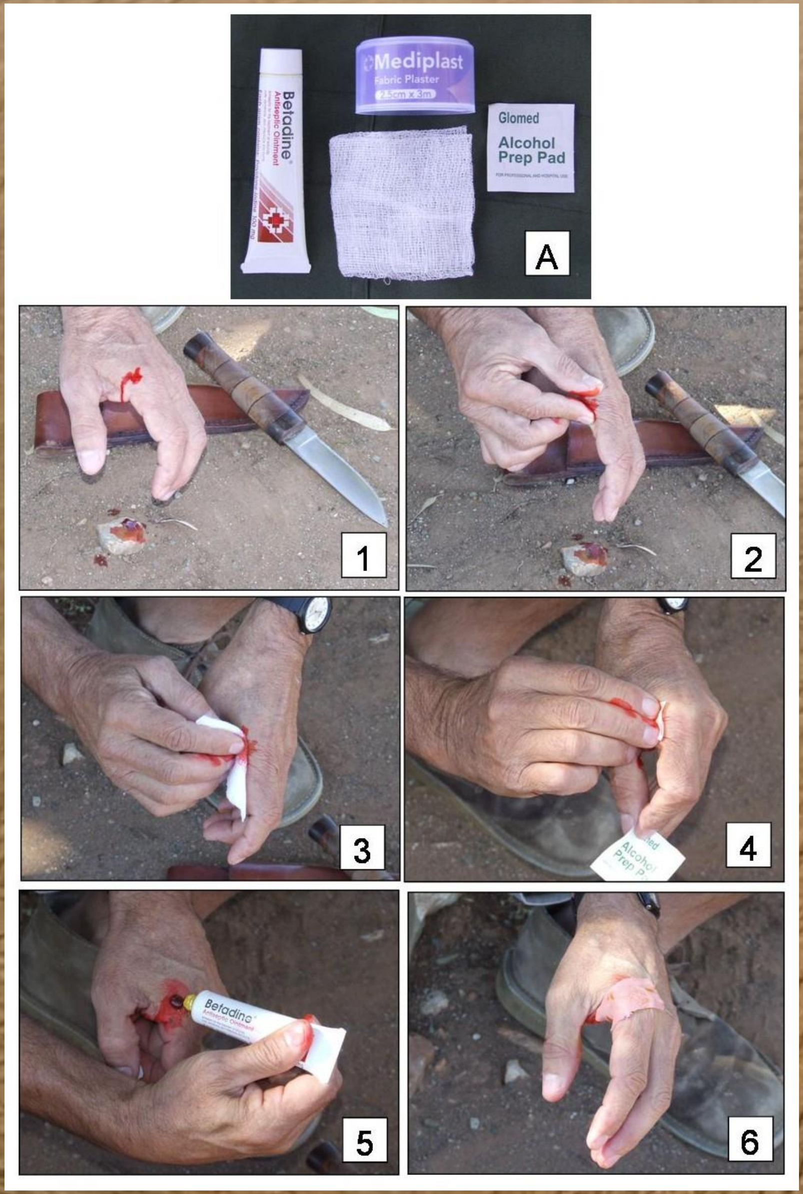
Always have a first aid kit handy.

Accidental knife injuries usually result in one of two types of cuts – a slice or a puncture wound. A slice is when a flap of skin is cut and a puncture is when the point of the knife imbeds itself. If you cut yourself allow the wound to bleed freely for 5-10 seconds to help flush out any contaminating matter. Don't suck the wound as your mouth is full of bacteria. Now apply firm pressure to the wound with a first aid dressing, a clean handkerchief or if you have nothing else your fingers. If you have clean water or an antiseptic such as Betadiene you can clean and disinfect the wound. If you have neither antiseptic nor clean water then apply an adhesive dressing and have the cut cleaned and disinfected at the earliest opportunity by someone qualified to do so. If you imbed a knife into your hand or leg don't remove it. Strap it in place as it acts as a plug. If you remove it severe bleeding may result. Get to a doctor or paramedic as soon as possible. If you do cut yourself accidentally with a knife then apply the basic first aid treatment as shown on the following page.

Working safely – cutting down small trees with a knife.
If you need to cut down a small green tree, up to wrist thickness, to use for some purpose, bend the tree with one hand and then make a cut with the knife at a downwards angle of about 30-45^0. When the cut is almost through, hold the tree firmly as it becomes difficult to cut through if it breaks.



The hands are most often the site of accidental knife cuts or puncture wounds.



Basic first aid for knife cuts.
A: Always have a wound first aid kit handy.
1: Allow the cut to bleed freely for a few seconds.
2 and 3: Apply direct pressure with fingers or clean gauze.
4. Disinfect with an alcohol swab.
5. Apply antiseptic.
6. Close wound with an adhesive dressing.

Return to wounds

A tree of thicker diameter may have to be bent back and forth a few times before it can be held down with one hand for cutting.

Cutting small trees with a knife.

Working safely – “limbing” with a knife.

If you have to cut small limbs off a branch or tree trunk work safely by working from behind the branch as shown and use a short thick branch as a baton to either hammer down on the top of the blade or force the blade downward to cut / chop off the limb. The knife used with the baton must be sturdy enough to withstand abuse otherwise the blade might bend or break. Folding knives are usually not strong enough to be used in this fashion.

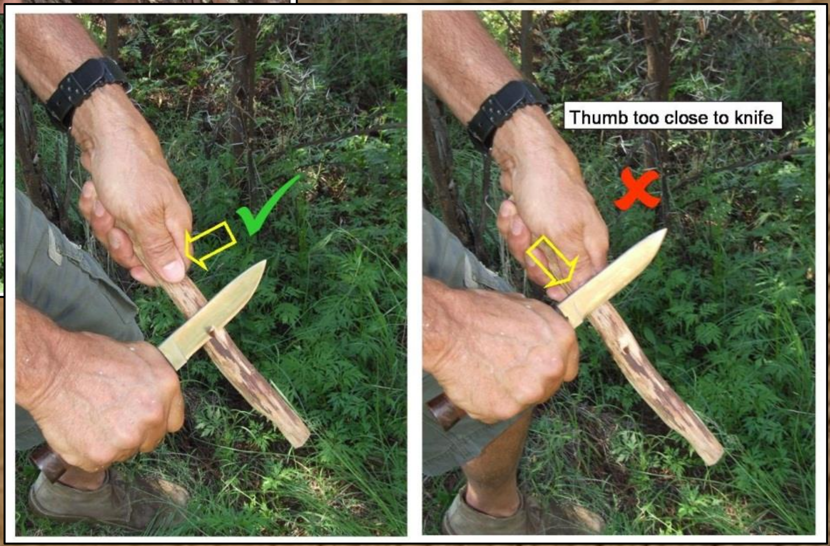
Working safely – cutting through a stick.

One technique for cutting through a stick is to carve a shallow channel circumferentially around it and then deepening the channel until it is about half to two thirds way through. It can then be easily broken by bending it and the ends trimmed neatly.

A deepening channel cut circumferentially around a small branch or stick makes it easy to break.

Working safely – peeling a stick.

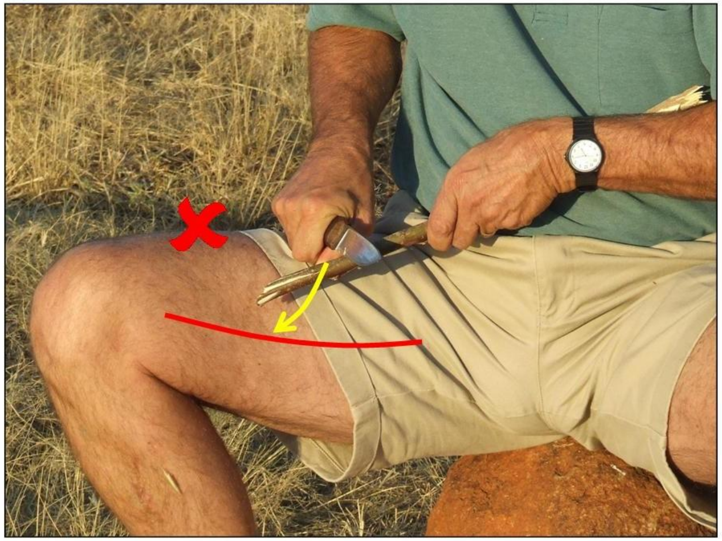
In the bush or in a survival situation the bushman may find it necessary to remove the outer bark from a stick to manufacture arrows or some other implement / tool.

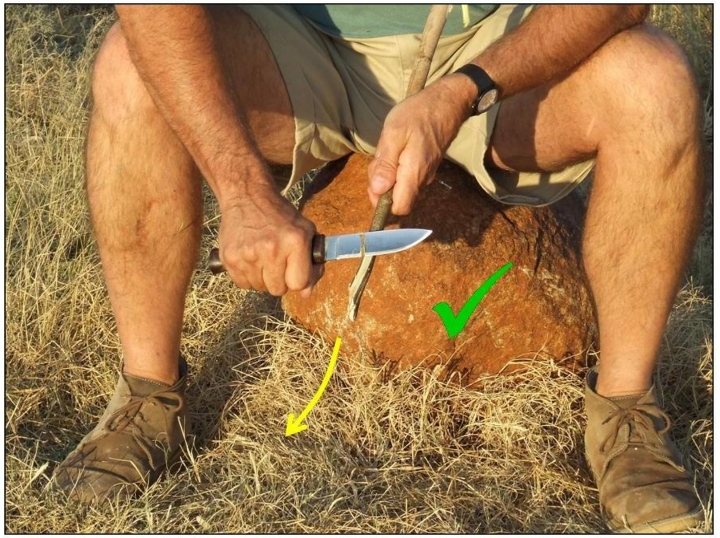


When peeling a stick keep the thumb away from the knife blade and direct strokes away from the body.

Peeled sticks dry out quicker and become lighter and tougher than unpeeled ones. Heavy knots may have to be removed and here again the baton becomes a useful accessory tool. Peelings are also useful tinder for making a fire. When peeling a stick keep the thumb well away from the knife blade and direct strokes safely away from the body. When sitting and peeling or carving a piece of wood make sure the blade is directed well away from the femoral artery which runs down the inside of the thigh. Severing this artery with a sharp knife could be fatal.

When sitting carving or shaving a piece of wood, make sure the blade strokes are directed well away from the legs. If the knife should slip in the above photo there is a danger of severing the femoral artery which is a potentially life threatening injury.





One thing about a blunt knife is that it is not too dangerous. On the other hand a blunt knife is not much use for survival or general purpose use. A razor sharp knife is a very dangerous weapon and whether used intentionally as such or by way of accident can be a lethal weapon.

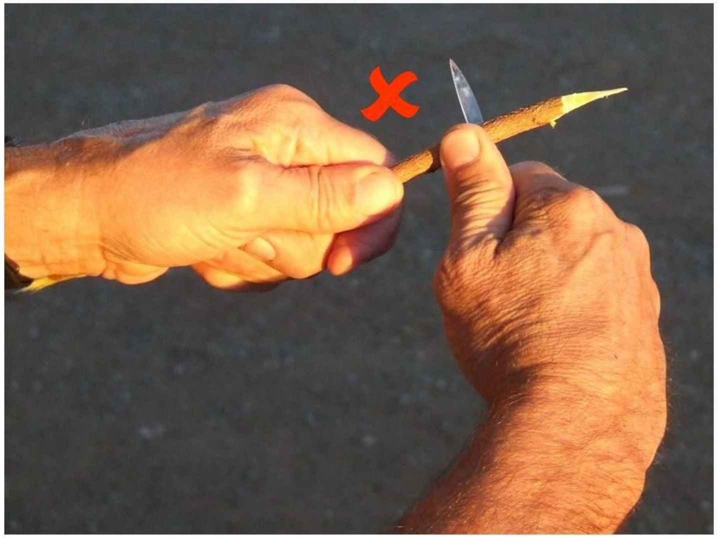
Injuries when using knives generally result from careless use. Some of the most dexterous people in the use of knives are butchers, cooks and housewives. You become dexterous with a knife by using it frequently and learning by your mistakes. Average city men seldom a use knife other than when eating. It is not surprising therefore that the average “Joe soap” urbanite who very occasionally goes hunting and hauls his hunting knife out of the safe at the same time as his trusty old .30 something which last saw the light of day the previous hunting season, cuts himself at some stage during the hunting trip.

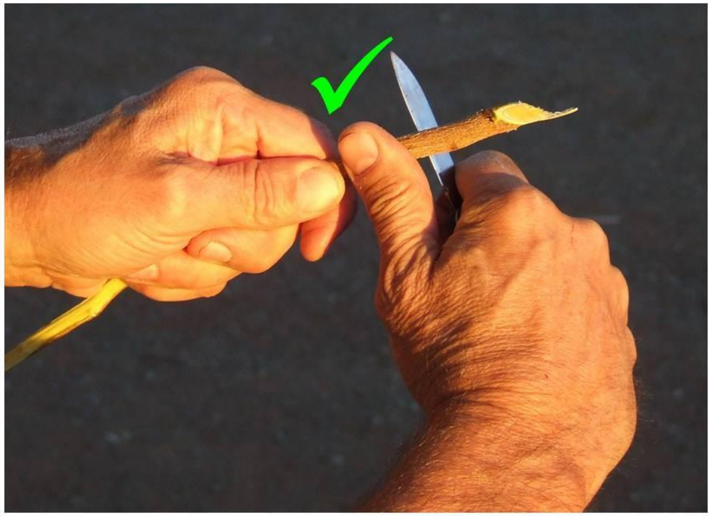
Thumbs and forefingers frequently end up bloody due to injudicious use of a knife. Using the point of a folding blade knife as a bore or awl commonly results in a cut to the forefinger when the knife folds back in on itself. If you wish to use a knife point to dig or gouge out a hole in a piece of wood don’t use a folding blade use a solid or locking blade

Another cause of injury is when cutting through an object (like a stick of biltong or a wooden stick) against the pressure of the thumb. If a sharp blade suddenly cuts through with your thumb directly behind it you can end up with a nasty cut. Rather position the thumb to one side of the blade so that if it suddenly passes through the object it will cut past your thumb.

Never run with an unsheathed knife blade - if you fall this can result in a serious or even fatal injury.
It is also not a good idea to hold an object which you are carving or gouging out in the palm of your hand as this could also result in a cut to the palm or fingers if the blade suddenly slips off the object you are working on.

Using the point of a folding blade knife as a bore or awl commonly results in a cut to the forefinger. A folding blade that can lock into position is a better option.





This is dangerous! If the knife slips it can cause a serious wound or cut off tendons

When cutting through a stick don't hold the thumb directly behind the knife blade

Knife sharpening

A blunt knife is a pretty useless tool and every bush man should know how to sharpen a knife and how to maintain it.

There is a misconception about knife sharpening. Some people think it is too difficult to attempt and don't even try and end up with knives so blunt that they can serve no useful purpose. Others think it is easy to sharpen a knife and without the know how make an attempt and end up with knives blunter than what they started out with. The truth of the matter is that given the correct knowledge and tools knife sharpening is fairly straight forward.

When it comes to knife sharpening we can learn the most from people who use knives on a daily basis such as chefs and butchers.

Types of steel

Steel, by definition is iron with a carbon content of less than 2%. There are a variety of alloying elements that are added to steels to impart certain characteristics as iron by itself is relatively soft, does not hold an edge well and has little resistance to bending.

Carbon combines with iron to form hard carbides and is the most vital hardening element. Any steel with a carbon content of more than 0.5% qualifies as a “high carbon” steel.

Chromium is added to iron to impart corrosion and wear resistance. A steel with a chromium content of 13% or more is considered “stainless”.

Manganese aids grain structure, increases hardness and improves resistance to wear.

Molybdenum prevents the steel from being brittle, increases hardness and makes the steel easier to machine.

Nickel adds toughness and contributes towards corrosion resistance.

Silicon increases hardness and strength.

Sulphur decreases toughness but improves machinability.

Tungsten increases wear, heat and shock resistance.

Vanadium refines the grain of the steel which contributes to toughness and allows a blade to take a very sharp edge.

There is an ongoing debate about whether carbon steels take a keener edge and hold it longer than stainless steel knives. Who’s right? Well it all depends on what the knives are used for. Carbon steels range from simple iron / carbon combinations to high alloy tool steels that hold their edges extremely well. Stainless steels vary from very soft to super stainless alloys. Carbon steel knives are easy to sharpen and take on an extremely keen edge whereas stainless steel knives are harder to sharpen but retain a sharp edge for longer than carbon steels.

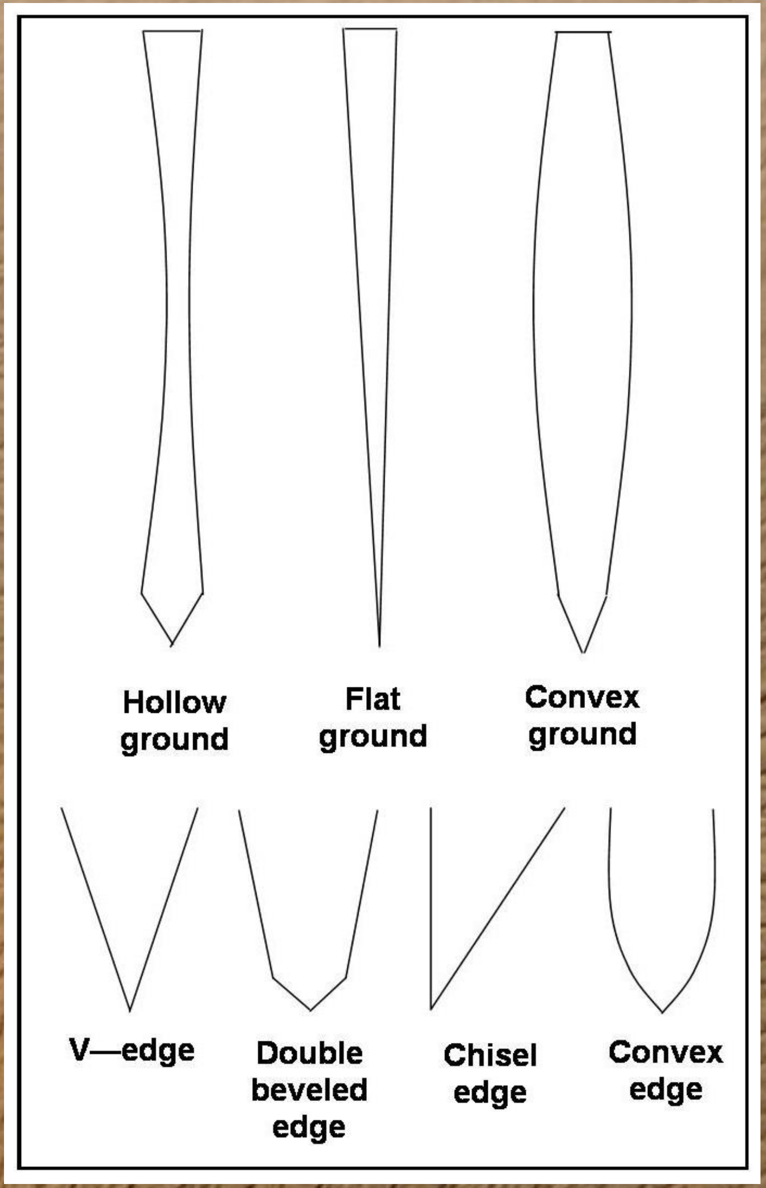
Edge basics

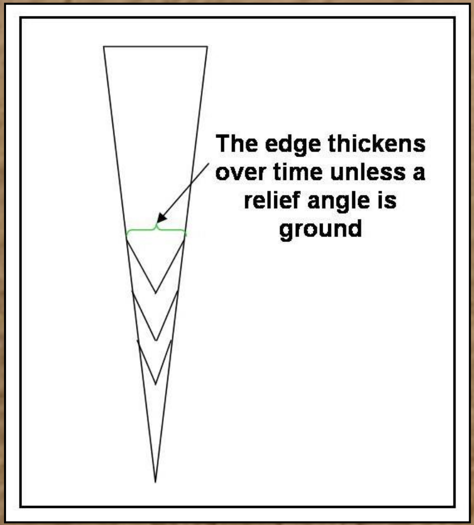
Knives may be flat ground, hollow ground or convex ground. Their edges may come in a variety of forms each one with a special application in mind. The purpose of a double bevel is to thin the metal behind the edge. The thinner the edge the greater the cutting ability. An edge that is too thin however is prone to damage so a smaller, more obtuse primary bevel is added to the very edge to give it strength to avoid impact damage, chipping or rolling over of the edge.

A back bevel also solves one of the problems found with “V” edges. The metal behind a standard “V” edge gets progressively thicker as the knife wears down and is resharpened over time. It does not cut well and becomes more difficult to sharpen. The answer is to grind the shoulders off the edge at an acute angle (i.e. add a back bevel) and then reestablish the primary bevel.

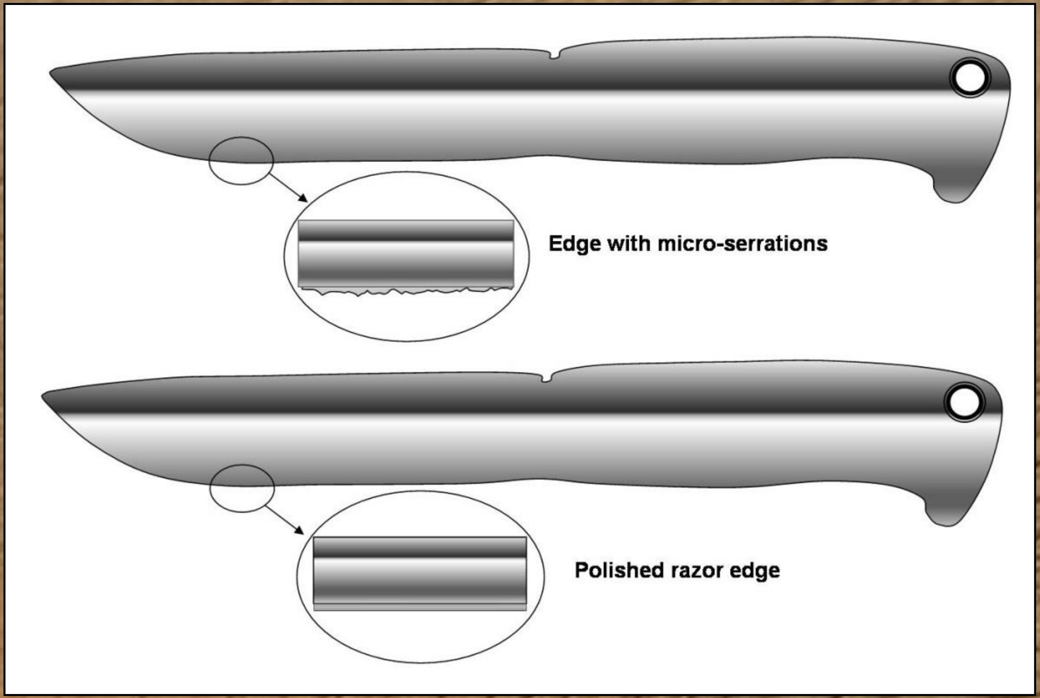
Chisel ground edge are ground only on the one side with the other flat and come in left and right versions. The edge can be extremely thin and sharp.

The convex shape consists of two intersecting arcs creating a very sharp edge with more metal behind it than the standard “V” edge.





There is also an ongoing debate on whether micro-serrations – microscopic teeth on the edge of the knife – are superior in cutting ability to a razor sharp polished edge



Some say that the small teeth of micro-serrations cut better whereas others say that the teeth are an indication of a dull blade.

The answer to this issue is depends on what our definition is of sharpness. Sharpness is a function of shape and intended purpose. You could grind your knife blade to be razor thin and it would be extremely sharp but it would not be very durable and it would crumble if you suddenly hit bone in a carcass you were cutting up.

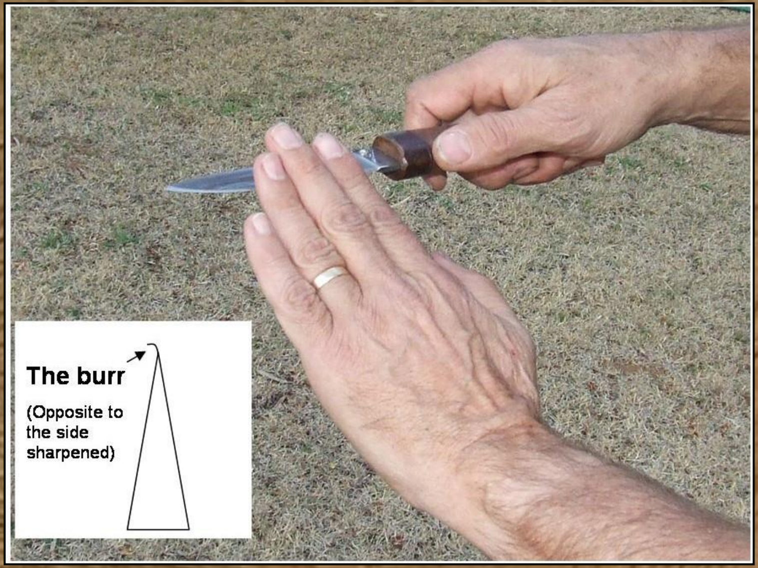
Your knife would be sharp but useless. Similarly a razor sharp but wedge thick edge may be good for splitting logs but not much good for filleting. The real question to ask is how sharp must my knife be to carry out specific tasks efficiently and still keep its edge. Some believe that thick edges (i.e. larger angles) last longer than thin edges. In practice this is not so. The thinner edge generally outlasts the thicker edge because it performs more efficiently. For maximum performance you want the edge as thin as possible and to do this you must lower the edge angle. The problem is that a thin edge is much more susceptible to damage because as it becomes thinner there is less material to support it and it degrades quickly. A knife with a polished razor edge is better at push cutting which involves parting fibres. Slicing however involves severing fibres and works better with micro-serrations. You must now decide whether you will do more push cutting or slicing and sharpen your knife accordingly.

Sharpening basics

Before beginning with actual sharpening it is good to know something about the burr, sharpening angles, abrasives, and consistency.

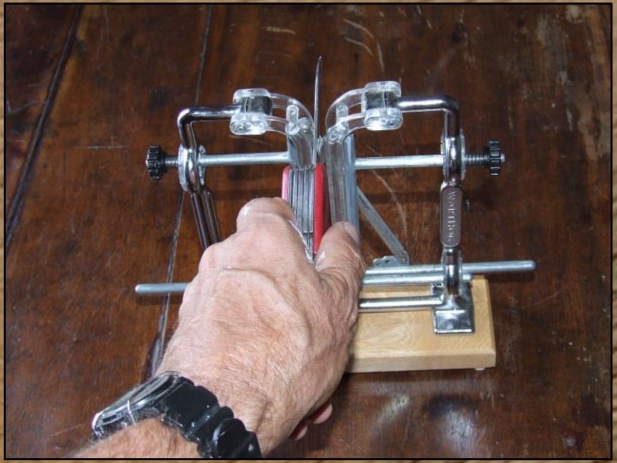
The burr

A burr is a tiny raised lip of metal that forms when one edge meets another and is the only way for confirming that you have fully ground an edge. When you grind one side it will eventually meet the opposite side and push up a curl of metal – the burr. If you stop sharpening before the burr is formed your knife will never be as sharp as it could be. You may not always see a burr but you can feel it. Hold the knife blade horizontally and pull your fingers or thumb down and away from the blade at a 45^0 angle on the side opposite to that which you have been sharpening.



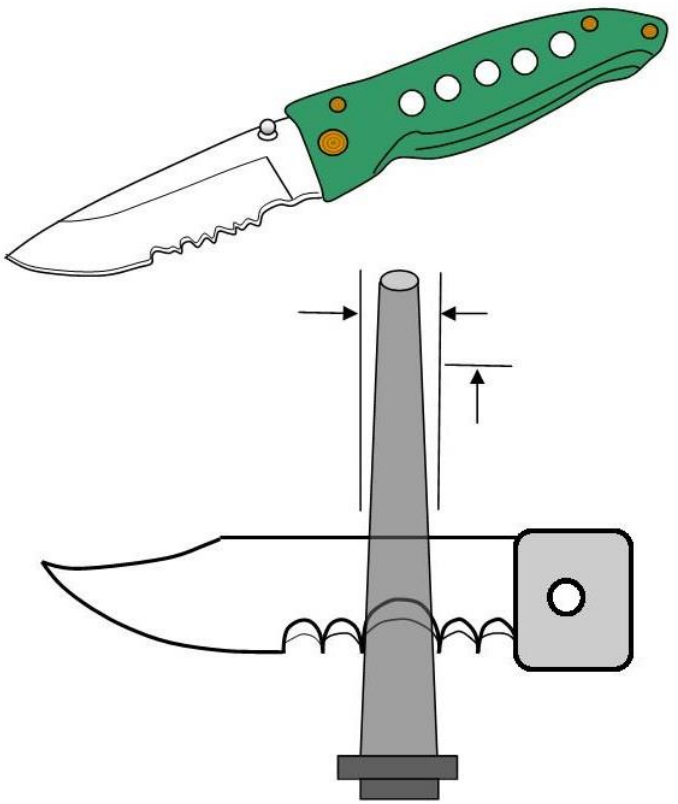
Do not pull along the blade towards the hilt or tip as you might end up with a serious cut.
Check along the full length of the blade as the burr must run along its total length to indicate that one side has been fully ground.

Knives can be sharpened on smooth grindstones or on commercial knife sharpening devices that use ceramic rods or stones of various coarseness. When sharpening on a stone keep the angle of the blade constant and move in small circles.



When using a commercial knife sharpening device like the “Warthog” (above right) the knife blade is drawn through ceramic rods that are tensioned up against the blade with springs. A “Lansky” knife sharpener supplies stoned of various grit and a knife holder that holds the blade at a specific angle. Sharpening begins with a coarse stone working down to finer grits.

The method used for sharpening a serrated blade and a gut hook is with a small round file as shown below.



Sharpening knives with a serrated edge

Sharpening gut hooks

The angles

Very sharp knives have an included angle of about 20^0 (10^0 degrees on each side). Typical knives are sharpened at an angle of 15^0 on each side (included angle of 30^0) whereas knives that require a tough durable edge are ground to angles of 20^0 a side (40^0) included angle. Hunting knives generally have an included angle of between 26-32^0 (13-16^0 angle per side).

The abrasives

Knives are sharpened by scraping away metal with abrasives. Abrasives come in a variety of grits ranging from coarse to ultra fine. Grit refers to the size of the individual particles of abrasive in the sharpening stone. A stone with fine grit produces a finer more polished edge with less micro-serrations whereas a stone with coarser grit produces an edge with more prominent micro-serrations.

You will need a coarse to medium stone for shaping and removing the shoulders of over thick edges and a finer stone for shaping the final edge.

Consistency

It is extremely important to maintain a consistent angle of the knife blade relative to the sharpening stone or tool and most sharpening systems provide some sort of guide to maintain his angle. Freehand sharpening is quite difficult in that it is not easy to maintain consistent angles.

Axe-craft

Much is written about knives as a survival tool but one finds very little written about one of the most useful of all bush and survival tools – the axe. Apart from fire little else can contribute more significantly to living comfortably in the bush than knowing how to properly use a well chosen axe. It is not only a formidable weapon but has many uses. No true bushman should be without an axe as part of standard equipment.

Few survival publications and books devoted to bushcraft pay attention to this incredibly useful tool. In this next couple of articles we will look at axe craft – the skill in using an axe.

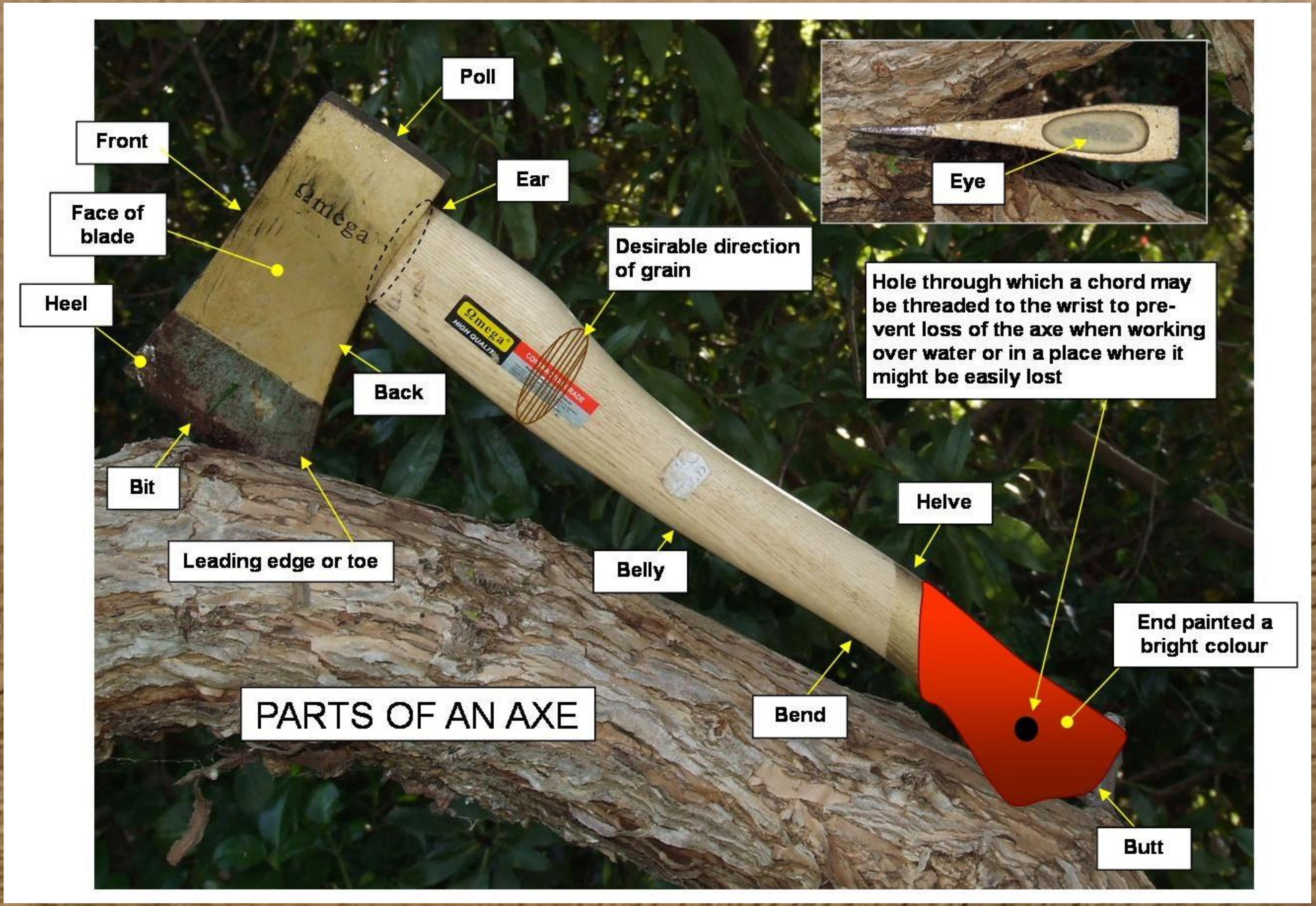
Axes come in many shapes and sizes.

Axes come in different shapes, weights and designs. The appearance of an axe does not necessarily give an indication of how well it will perform the tasks it is intended for. However the larger an axe the safer it is and the less effort required for its use. The downside of a heavy axe is that they are cumbersome to carry during bush travel. The size and weight of a good bush axe will end up being a compromise between the work it is intended for and its ease of carry. If the axe is uncomfortable to swing the head is probably too heavy. If, on the other hand, the head is too light it lacks inertia and it will not work efficiently and will require much effort to use. Ultra-light axes are best suited to experienced users as their light weight requires a strong swing which can be dangerous in inexperienced hands.

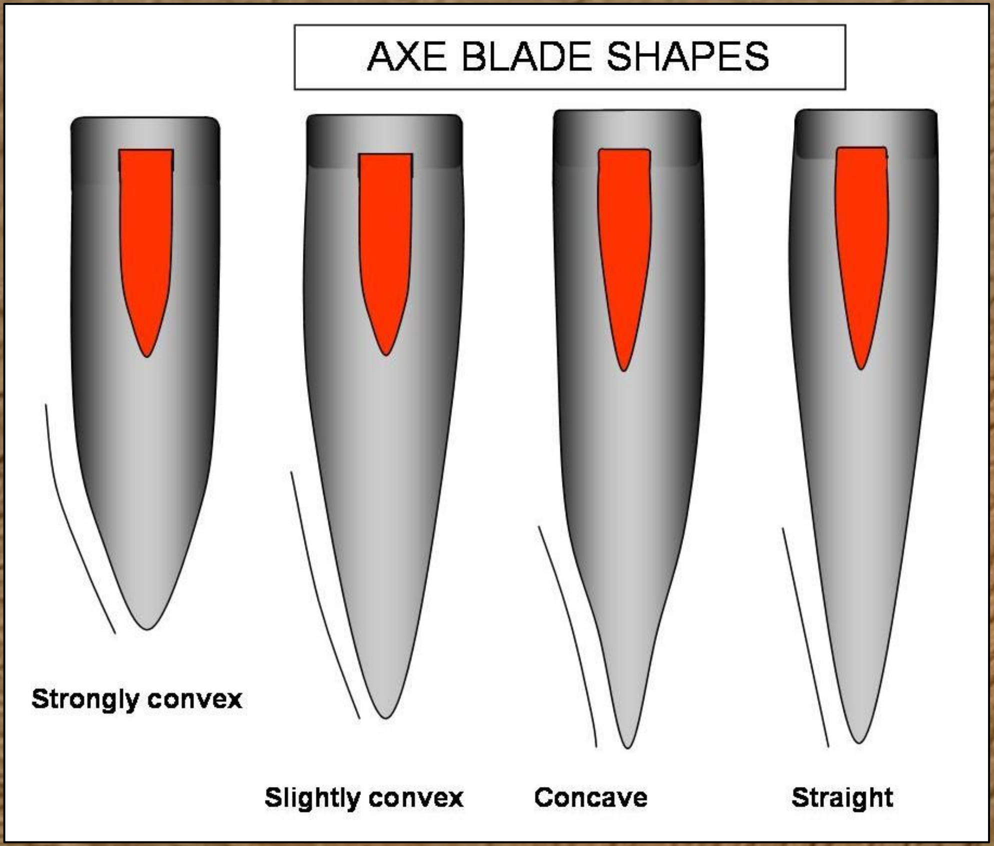
Before we go any further lets learn something about the parts of an axe as shown on the following page.

Axe design

The shape of the head of the axe will determine its cutting characteristics. A blade with a slightly convex face rather than a flat or concave one, releases easily from the cut, throws chips well and is stronger when used on very hard (or frozen) wood.


Poll
Front
Ear
Face of blade
Heel
Back
Bit
Leading edge or toe
Ωmega
Desirable direction of grain
Eye
Hole through which a chord may be threaded to the wrist to pre-vent loss of the axe when working over water or in a place where it might be easily lost
Helve
Belly
Bend
End painted a bright colour
Butt
PARTS OF AN AXE

If however the shape is too convex the blade does not penetrate to maximum depth resulting in a waste of energy. If the blade is too thin or concave it tends to bind in the cut and requires an annoying tug to free it each time which not only wastes energy but also loosens the handle over time. The ideal blade shape is one which is convex enough to effect easy release at maximum depth of the cut.

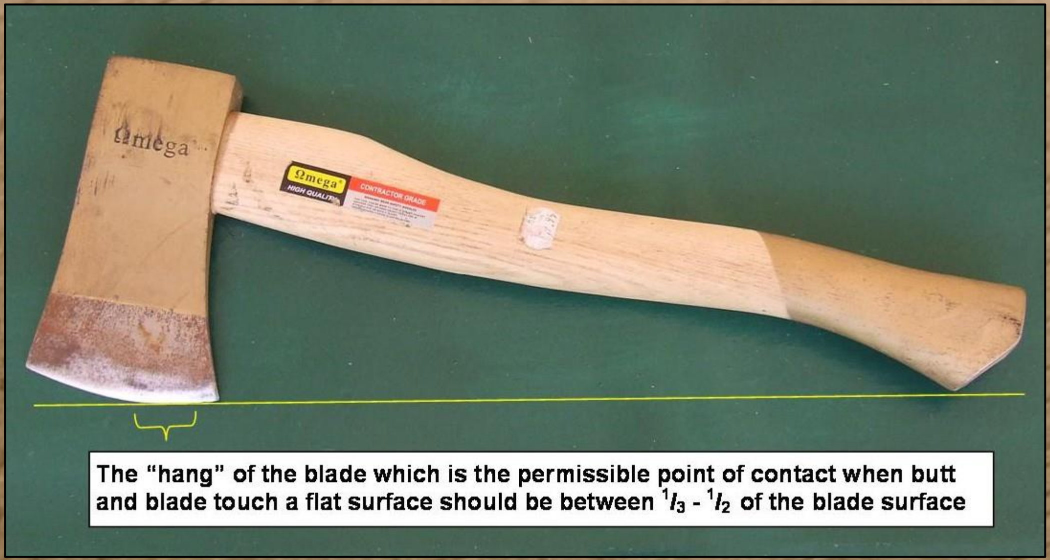


Example of a straight bladed axe (above). Axe blade shapes (left).

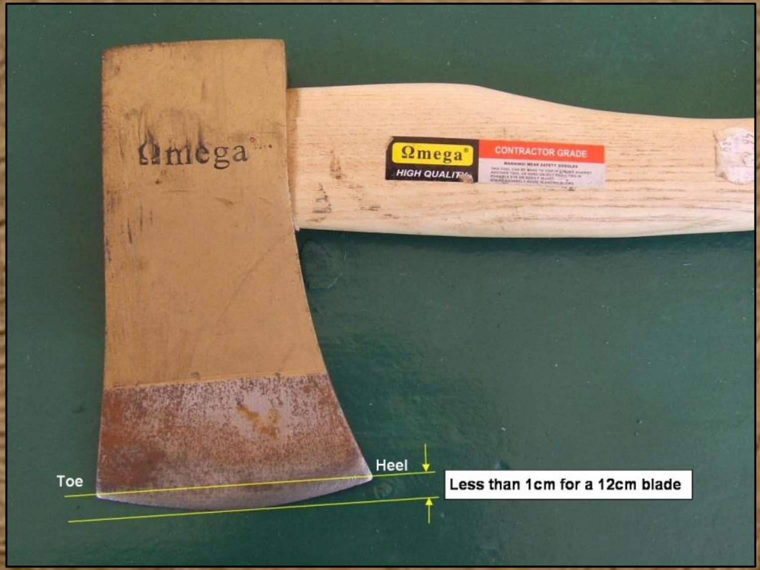
A strongly convex axe blade is good for splitting logs. A concave blade works well for removing limbs from the trunk or thick branch of a tree or for shaping. A straight blade is one that is less likely to glance off a log. The slightly convex is a good general purpose axe.

The heel of the axe blade should be narrow enough to set easily into wood that is being split. A blade 12cm long should bulge out less than 1cm from a straight line connecting the toe and heel of the blade and the permissible point of contact when butt and face touch a flat surface should be between $^{1}/_{3}$ to $^{1}/_{2}$ of the blade length. This way the weight of the head is fully behind the cutting edge of the blade edge and energy is not wasted through deflection.

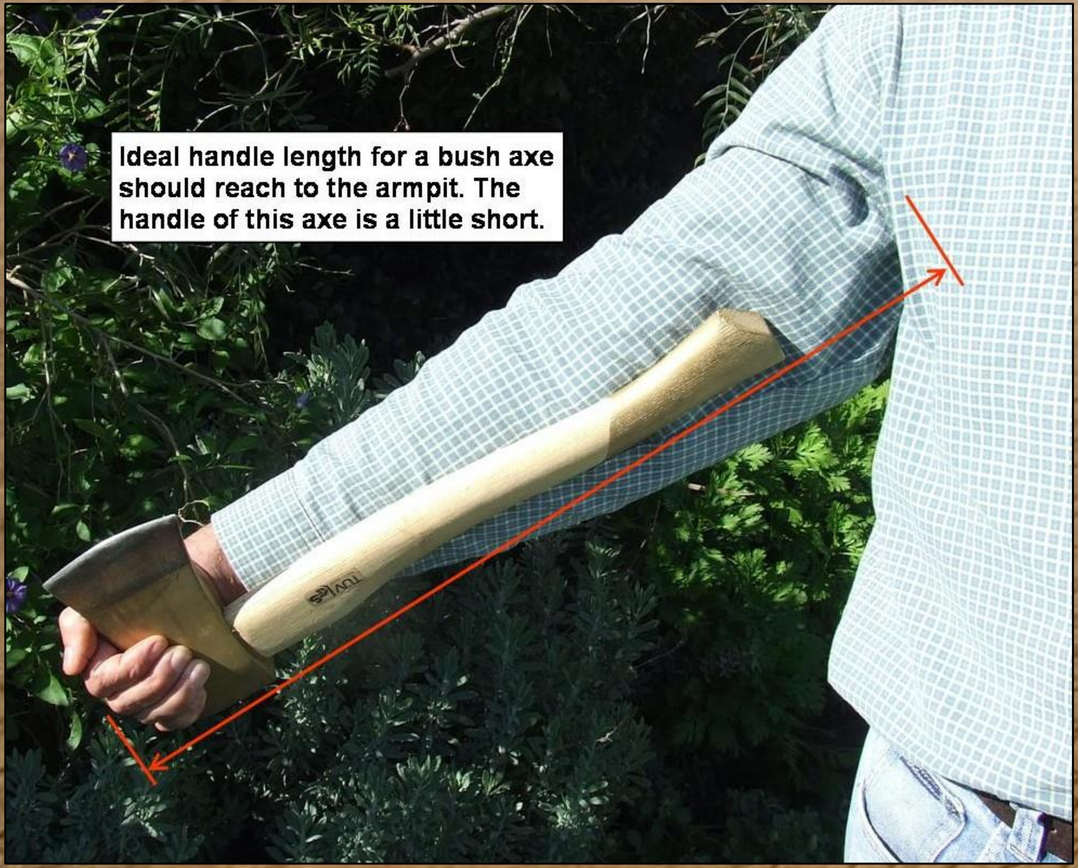
A cutting edge of 15cm or more makes the axe too cumbersome. The eye of the axe is its weakest part. With a small eye the part of the handle entering the eye may be too thin to have the required strength. A large eye provides better strength to the handle. The metal around the eye is left more malleable than the blade to resist cracking. For this reason it is easy to distort the eye by hammering on the poll with another axe or by using the poll itself as a hammer.



Some of the design features of a good axe blade



What is the ideal weight and length for a general purpose bush axe? The length of an ideal bush axe has a handle of a length that fits snugly into the armpit when the blade is held. An axe with a handle shorter than this is called a hatchet. A good weight for a general purpose axe is about 1,5kg and about 0,5kg for a hatchet.

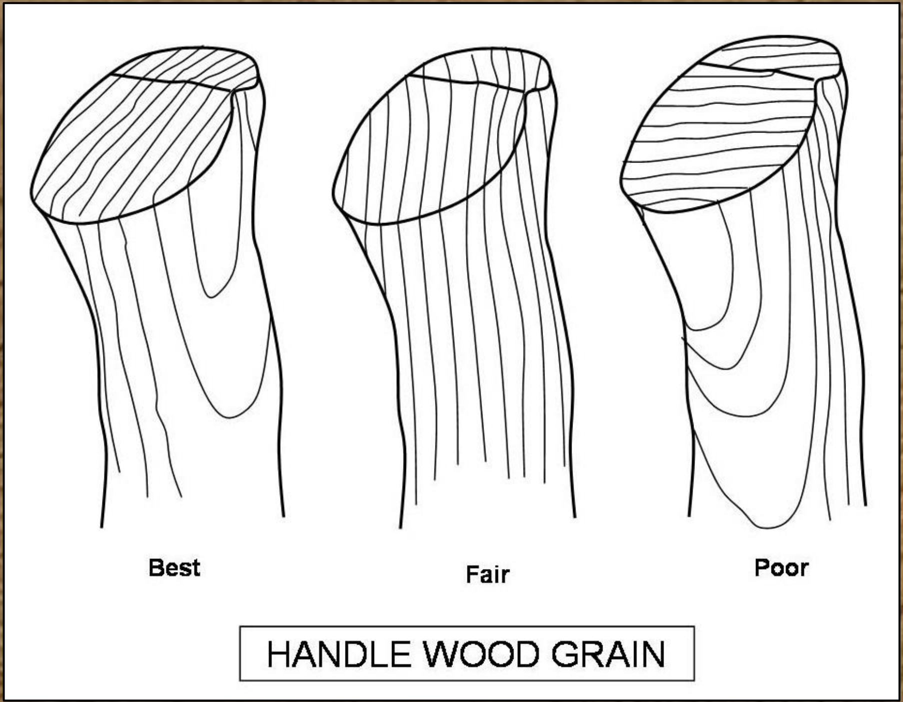


When it comes to the temper of the axe blade it should be tough but not too hard. If it is too hard it is brittle and can chip more easily – especially in cold weather - and it is difficult to sharpen with an ordinary whetstone or file. A blade that is too soft will not hold an edge for long and will have to be regularly sharpened and will also wear out quickly.

Handle length for a general purpose bush axe.

A good axe handle should be neither too thick or thin and should fit comfortably in the hand. If it is too thick it causes uncomfortable jarring with hard hits as it cannot flex. A handle that is too thin however will flex too easily.

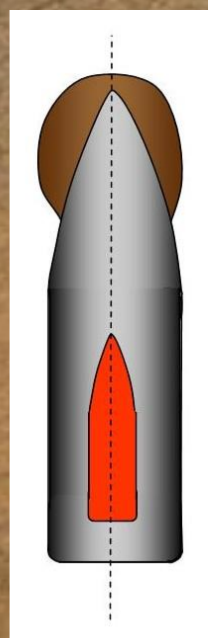
A handle that is too round in cross section is awkward to hold and gives a poor indication as to where the leading edge of the blade should be. If too flat it will be tiring to use as the handle will flex too much when the blade is pulled from its cut. For a straight handle the flatness has to be more pronounced to keep the axe from turning in the hand on impact. A good knob on the end of the axe handle signals the hand when the end of the handle is reached. The grain of axe handles should run parallel to the face of the axe blade as shown below.

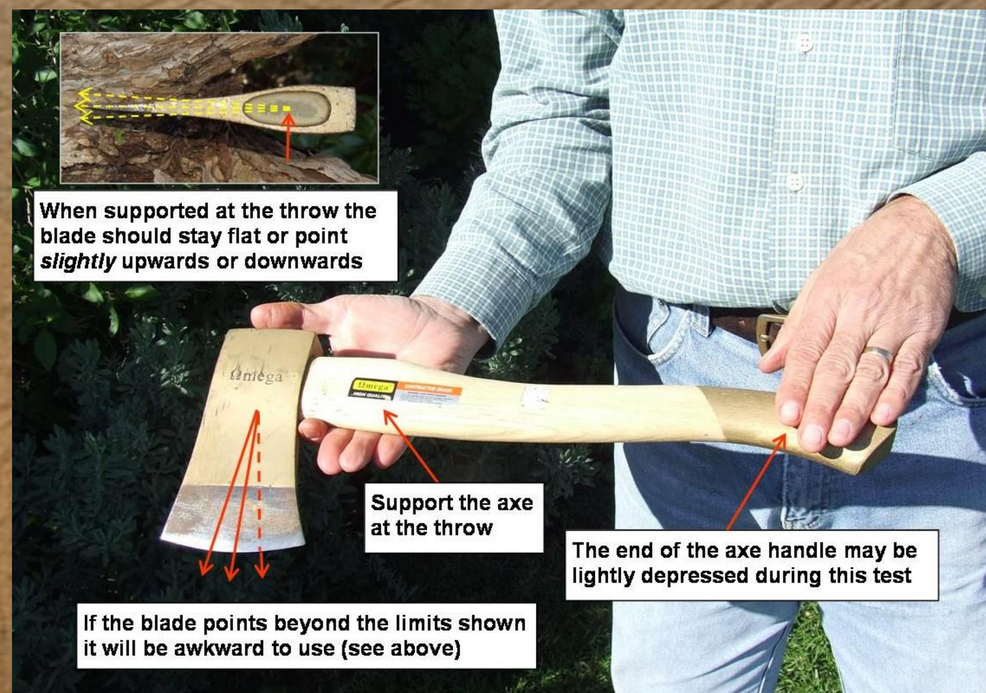


Sight in line with the axe blade and handle to determine the alignment of the head with the centre of the handle. Slight misalignment in the right direction may improve the performance of the axe for some users (see next page). The balance of the axe is determined by the "throw" of the axe which is the forward bulge of the handle within 15 – 20cm of the head.

If the axe is held at the throw in the flat of one hand and the end of the handle is held up or down by the other hand (see below), the axe head should lie flat or the blade point *slightly* upwards or downwards. The longer the bit or the lighter the poll, the more throw is required (i.e. a greater bulge of the handle). An axe that exceeds these parameters will feel unbalanced and as awkward as a pick. For an axe to work at optimum performance it should be sharp.

Axe head and handle alignment (right). Balance of the axe (far right).





An axe in camp

A sharp axe can be dangerous if left lying on the ground as it can easily slice open a foot or ankle. See below. Choose a convenient tree at the campsite which affords some protection from the elements where all tools will be kept or, if you have a spare tent, store tools in the tent where they can be protected from the weather – don't leave them lying scattered around camp.

Don't drive an axe into a living tree to store it as the axe can dislodge and fall onto a person and it also causes unnecessary damage to the tree. See next page. The two best ways of storing an axe at your campsite are to drive it into an old stump or lean it at the base of a tree with the head resting on the ground and the handle leaning up against the tree trunk. See next page. Another option to store an axe safely around a camp is to have a leather sheath for it.

Don’t drive an axe into a living tree to store it as the axe can dislodge and fall onto a person and it also causes unnecessary damage to the tree. Rather “store” it as shown on the right.

Axe etiquette

It is poor etiquette to ask a person for the loan of his axe as, like with a knife, a wife, or a rifle, it is a personal possession. It is even worse manners to use someone's axe without permission. If you have work to be done that requires the use of an axe, ask the axe owner if he would mind doing it for you. A careless moment of misuse on your part can result in a broken handle or chipped blade which will require many hours to repair. A handle is not too expensive to by but it requires a lot of work and time to shape it to fit the axe head properly.

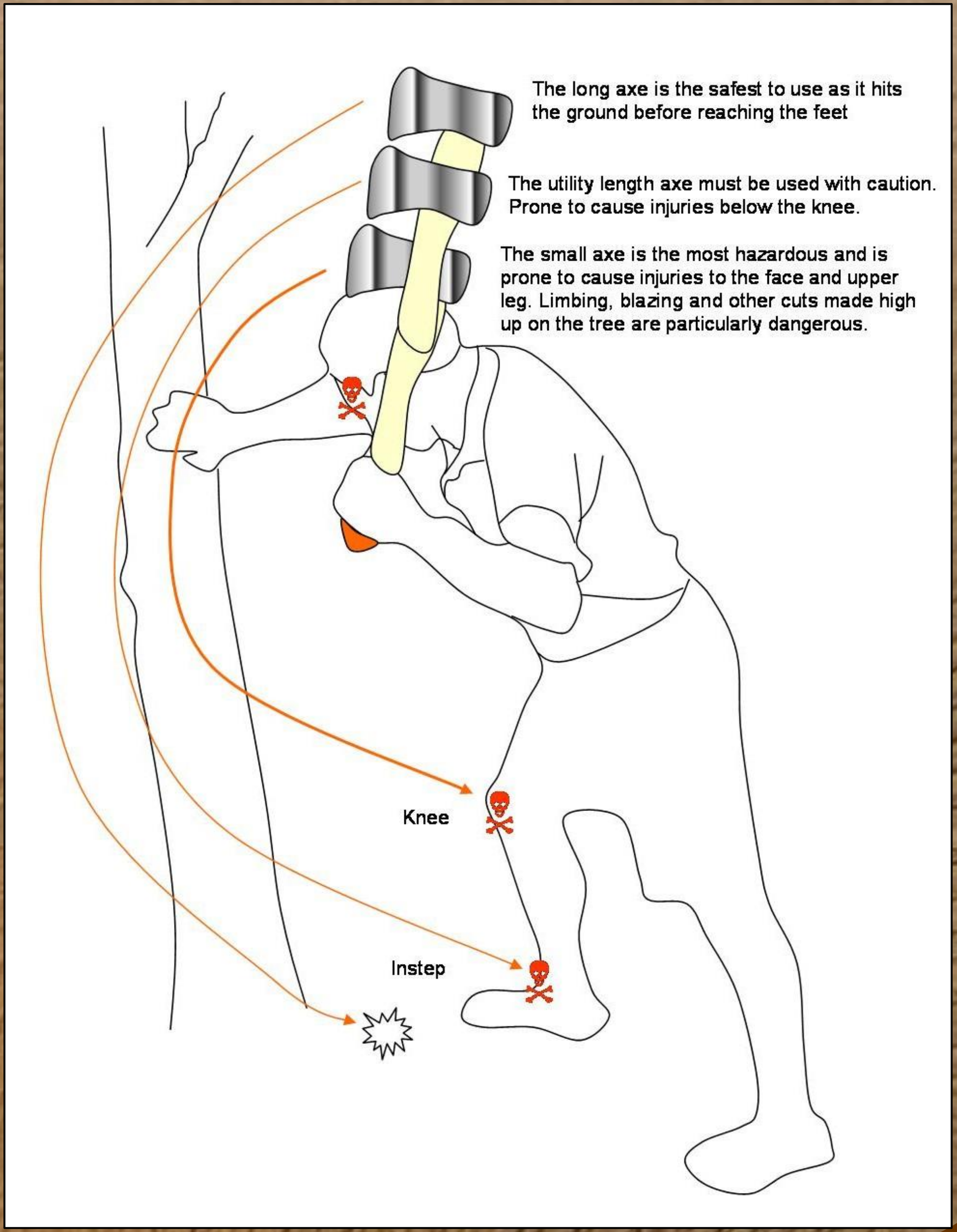
General safety

The axe is a dangerous tool and safety should be a major consideration. Using an axe to fell a large tree is one of the most dangerous activities in wilderness living. Safe axe use implies knowledge of both the tool itself and the tree that must be felled. You must know how to fell a tree and make an accurate prediction as to where it will fall. The more experienced you become the greater your ability to judge in which direction the tree will fall.

The best way to learn to use an axe properly and safely is to work with and under the guidance of someone skilled in its use. Many accidents occur with axes, some fatal,   and is a tool which should not be used by just anyone (especially children). Always use eye protection.

When using an axe to cut into a tree, lean against the trunk with one hand so that you can place your feet a safe distance from the base of the trunk. If your axe should glance off the tree it will then hit the ground and not your legs or feet. See right.

It is a favourite length for wilderness dwellers, trappers and survivalists. Misuse can also cause injuries to the face but is most likely to cause injury to the lower leg, instep and toes. The full size axe with a handle length of approximately one meter is the safest to use because when it glances off a tree it deflects into the ground before causing injury to any part of the body. See right.



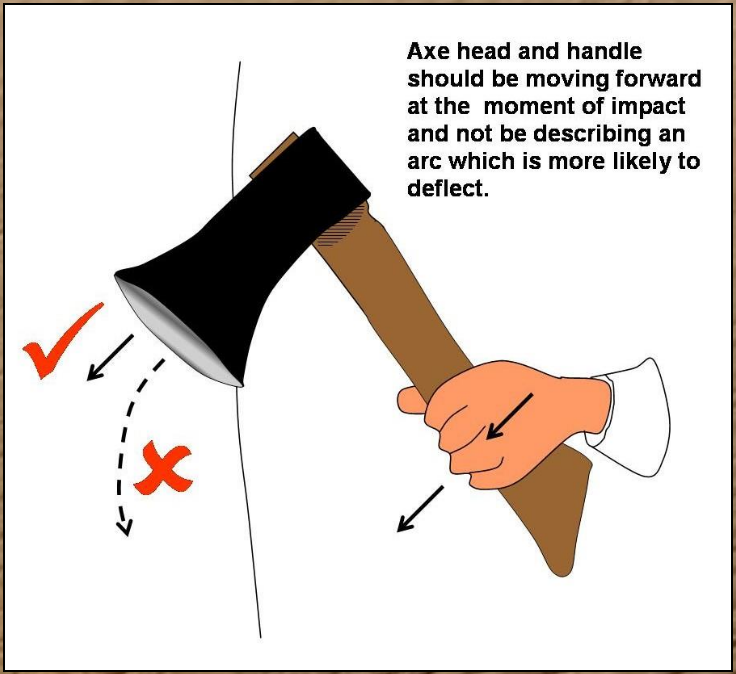
A weapon of war, and an exceptionally versatile and useful survival tool – the axe – oft overlooked, abused or ignored. Ax craft is one of the “lost bushcraft skills” that needs to be revived.

We will now learn how to use different axes safely for different applications. Axes come in different shapes and sizes – hatchet, single bit, double bit, short axes long axes, throwing axes and so on.

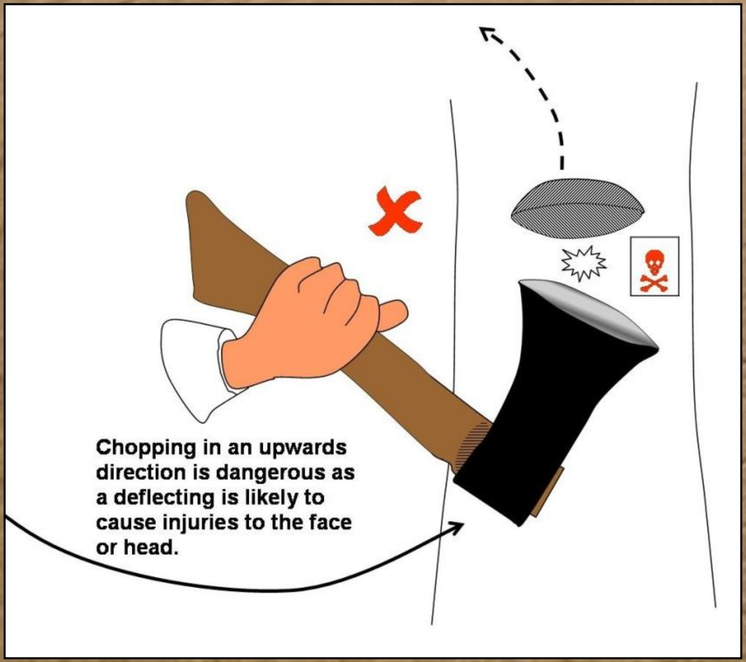
An assortment of axes – double bit axe on the right (courtesy Wallace Vosloo)

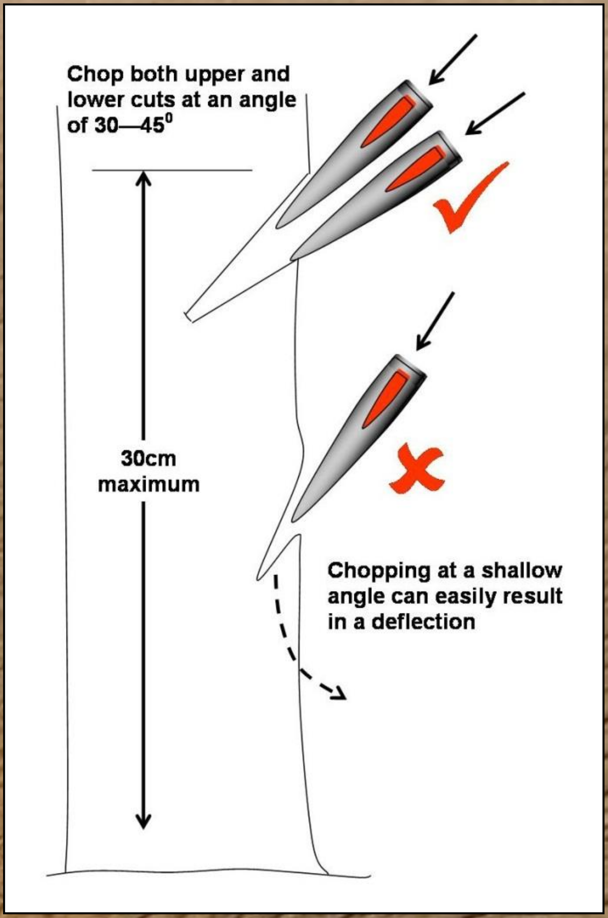
The hatchet or general purpose camp ax.

The hatchet is usually (but not always) held in one hand. If you are felling a small tree with a hatchet stand well away from the tree, support yourself with your free hand against the tree and chop as close to the ground as possible. Use both the shoulder and arm in the chopping action. When the blade is about 30cm from the tree move the hand forward and not in an arc. If the blade impacts the tree describing an arc it is easily deflected.



The axe should bite into the wood at an angle of 30-45^0. Attempting to cut upward could result in the blade deflecting and injuring you in the face. See next page. Angling the blade in at a shallow angle can also result in potentially dangerous deflections. The downward angling cuts should be the same for both upper and lower cuts. This will result in a somewhat ragged looking cut but any other method is neither faster nor safer.





The hazards of chopping in an upwards direction (above). Upper and lower cuts should be at the same angle. Avoid angling the blade in at shallow angles (right).

If the cut is made from a kneeling this frees up both hands which can then be used to hold the axe. Stay one or two axe handle lengths away from the tree and use the same pre-impact movement described above to prevent deflections. When removing small branches from a tree with an axe (referred to as "limbing") the forward movement of the axe head (as opposed to an arc) allows for better control of the follow through.

Reach slightly round a tree when limbing so that if the axe passes easily through a branch the follow through will be off to one side – well away from you.

Large axes.

When using larger axes with longer handles stand at least a handles length away from the tree and use the same pre-strike motion of the blade by allowing the axe head and hand to travel in parallel paths for 30-50cm before impact. Bend your back and strike at a point not move than 30cm above the ground. If a chop deflects it will hit the ground and not any part of your anatomy. Cuts higher up the trunk which deflect may strike the feet or lower leg. Do not attempt upward facing blows as the axe can deflect and cause serious head or facial injuries.

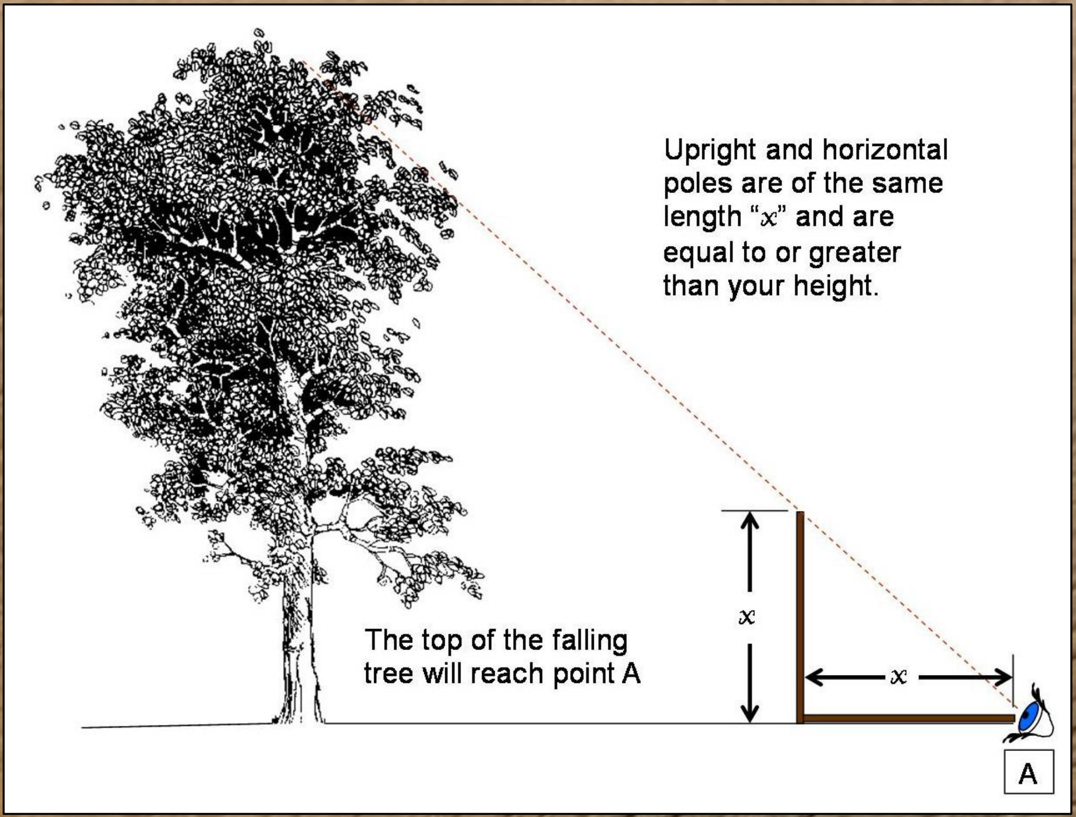
Felling trees

There is a procedure to follow for safely chopping a tree down.

Trees are used for many purposes some of the most important being to provide timber for building dwellings, and manufacturing furniture, boats, wagons, tools, or implements. Trees can be felled using a chainsaw, handsaw or axe. Whatever tool is used it must be remembered that felling trees can be dangerous work. We have already touched on this in a previous article but it is important enough for us to expand on the subject.

Try and determine by careful observation which way the tree is likely to fall taking into consideration its direction of lean, wind, foliage distribution, slope etc.

Look at the site and identify danger areas and the most obvious escape route. Carefully clear this route of any obstructions which might hinder a quick getaway. See next page.



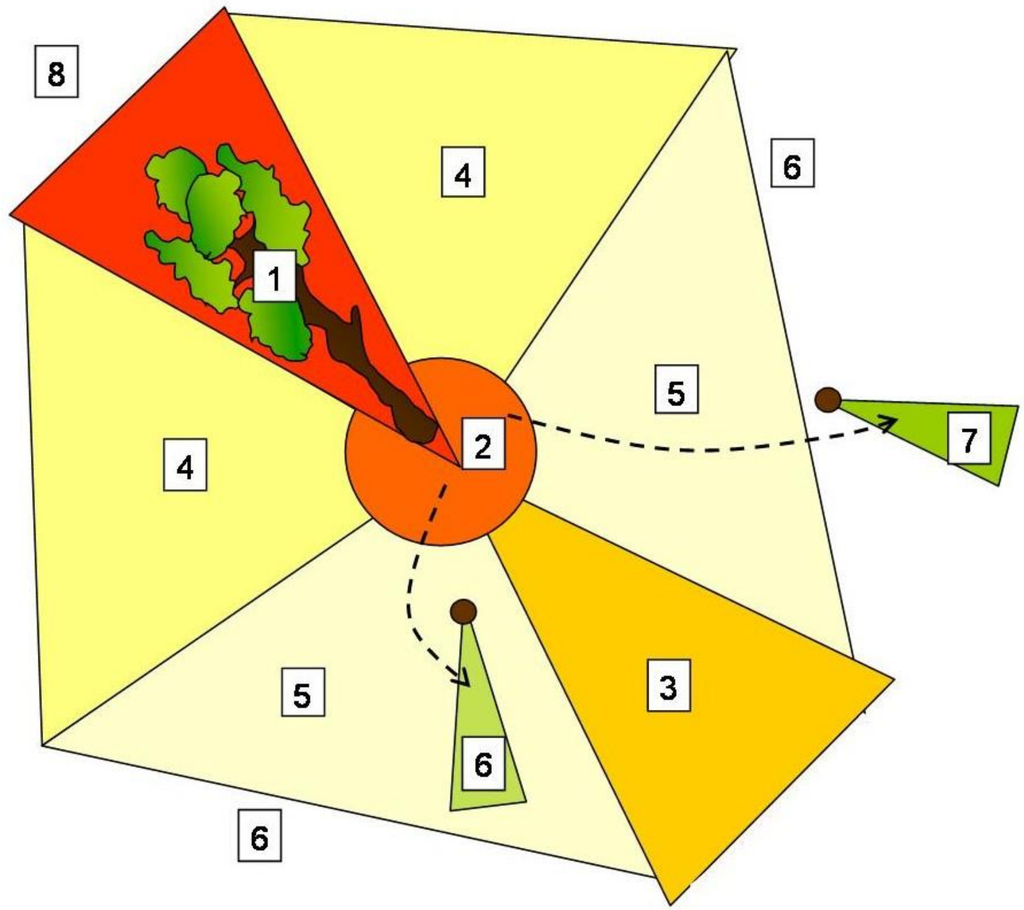
Estimating the height of a tree and to where it will fall.

Estimate the height of the tree and the distance to which it will fall. See Figure above. Clear any obstructions around the tree which might hinder your work. Make the first cut – referred to as the undercut – in the direction in which you expect the tree to fall.

SAFE AND HAZARDOUS AREAS RELATIVE TO A FALLING TREE

1. The most hazardous area is where the tree actually falls.
2. The area around the stump is the next most dangerous.
3. A tree often falls in the opposite direction to that expected.
4. Some hazard in this area.
5. Relatively safe area.
6. The safest area within the reach of a falling tree is in a safe sector behind a tree.
7. The safest area is behind a protective tree, beyond the reach of the falling tree and to one side opposite its direction of fall.
8. Beyond the reach of the tree is relatively safe except when the domino effect occurs and the falling tree knocks other trees down.

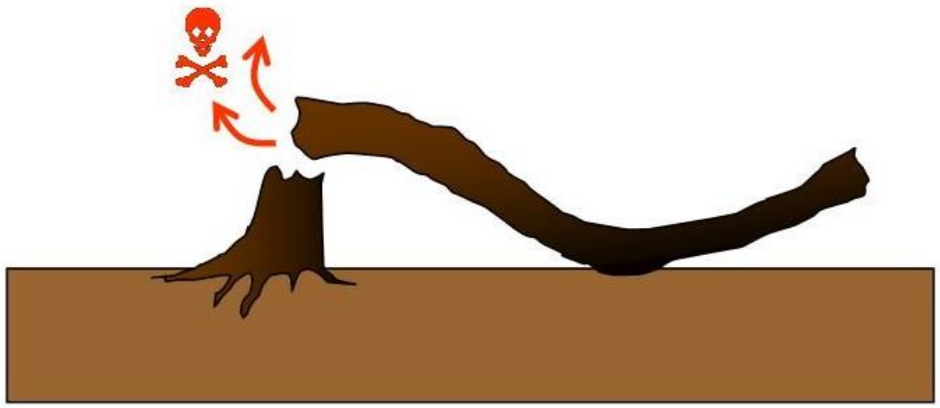
Dotted lines indicate planned escape routes.



Identifying safe and hazardous areas and preparing escape routes.

Felling trees is a risky and dangerous business which can result in serious injury and death. Without experience it may be prudent to fell only straight trees, less than 30cm in diameter and on level ground. A quick way to estimate a diameter of 30cm or less is to reach around the tree and touch your left shoulder. If you cannot then the tree is to big to take on without experience. If you do not know what you are doing avoid trees growing on slopes, that lean to one side or that are located on uneven ground.

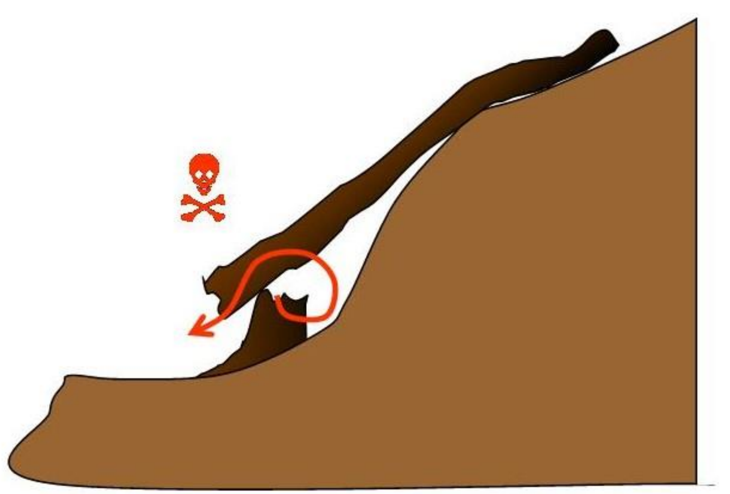
Crooked trees can kick up when they fall and cause the woodsman serious injury (See below).



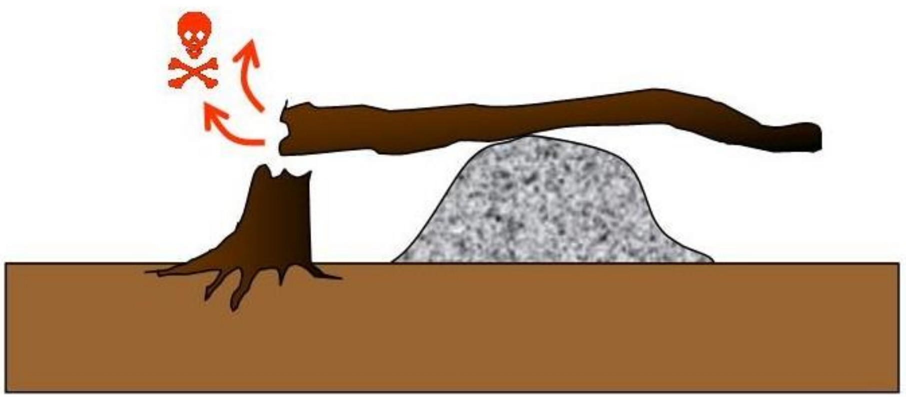
Danger of felling a crooked tree. The tree may flail from side to side or bounce up and injure the woodcutter.

When felling a tree on a steep hillside the tree can slip back over the stump and slide downhill onto the woodsman.

It is also dangerous to fell trees on rocky or uneven ground as the falling tree may flail side to side or kick up if it impact with a hump on the ground or a rock and can result in serious injury to the woodsman



Danger of felling a tree next to a hill. The tree is prone to come back downhill over the stump towards the woodcutter.



Danger of felling a tree next to a rock or hump in the ground. The tree falling over a rock or hump may kick up or flail from side to side. The closer the hump to the mid point of the falling tree the more violent will be the kick up.

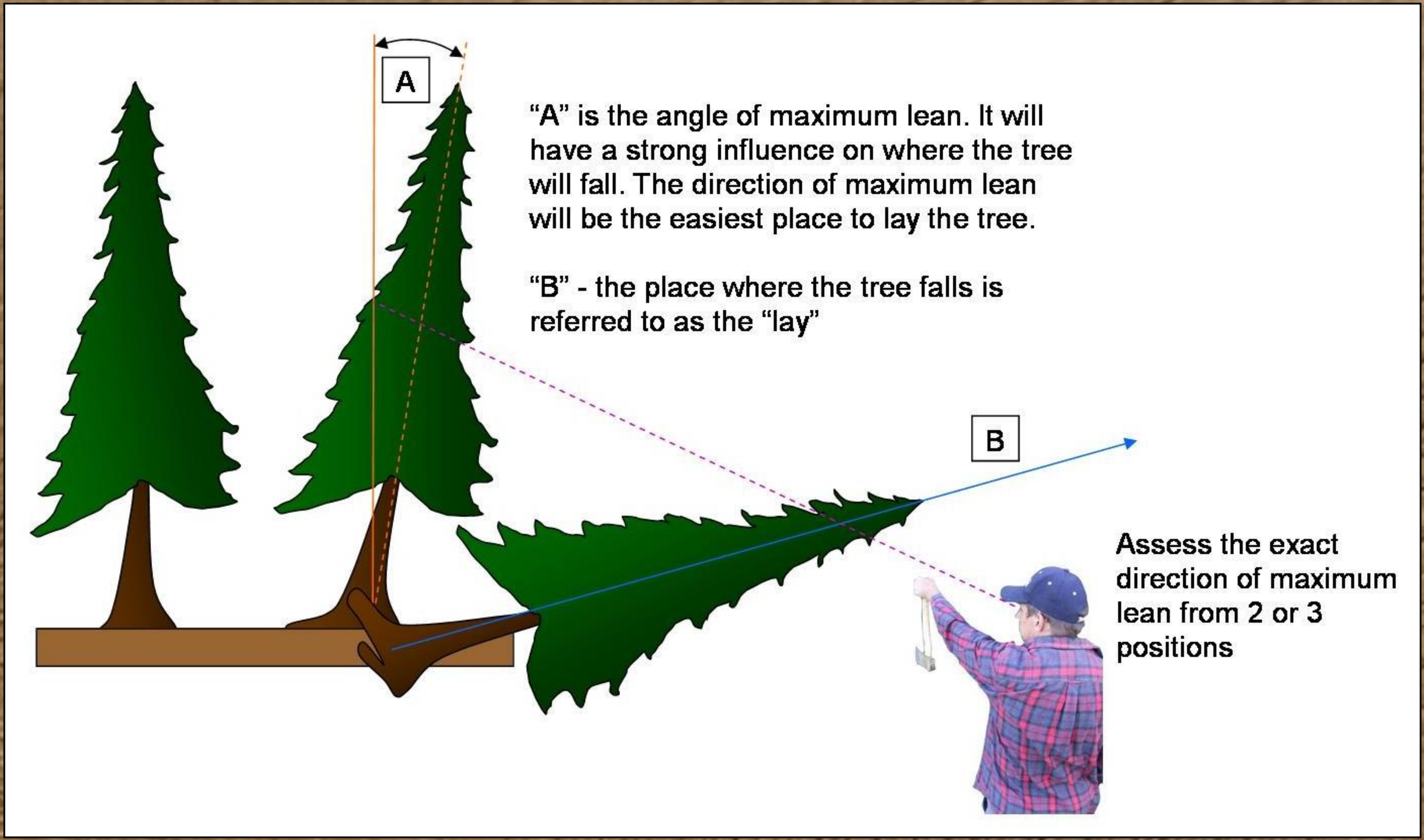
Hazards of tree felling

Before you attempt to fell a tree take the time to carefully assess the situation. You must have a clear work area, a sure footing and a readily available avenue of escape. Low branches that may trip you up if you have to move quickly or that may catch the axe should be cut or cleared away. Pay special attention to overhead branches or wires as the axe may rebound from them during a swing and cause you serious injury.

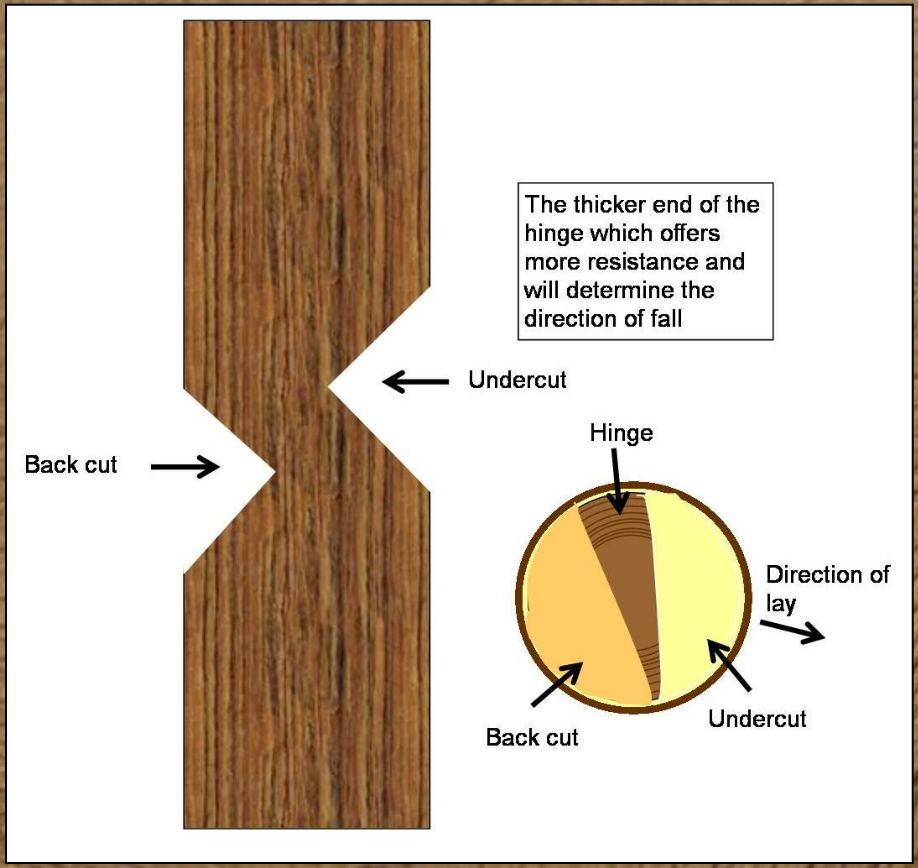
The direction in which a tree will fall is determined by many factors. Unless there is a pronounced lean to one side a tree will generally fall in the direction that the wind is blowing especially if it has a lot of leafy branches. Before attempting to fell a tree check from at least 2 or 3 positions if it has any lean and try and estimate where it will fall. “Lean” is the deviation in any direction from the vertical and “lay” is the position in which the tree will come to rest when it falls. See next page.

An experienced woodsman can make a tree with less than 4^0 lean fall in any direction he desires by placing the undercut and the back cut in the appropriate position.

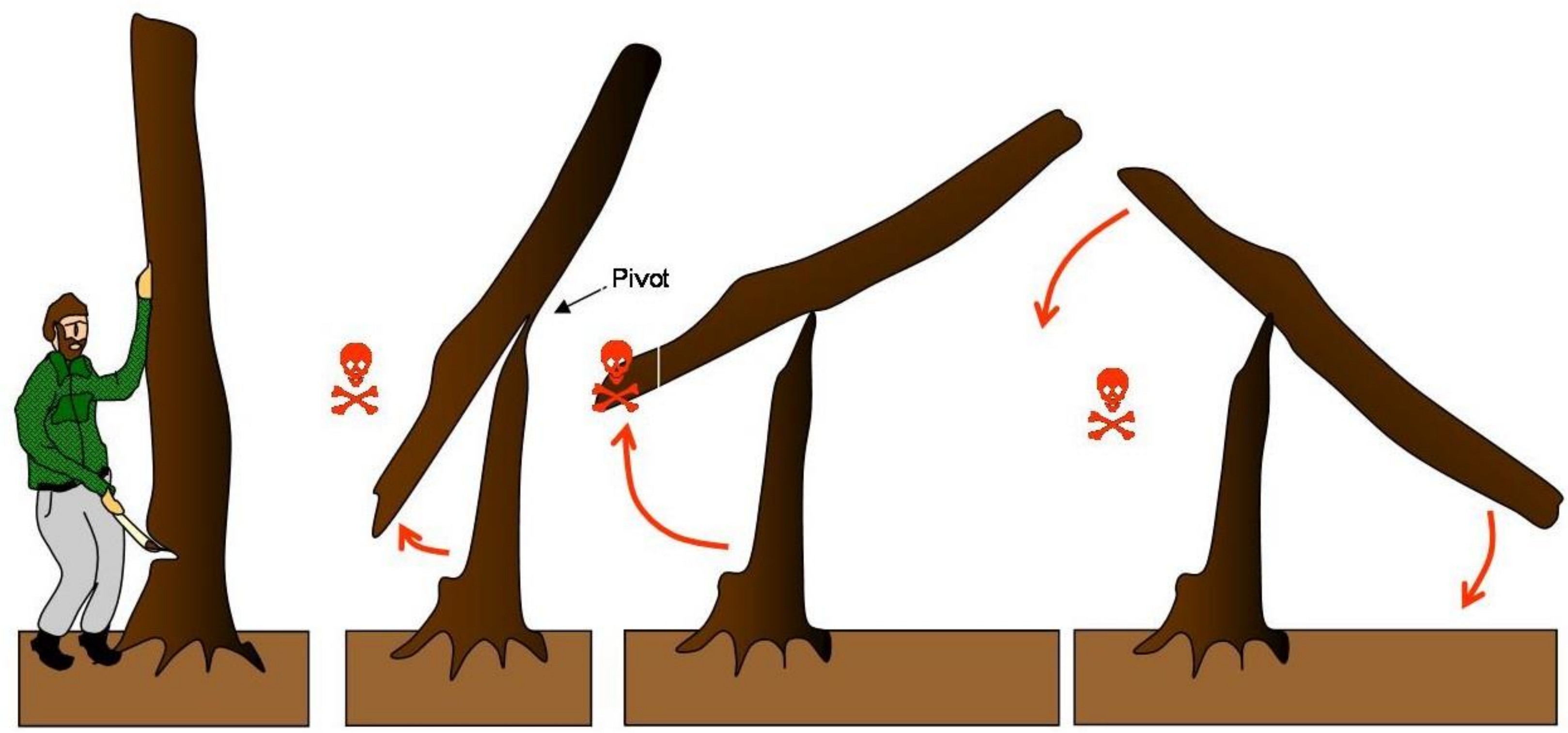
Careless estimation of the amount of lean is the main reason for a tree falling in an unexpected direction. Another potential hazard is attempting to fell a leaning tree with little or no undercut. The tree breaks and falls whilst still attached at a point which acts as a fulcrum which pivots the tree in an arc around this point.



The lower end of the stump can hit the woodsman resulting in serious trauma or a fatality. When the top end of the tree hits the ground it can also rotate back in the opposite direction around the same fulcrum which is also extremely dangerous. See next page. Remember trees weigh hundreds and in some cases thousands of kilograms. Great caution should be exercised when felling trees leaning to one side and the correct cuts which should be made with the axe are shown

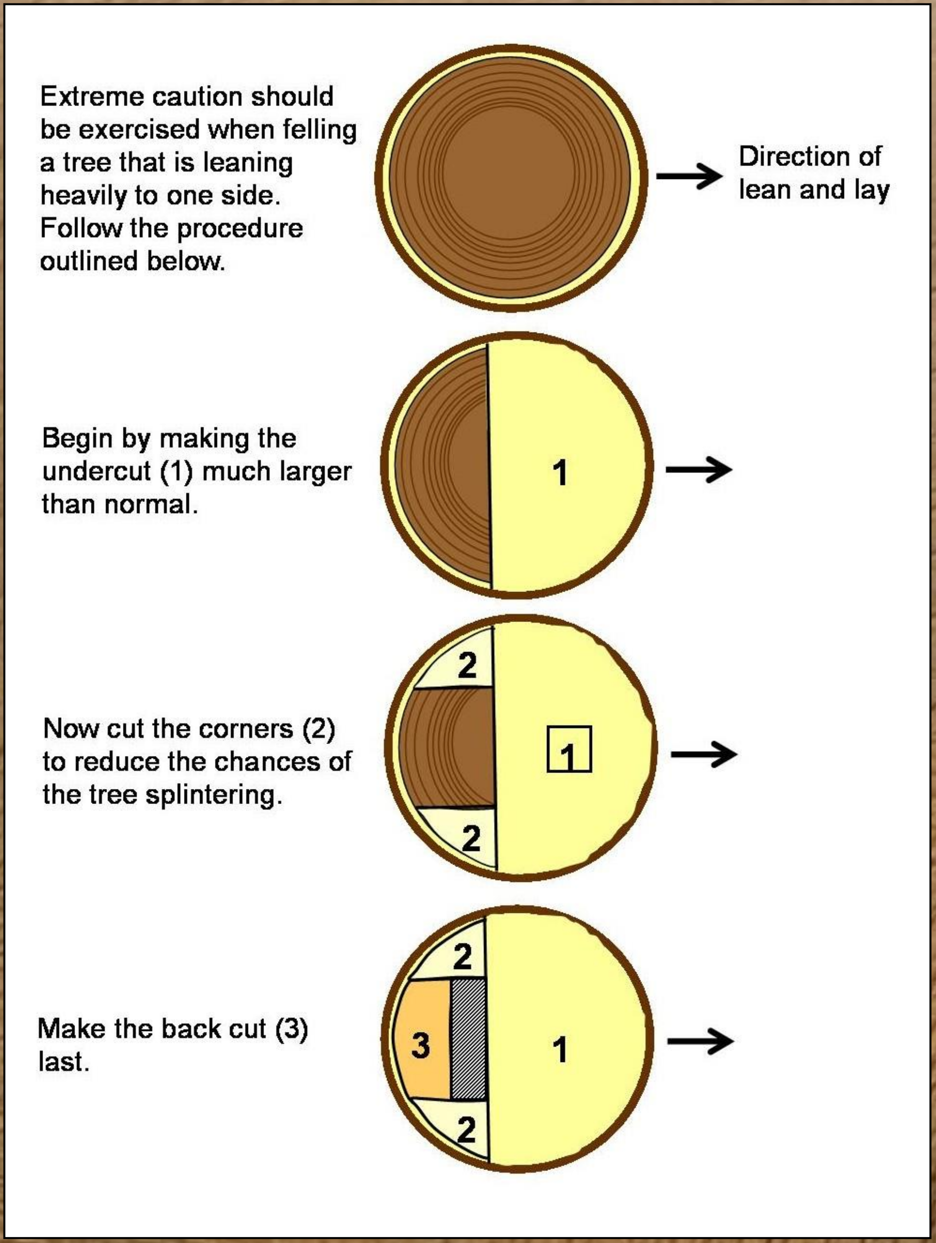


The direction of fall is determined by the positioning of the undercut, the back cut and the thickness of the hinge.



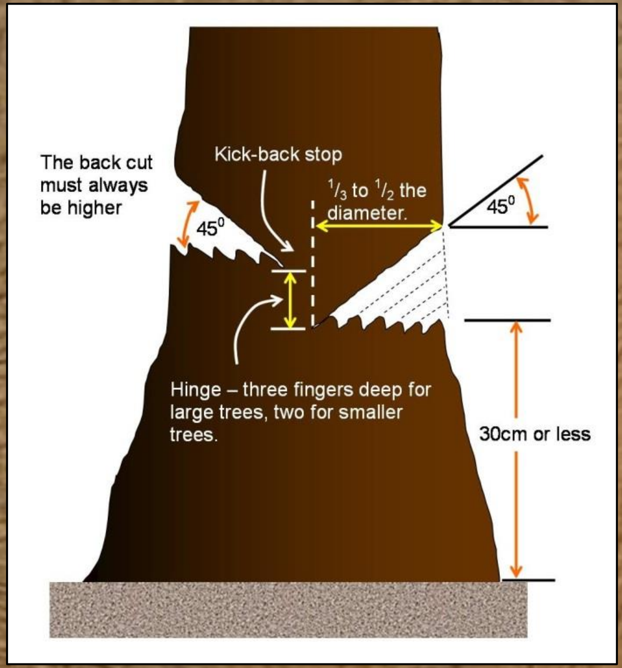
Attempting to fell a tree that is leaning heavily to one side or with little or no undercut can result in a “barberchair”. The tree breaks away and pivots around a point causing the trunk to swing upwards in an arc and hitting the woodcutter. It can then hit the ground and pivot back in the opposite direction which also can result in injury.

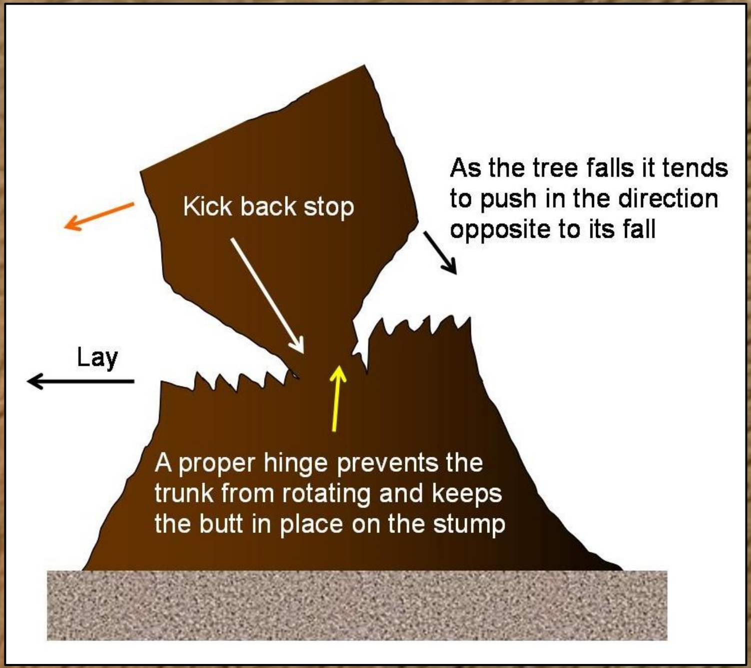
The “barber chair” phenomenon which can result from felling trees which lean to one side or that are felled using little or no undercut.



The correct sequence of cuts when felling a leaning tree.

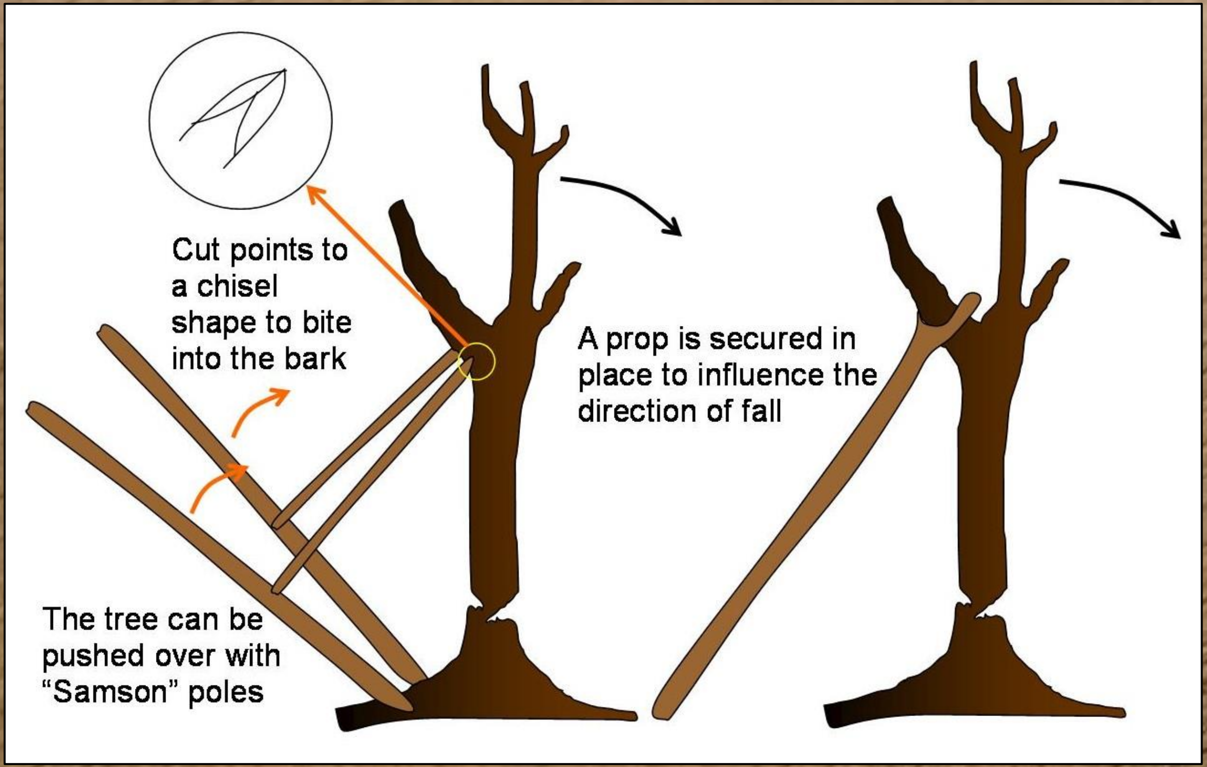
When chopping down a tree the top part of the cut should be angled in at about 45^0. Subsequent cuts are made at a similar angle but that move through the wood in small increments of a few centimeters at a time. The width of the gap of the undercut should be equal to about the tree's diameter. The depth of the undercut may vary between one third to one half of the trunk's thickness, depending on the soundness of the tree, lean and wind strength. If the undercut is made too deep the tree may fall in the opposite direction before the back cut is made resulting in a dangerous situation. The cut should be made straight across as a slanted one makes a poor hinge. See below.





The back cut is made on the opposite side and slightly higher. Retaining a few centimeters of wood as a hinge will prevent the tree trunk from slipping back off the stump or rotating. If the undercut is not deep enough or if the back cut is too high above the undercut the tree may fall in the opposite direction to that expected. If the undercut and back cut are at the same level or if they are cut at an angle instead of opposite to one another the tree has a tendency to kick back opposite to the direction of fall which is hazardous and may have fatal consequences. The width of the hinge is about two to four finger widths. To get the tree to fall away from a pronounced lean the hinge should be made wedge shaped when viewed from the top with the widest part of the hinge made in the direction the lean is to be shifted. Green trees may fall with a substantial hinge whereas dry trees tend to fall when the hinge is relatively thin.

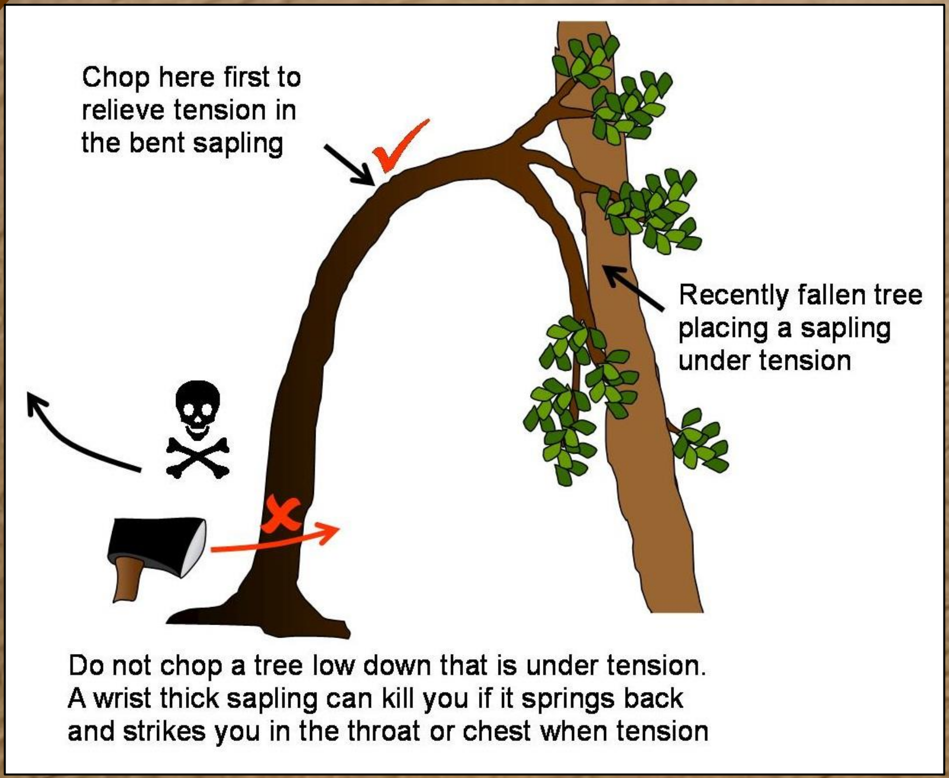
As the back cut nears completion, the tree may be propped up to influence its direction of fall or started on its way with a push to ensure that it falls in the desired direction. From the moment a tree begins to fall watch it closely and don't stop watching until it has fallen and come to final rest. Be ready to take evasive action should any erratic or unexpected behaviour occur. Back away from the tree as it begins to fall and if possible position yourself in a safe area and preferably behind another substantial tree for protection. Never stand close to the base of a falling tree as too many unpredictable things can happen near the stump.



Using props and Samson poles to assist direction of fall.

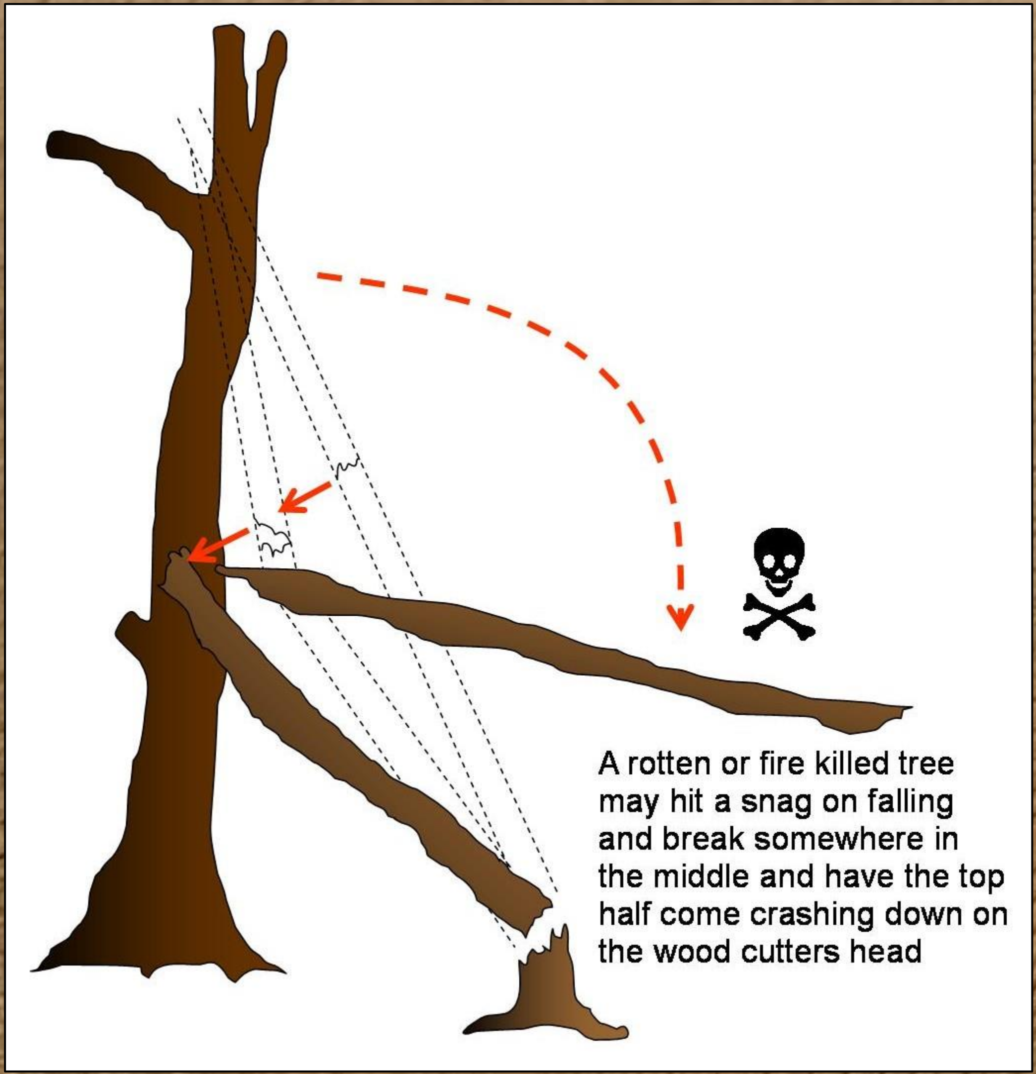
Falling characteristics of different trees

Different tree species fall in ways peculiar to the species. Branches of densely foliated tree species may cause them to rebound back over the stump. A flexible tree under tension (for example if another tree has fallen on it) may suddenly spring back if tension is relieved by cutting it too low down on the trunk and cause serious injury. Tension must first be eased by cutting branches higher up.



The tension is best relieved by a partial cut at the central portion of its bend. Some trees have rotten cores or have been weakened by wood borers that may cause them to fall sooner than expected or in an unexpected direction. Weakened trunks can also break as they fall and hit other branches causing the trunk to break, fold back on itself and fall in an area opposite to its direction of predicted fall.

Falling trees that get hung up in other trees are very dangerous and require careful inspection as to how to solve the problem and bring the tree down safely. A hung up tree can come down unexpectedly with fatal results so never stand under any part of it. Rocking, rotating or prying may dislodge it but if this proves unsuccessful you may have to chop off sections of trunk to get the tree down. Cutting down the tree causing the hang up is extremely dangerous and should not be attempted.

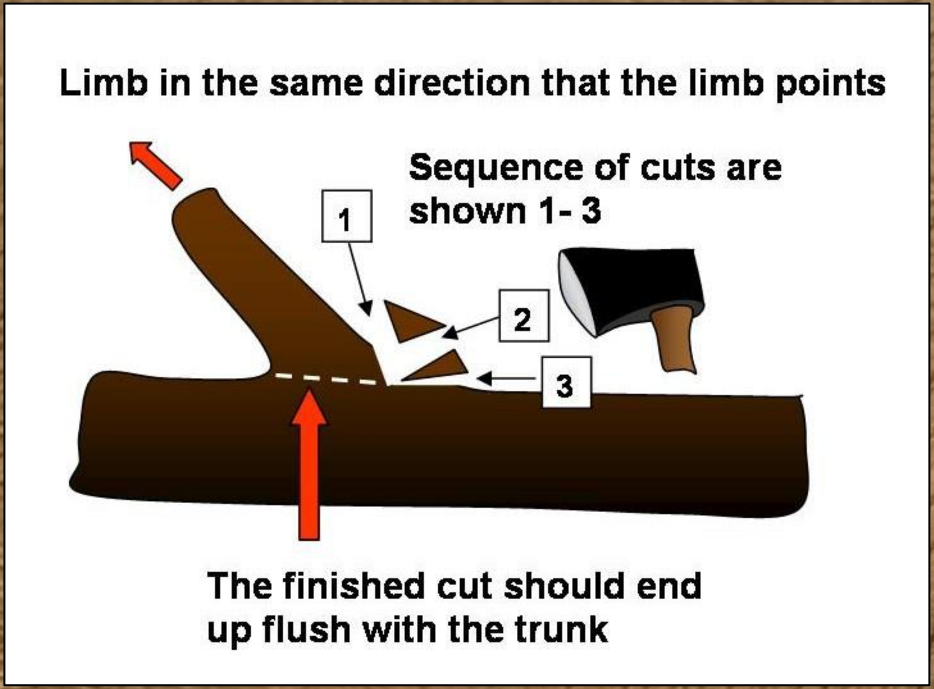


We have seen thus far in this section on axecraft what a useful and often neglected tool an axe is and that not much has been written about its correct and effective usage. We conclude this section by looking at limbing (removing branches from a tree trunk) and sectioning (chopping it up into useable pieces) techniques.

The danger of weakened tree trunks.

Limbing

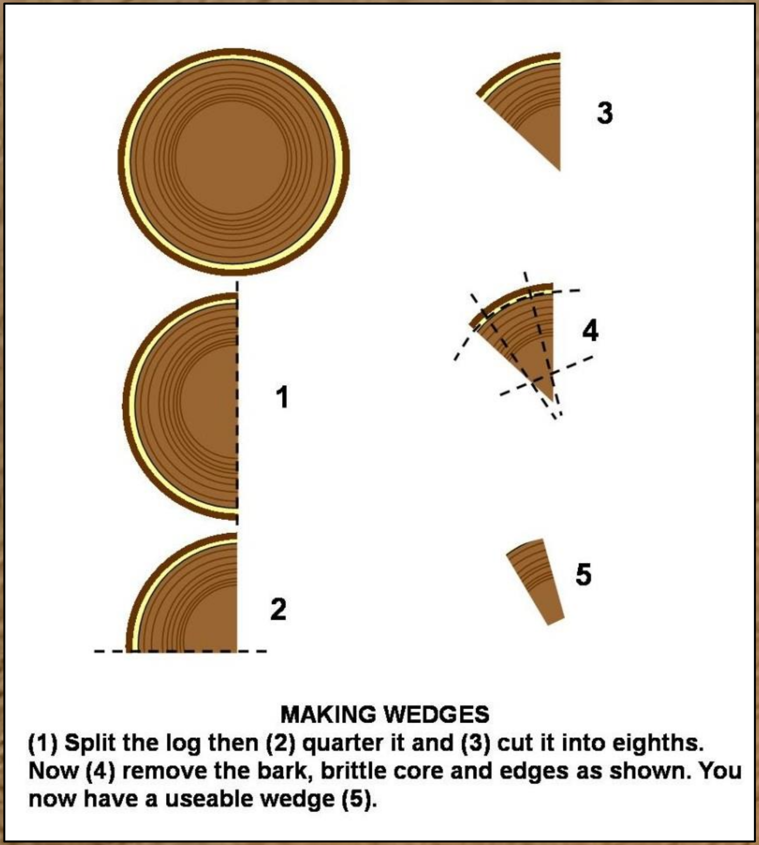
When a tree has been felled you now have to remove the branches before you can get to work on the trunk. The most effective way to remove the limbs is to cut in the direction in which the branches grow. The sequence of cuts for removing thicker branches is shown below. Make sure you stand on the opposite side of the trunk as this is the safest position from which to work. Using a protector log is an additional precaution - see next page. This is also a useful method when sectioning smaller logs into firewood.



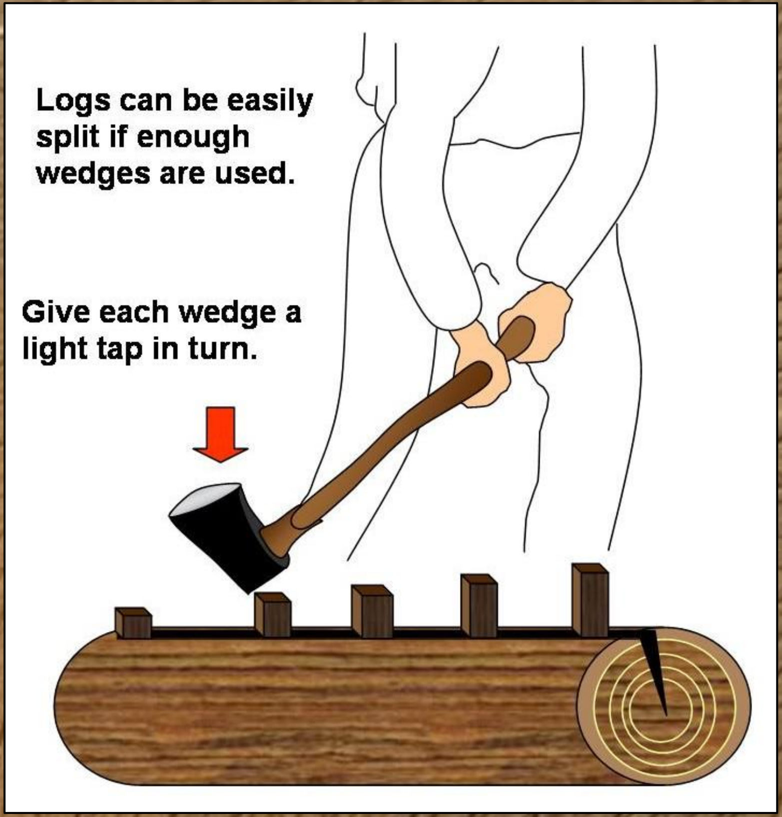
To chop a log into sections it is easier to cut it half-way through from opposite sides rather than attempting to cut it all the way through from one side. Stand close to the log as the axe handle will permit with legs well apart taking care to not let the toes protrude under the log. Standing too far back might cause your swing to fall short and either hit the ground or your lower legs.

Standing on top of a log or steadying it with your foot may result in injury to your foot unless the point of impact of the axe is kept well below the sole of the shoe – see above. The cut width should be the same diameter as the log with the cuts being made at a 45^0 angle to the centre line of the log. If the log is of a large diameter start with a smaller notch and increase its size progressively or the chips will dislodge with some difficulty.

The simplest way to split a log is to use wooden wedges. Figure below illustrates the way to make wedges for splitting large logs.

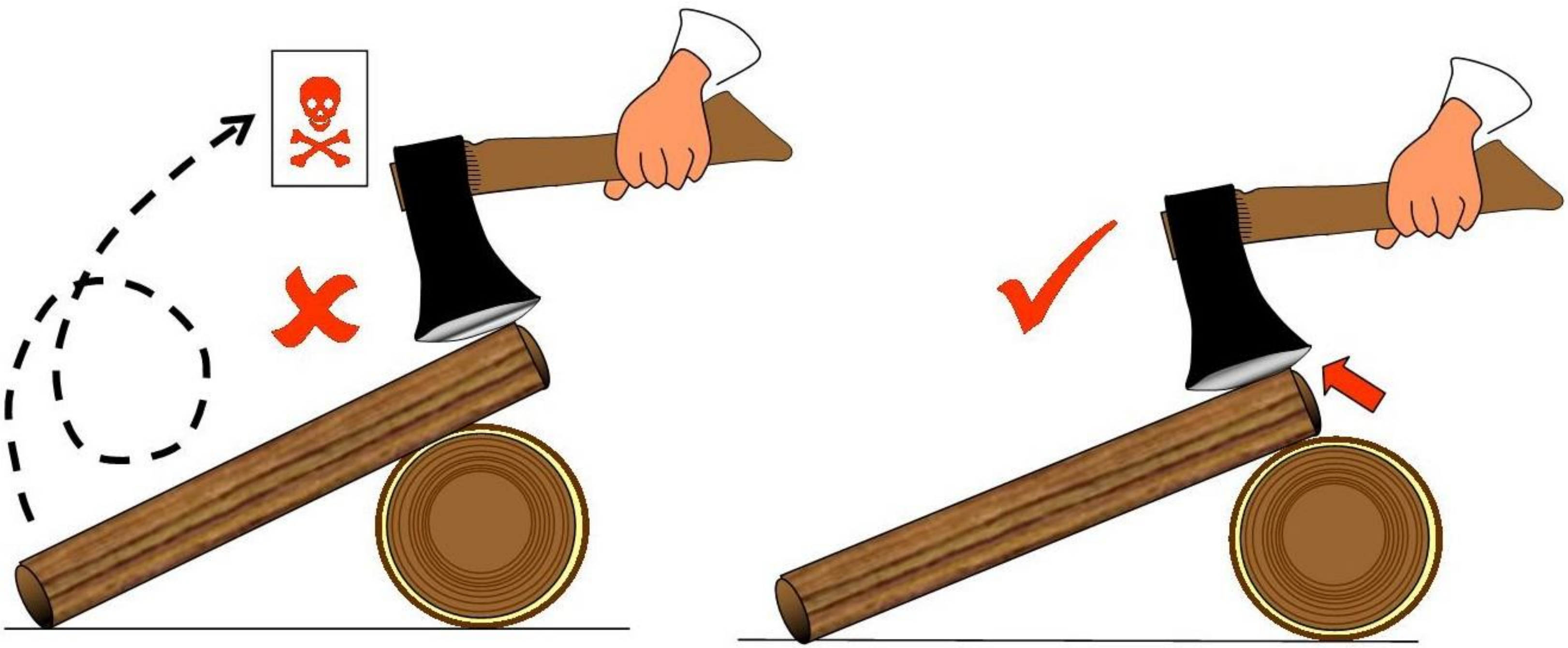


Place a number of wedges along the length of the log you wish to split and tap them in a little way at a time from one end to the other as illustrated below.

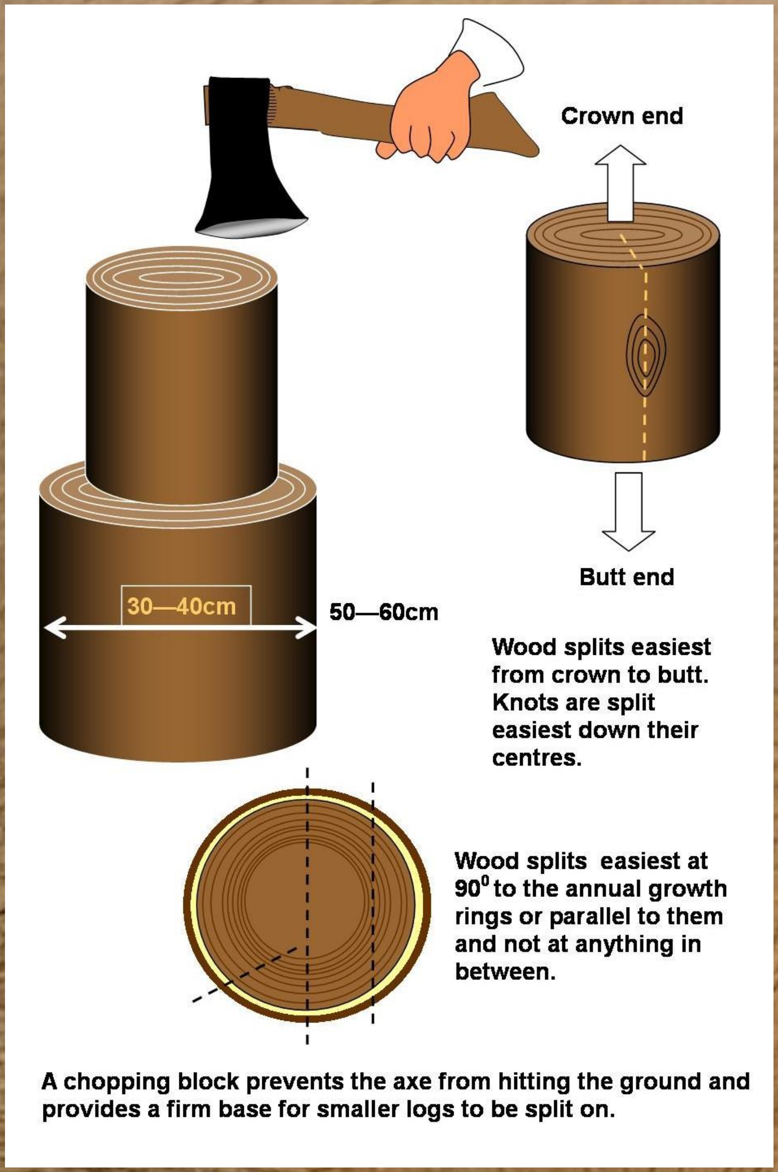


Making wedges for log splitting (above) and using wedges to split a log (right)

Take care when splitting up smaller logs as this is when accidents often happen. Make sure the support below the log lies directly under the point where the axe's point of impact will be otherwise the log might flip up backwards and hit you in the face – see below.



The end of the smaller log must coincide with the underlying support and the point of impact or it may flip backwards into your face. The heel of the axe should overhang the end of the log for effective splitting (see arrow).



Using a chopping block.

A chopping block is a very useful aid when sectioning logs as it provides a firm base of support and lifts the work up to a comfortable height. It also prevents the axe hitting the ground and damaging it. When splitting logs allow the heel of the axe blade to overhang the edge of the log slightly on impact as this splits the log more easily. Logs also split more easily from crown (the top of the tree) end to butt (the roots of the tree) end and either at 90^0 or parallel to the annual growth rings.

Hopefully this series on axecraft has been helpful, has shown what a useful tool an axe is in general bushcraft and survival and how to use it safely and effectively.

Sharpening an axe

What do you call a blunt axe? A hammer. Well that is a bit of “tongue in cheek” but a blunt axe is pretty useless as a cutting and chopping tool and so the good bushman should know how to sharpen an axe so that it can be used effectively for what it was designed for. Like a well sharpened knife a sharp axe should have an edge keen enough to shave with. A sharp axe provides the user with effortless, efficient and enjoyable work. Many people do not realize that a dull axe is more dangerous one to work with than a sharp one because it does not bite into the wood and glances off more easily. Most axes – even new ones – take from an hour to half a day to hand sharpen into proper shape. An axe should be sharpened on a regular basis – like after every half hour of use.

The first stage of sharpening is removal of unwanted metal by file, grindstone or coarse whetstone. Coarse grinding tools work quickly but leave a rough surface behind. The second stage, using a medium whetstone produces a finer edge. The third stage is a fine edge produced by the fine side of a whetstone and the final stage with a hard, smooth stone called a hone which should produce a mirror finish.

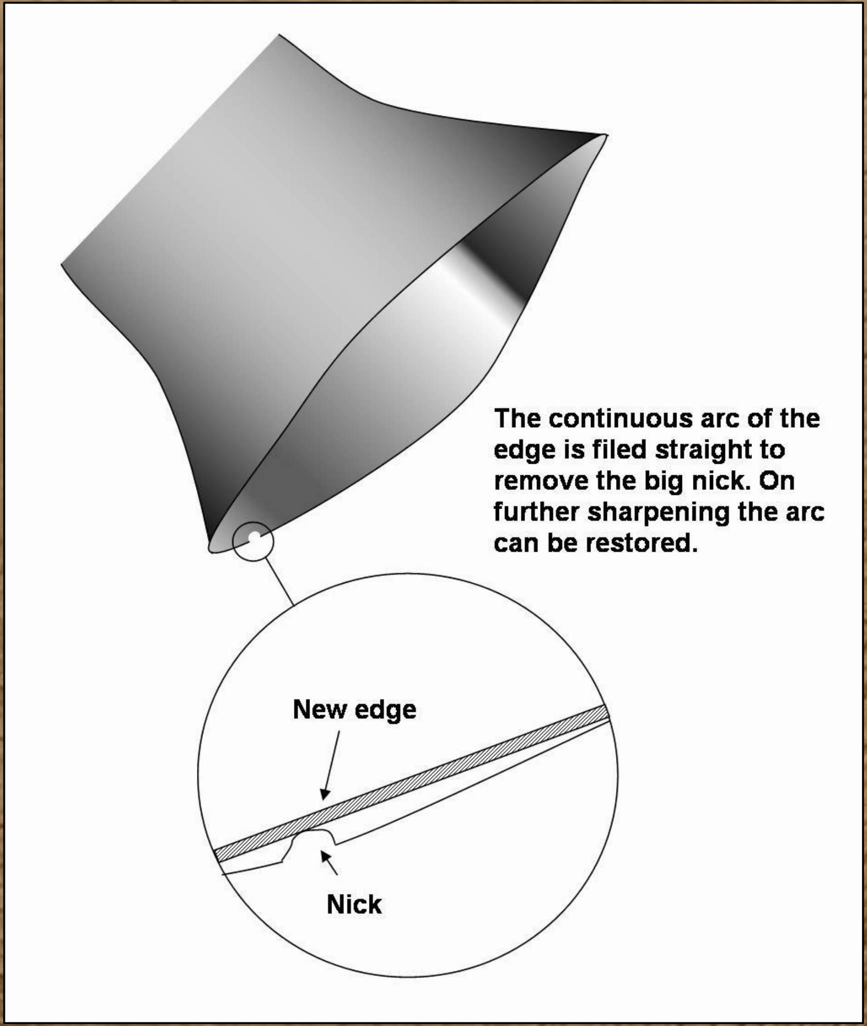
New axe blades may require a once off thinning which is accomplished with a file. The right file to use is a single cut with second teeth on one side and double cut bastard on the other. When the teeth are in parallel rows they are called single cut. Double cut teeth are crossed with a series of similar teeth. The “roughness” of a file is described as rough, bastard, second cut, smooth and dead smooth. A mill bastard is a small tough file that leaves a surface that is smooth and skips least on hard spots. Files must be well cared for to provide long service and should be separately wrapped in cloth when stored away. They should be protected from moisture and rust which weaken the teeth. Any material which can clog the teeth such as sap, oil or grease should be avoided and the teeth should be cleaned with a wire brush after use. To prolong the life of a new file fill the teeth with blackboard chalk which reduces clogging.

Sharpening an axe with a file

Apply only enough downwards pressure to get a light even cut. Excessive downwards pressure, especially on the backwards stroke can break file teeth and cause nicks in the axe blade. Hold the file handle in the palm with the forefinger pressing down lightly on the back of the file. On the return stroke lift the file from the axe surface.

The safest way of sharpening an axe but it leaves the heaviest burr. Apply slight downwards pressure on the forward stroke and lift the file from the axe surface on the backwards stroke.

Severe nicks on the cutting edge of the blade may take hours to remove. File out a straight edge where there is a nick which will regain its curvature with subsequent sharpening.



Experienced axe users file the axe towards the blade as this ultimately provides a better blade shape and thinner edge burrs. See next page. Filing in the same direction as the cutting edge is however a safer option.

Draw filing provides an extended life to a worn out file. The file handle is held in the palm of the hand over the poll of the axe and the opposite end is worked back and forth.


Apply slight downwards pressure on the forward stroke and lift the file from the axe surface on the return stroke. Not the safest way to sharpen an axe but provides the smoothest cutting surface. Be careful of not cutting fingers on the forward stroke.
TÜV GS


Slight downwards pressure is applied to the tip of the file and the other hand is worked back and forth. This is a useful method when working with worn files.

Sharpening an axe with a whetstone

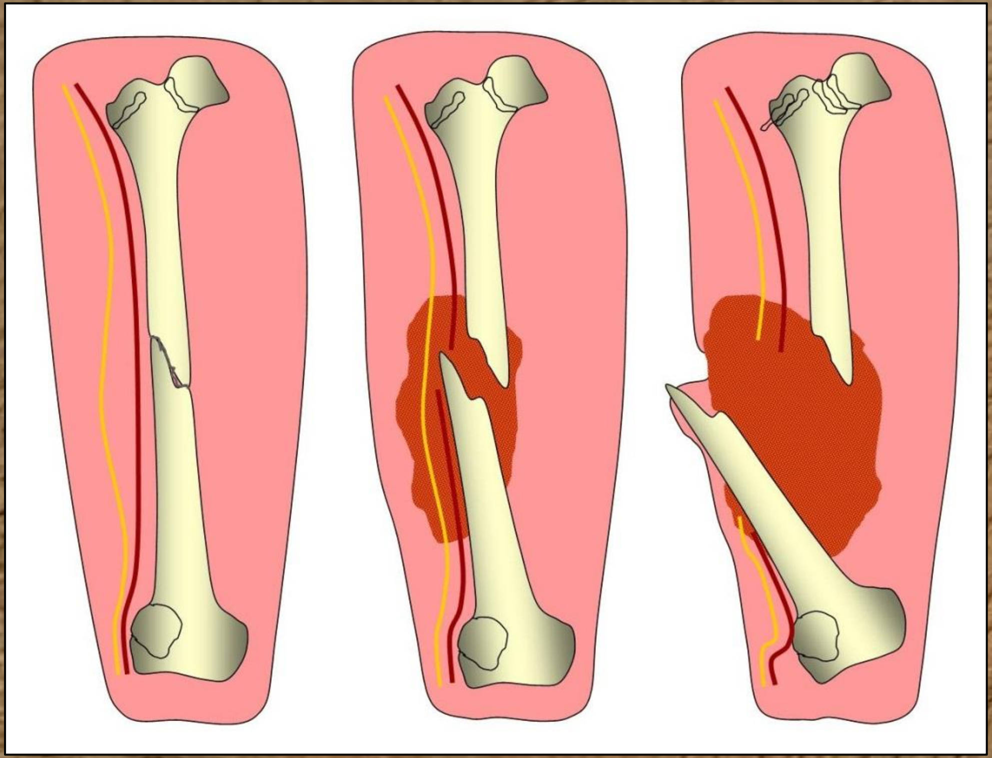
When traveling light or when in the bush a whetstone is an appropriate tool for maintain a sharp edge on the axe. A medium coarse stone will grind out any file serrations and fine stone grinds out the medium serrations to produce a workable edge. Round river stones provide a good natural alternative to commercial whetstones. A file works quicker than a stone but wears out more quickly. When properly cared for a stone can last a lifetime as it continually produces a new surface as the top one is worked away. In the space of a year you may end up wearing out a number of files each of which is more expensive than a whetstone.

When sharpening with a stone it is held about the perimeter with no fingertips projecting over the end. This is a sure way of cutting off the tip of a finger Whilst applying light downwards pressure the stone is moved in a circular motion along the cutting edge of the axe Use the stone in such a way that the surface wears out evenly.


Watch out for fingertips!
TÜV GS


When using a stone to sharpen an axe use a smooth circular motion to produce an even wearing surface on the stone.

Medical emergencies



In your survival first aid kit you should have at a minimum of the following:

2 Bandages – use for cuts or wounds or pressure bandages to control bleeding

4 Assorted plasters – use for cuts or wounds

1Alcohol swab and anti-septic swab – clean wounds

1 Sterile gauze – use for cuts and wounds as padding or to clean wounds

1 Rehydrate sachet – mix with water and drink if you have sweated excessively, have diarrhoea or have vomited to replace necessary electrolytes

***Anti-diarrhoea pills – drink the 2 pills if you have the first signs of diarrhoea**

***Anti-nausea pills – drink the 2 pills if you have the first signs of nausea**

***Anti-allergy pills - drink the 2 pills if you have the first signs of allergy**

*** Anthisan injectable and adenaline 1:1000 – for anaphylactic shock**

***Pain pills – drink as required**

1 Insect repellent – apply just before sunset to keep mosquitoes at bay

1 Burn gel – to apply to any burns

1 Oropharyngeal airway (adult) and 1 CPR mouthpiece – required when giving rescue breathing or CPR

HINT 1: ***The rope supplied in the kit can be used for a tourniquet and to tie splints into place in the case of fractures.***

HINT 2: ***The black plastic bag in your survival kit has a number of first aid uses (see Chapter The art of improvisation)***

* Make sure you are not allergic to any of the medicines in your kit.

In a survival situation a medical emergency may arise at any time as a result of an accident, negligence or sickness. You can avoid being negligent and take precautions against contracting diseases but sometimes things are beyond your control an accident resulting in trauma may occur and you might have possibly only yourself or that of a companion to deal with the emergency. It is advisable if you spend time in the outdoors to be properly trained in first aid. This chapter is not a comprehensive treatise on emergency medicine but will deal with some likely medical situations and how you can deal with them with a basic first aid kit.

Taking precautions

Prevention is better than cure. This saying is especially appropriate in a remote bush setting where you are far from the nearest medical help. Taking stupid chances is not acceptable. As a hunter taking calculated risk is acceptable. Hunting can be a hazardous pursuit and there are risks involved. If you are not prepared to accept these risks then rather stay at home. You can however take on these risks in a calculated way designed to stack the odds in your favour. Much of this boils down to common sense and the following general guidelines will help minimize risks to your health and well being:

- Always stay well hydrated (drink enough water)
- Don't drink unpurified water
- If you are not adequately armed steer well clear of dangerous animals
- Check your clothing and footwear before putting it on
- Watch the weather – take shelter from an approaching storm
- Stay cool in the heat and warm in the cold
- Practice basic hygiene – wash your hands before preparing food or after having gone to the toilet. Wash food before eating it.
- Take care when working with fire or hot liquids
- Be careful where you walk – take special care when walking where you can fall a distance
- Don't attempt to cross flooded rivers or streams
- Work carefully with sharp tools or instruments such as knives, axes or broadheads
- Chew your food well to prevent choking
- Rest when you begin to feel tired
- Keep an eye open for creatures that can bite or sting – bees, wasps, scorpions and snakes

Emergency priorities

Some medical conditions can be life threatening within minutes, others within hours, others within days.

The first aid ABC helps you to prioritize and stands for **A**irway, **B**reathing and **C**irculation.

We must be able to breath because our bodies need oxygen. Our brains begin to die without oxygen within four minutes and there will be different levels of permanent brain damage. After 6 minutes the brain is dead and nothing can be done to resuscitate the person. When airways are blocked or a person has stopped breathing we thus have 4 minutes to resuscitate the person without permanent brain damage resulting. To be able to breathe the airways leading to the lungs must be open and the person must be able to breath. The circulation refers to the functioning of the heart and bleeding. If the heart stops beating the brain will not receive oxygen and will soon die. If bleeding is severe a person can also begin to die within 4 minutes because not enough blood will reach the brain to supply oxygen.

Choking or airway obstruction

A person can choke on food, vomit, blood or the tongue. If the person is unconscious and lying on the back the tongue will fall to the back of the throat and close off the airway. To correct this position the head by tilting the neck (if no neck injury is suspected) and lifting the chin. Keep the head in this position and the airway will stay open.

If someone is choking stand behind them, clasp your hands just below the breastbone and squeeze upwards and inwards to dislodge the stuck object (this is called the Heimlich maneuver).

Continue until the object is expelled or if the person falls unconscious. If they collapse unconscious you must then straddle them and provide abdominal thrusts by pressing below the breastbone until the object is expelled.

Abdominal thrusts applied to an unconscious patient to dislodge an object lodged in the airway.

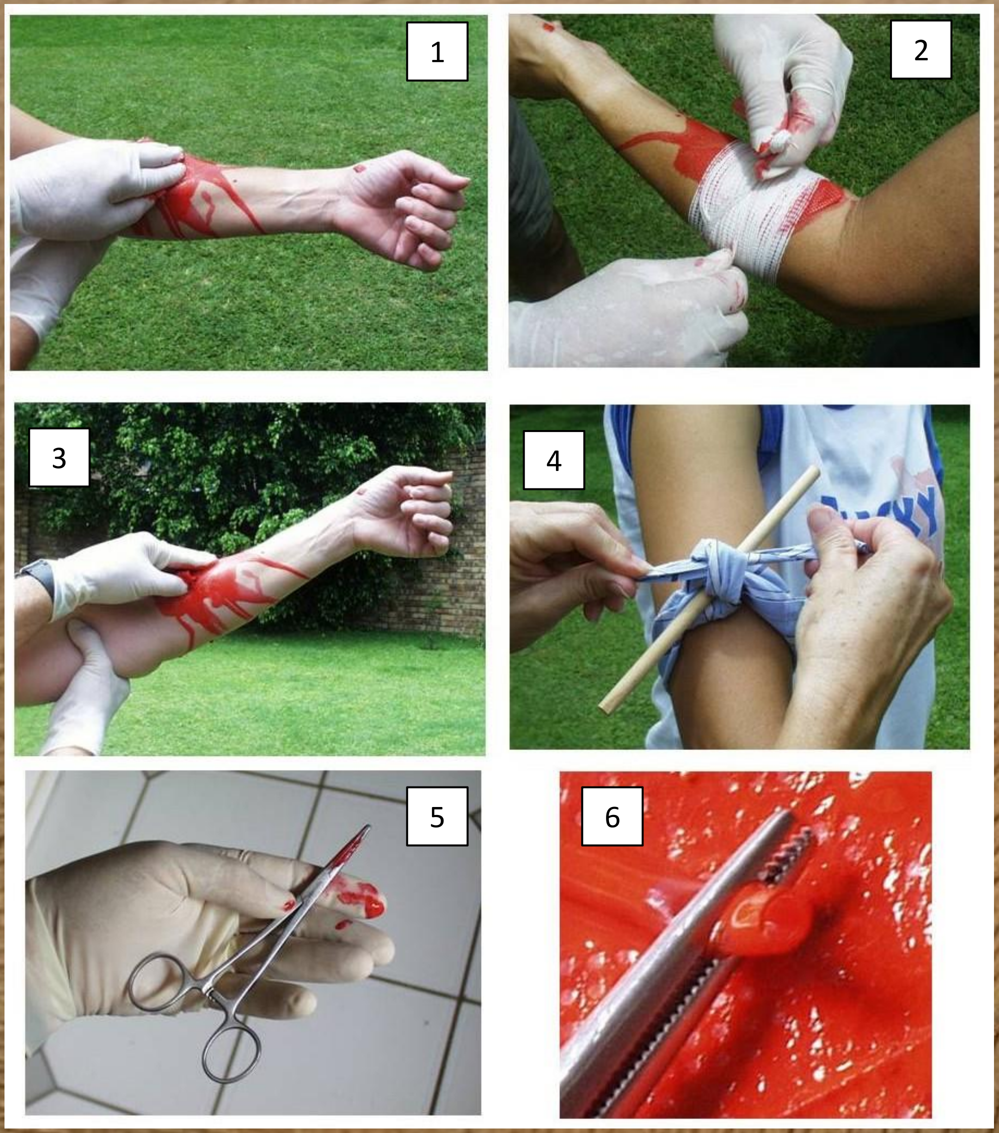
Rescue breathing and CPR

If a person stops breathing open the airway, pinch the nostrils shut and blow a full breath into the patients lungs. Check to see that the chest wall rises. For an adult breath 12 breathes per minute for a child or infant 20 breathes per minute.

If the heart has stopped you must breath for the patient and compress the heart to circulate blood. Give two deep breathes and five chest compressions over the heart and repeat the cycle until the heart begins beating and the person begins breathing spontaneously or until medical help arrives. Give 60 - 80 compressions a minute and 12 – 15 breaths. This is referred to as cardiopulmonary resuscitation (CPR).

If a person is unconscious but breathing place them on their side with the head tilted back. This is the recovery position.

Controlling bleeding



Apply direct pressure by hand or with a pressure bandage (1 and 2).

Apply indirect pressure to a pressure point and elevate the limb higher than the level of the heart (3).

Apply a tourniquet for serious life threatening bleeding (4). Loosen every 20 minutes.

Clamp off blood vessel with an artery clamp (5 and 6).

Fractures

Fractures must be immobilized with splints. Splints can be fabricated from sticks, board or folded paper.

Burns

Burns should immediately be cooled off under cold running water for at least 10 – 15 minutes. A wound ointment such as Burnshield or Flamazine can then be applied and a dry dressing.

Heatstroke

Heatstroke can be lethal. To treat heatstroke move the person to a cooler place in the shade and remove clothing (1 and 2). Sprinkle water on them and fan them down (3 and 4). Continue until the temperature stabilizes and begins to normalize. Give cold fluids to drink if the patient can keep them down.

Shock

To treat shock place the person on their back with legs raised as shown in 4 above. Treat the cause of the shock (e.g. if it is being caused by blood loss stop the bleeding). Keep the patient warm.

Wounds

The general treatment for wounds is as follows:

1. Stop the bleeding.
2. Clean the wound.
3. Apply an antiseptic ointment and a clean dry dressing.

Click on the icon to see how to treat a wound.

Irrespective of the size of the wound the principles are the same. Don't neglect to treat small, seemingly insignificant wounds as they can become infected and make you very sick.

Bites and stings

Bites and stings should be treated in an appropriate way.

To see how to treat snakebite click on the icon

To treat scorpion sting apply icepacks or cold water if you have it. Get to medical help as soon as you can.

To treat the bite of a venomous spider you must get to medical help as soon as you can.

Bee stings are not serious in people that are not allergic to bee stings. You should carry anti-histamine tablets with you if you are prone to allergies. If you are allergic to bee sting you should carry injectable anti-histamine and adrenaline with you and if you start showing signs of anaphylactic shock you must inject yourself with anti-histamine first to see if the condition improves. If your condition deteriorates further you must inject adrenaline.

Nausea and vomiting

There are a number of things which can make you nauseous and cause you to vomit. In a wild remote situation this can be serious as it can lead to dehydration and even death.

To treat nausea and vomiting you should take anti-nausea pills such as Valoid, which you should have in your first aid kit.

Diarrhoea

Diarrhoea can also lead to dehydration and if this is accompanied by vomiting the situation can become very serious. Treat diarrhoea with medication such as Lomotil which you should have in your first aid kit.

If you are suffering from vomiting and / or diarrhoea treat as described above and try and replenish your fluids by drinking water or fruit juices.

Low blood sugar

Imbalances of blood sugar can be life threatening as your brain needs sugar (glucose) to be able to function.

If you are a diabetic you should carry your medication with you at all times. If you are not aware of being a diabetic and you suddenly start feeling very weak then suck some glucose sweets, eat some fruit or drink some liquid with a high sugar content as your symptoms could indicate that your blood sugar levels have dropped dangerously low.

Pain and fever

Pain and fever can be treated with Disprin or Panado which you should also have in your survival first aid pack.

Natural medicines

Natural remedies are available in the bush. Some of these will be dealt with in the Chapter Useful plants.

Navigation skills

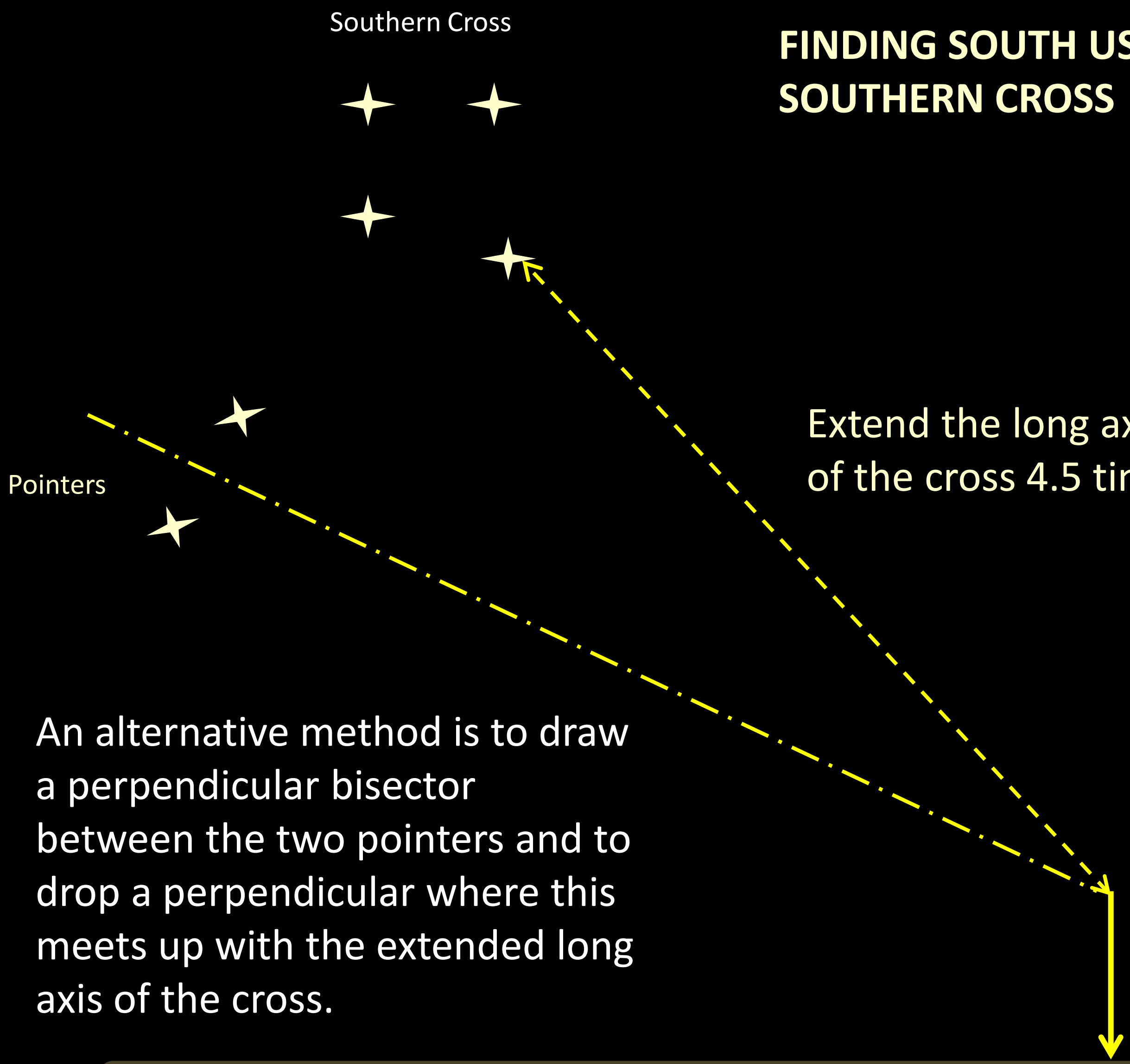
Always try and keep your bearings when you are walking in the bush. It is very easy to get lost. Before going into unfamiliar territory study the area using maps, Google earth, or aerial photographs, so that you become familiar with the landscape and prominent features such as roads, mountains, rivers and settlements. You can print out a copy of the area you will be working / hunting / walking in on Google earth and carry this with you.

Natural features we will use for navigation are sun, moon and stars.

Using the Southern Cross at night. Extend the long axis of the Cross 4 ½ times and drop a perpendicular to the horizon to find south. This is illustrated on the following page.

Getting lost in the outdoors is not only frightening – it can have life threatening consequences.

FINDING SOUTH USING THE SOUTHERN CROSS



Extend the long axis of the cross 4.5 times

An alternative method is to draw a perpendicular bisector between the two pointers and to drop a perpendicular where this meets up with the extended long axis of the cross.

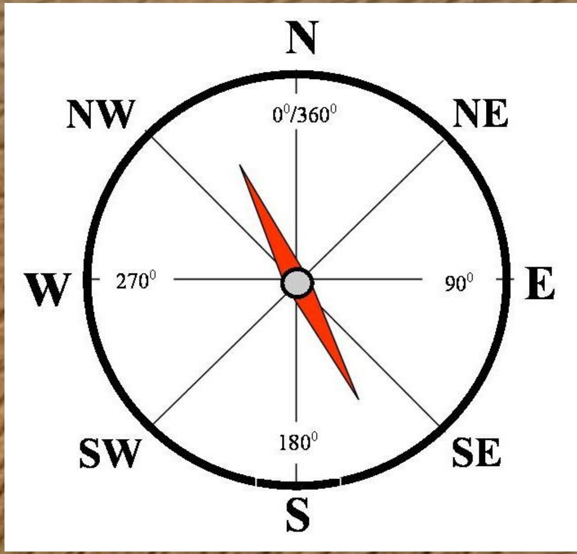
Drop a perpendicular line to the horizon. This will give you celestial south.

Using the sun and moon to orientate yourself

The sun rises more or less in the east. It actually moves northwards towards winter rising north east in the middle of the winter. It rises due east at the height of summer. The sun sets in the north west at midwinter and more or less due west at midsummer. The moon always rises due east and sets due west. It is thus relatively easy to orientate yourself at sunrise, sunset or moon rise or moon set.

To determine where north and south lie at sunrise or sunset the following applies. At sunrise with the sun on your right you will be facing north with south behind you. At sunset with the sun on your left you will be facing north with south behind you.

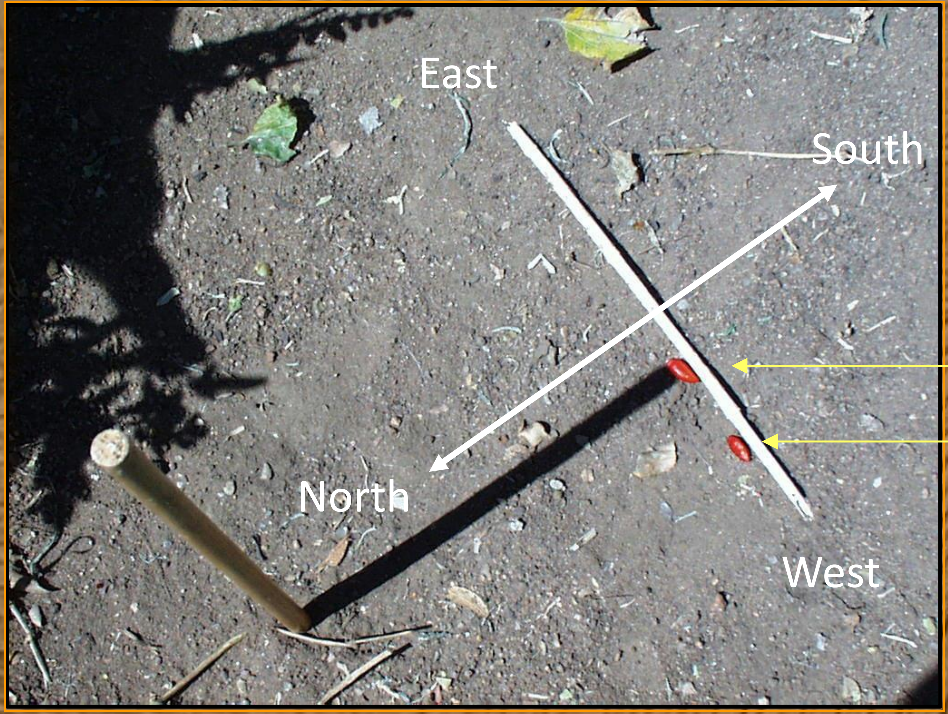
Once you have determined where north or south are it is then relatively easy to determine the other cardinal directions



It is often very difficult to determine direction during the middle hours of the day when the sun is high in the sky. You can then use the stick and shadow method.

Stick and shadow method

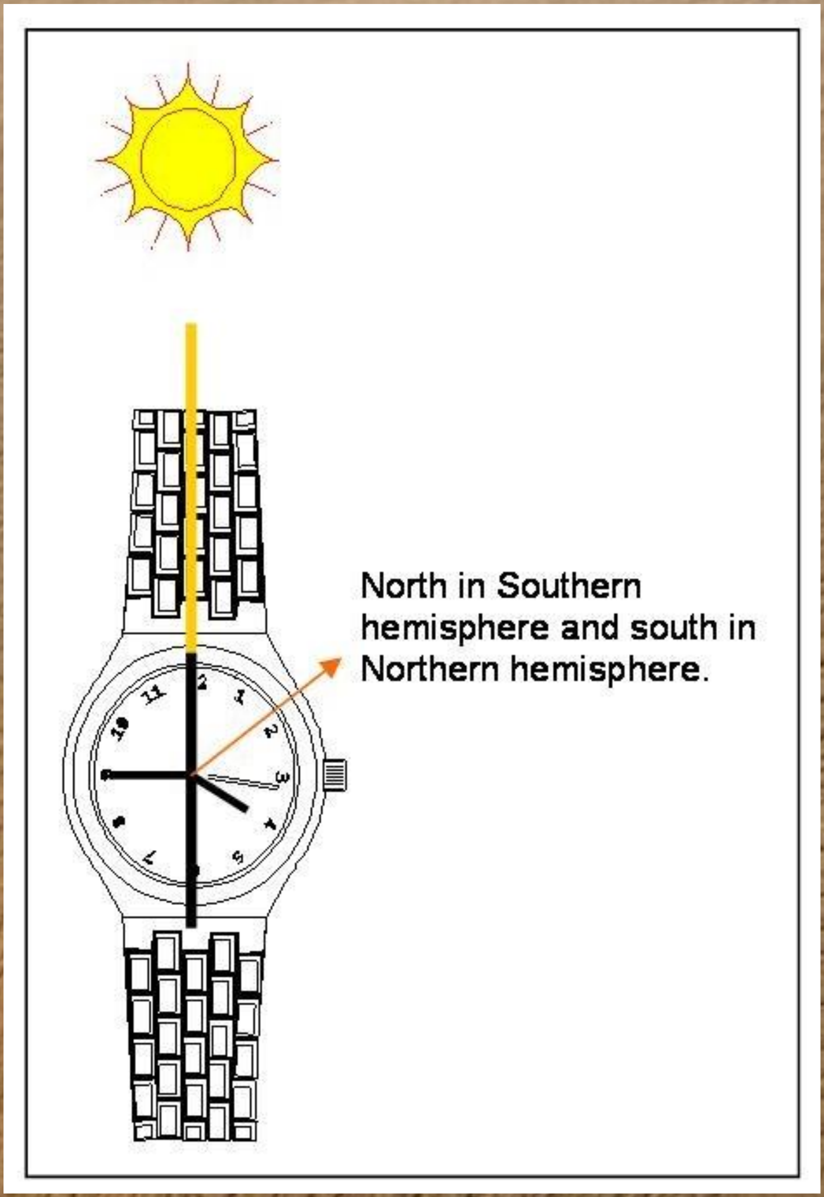
Place a stick vertically in the ground. Mark the point of the stick's shadow every hour. The point of the shadow will move from west to east. The point of the first shadow will be west. Construct a line perpendicular to this one. This will be the north/south line. When facing north, west will be on your left and east on your right.



Sun and watch method to find north

Most of us wear a watch. If you have an analogue watch (with hour hands) it can be used as a navigational instrument.

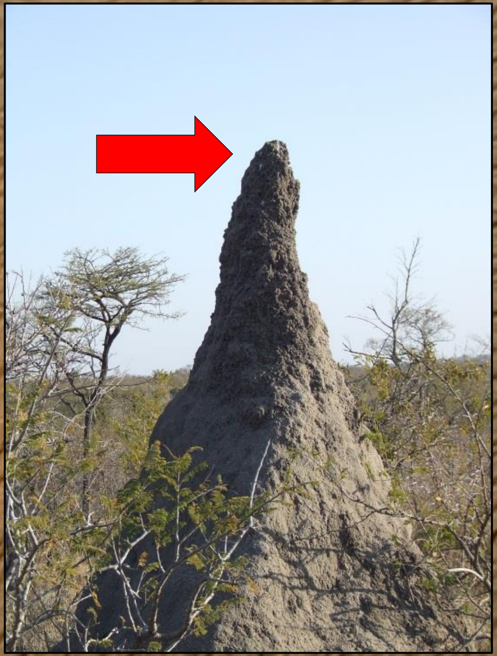
Place a piece of grass vertically at the 12 o'clock position so that its shadow falls across the face of the watch. Rotate until the shadow falls through the 12 and the six. The 12 o'clock position will be pointing towards the sun. Bisect the angle between the 12 o'clock position and the hour hand on your watch. This will give you north in the southern hemisphere.



Natural indicators

Apart from the sun, moon and stars there are some natural indicators which can help us navigate in the wilds.

- Major river systems in Africa run more or less in an east west direction.
- Communal nesting birds such as social weavers and buffalo weavers build their nests on the north to north westerly side of trees.
- The tips of large termite mounds often bend to the north.



- The southern sides of trees and rocks usually have more moss because moss prefers growing on the cooler side.
- The southern slopes of hills have more vegetation than the northern slopes which are warmer and drier.

The northern aspect of the trunk of this tree has no moss growing on it (above left) whereas the southern aspect which is cooler and has more moisture has moss growing on it (above right)

When hunting or walking in unfamiliar territory mark your back trail with some easily visible material such as toilet paper. This will help you find your way back.

If you get lost climb to a high point to orientate yourself with respect to your surroundings

A useful item in a survival kit is a combination liquid filled button compass and thermometer. On the back of the thermometer is a wind chill factor chart. The thermometer can be useful to you in knowing when to cease activity and rest or seek shelter to keep warm or cool as the case may be.

To use the button compass place it flat on the ground and away from any metal objects made of steel or iron. Don't stand near fences or under power lines as these may cause a faulty reading on the compass. Allow the compass needle to come to rest. It will indicate north to you and enable you to navigate.

If you are walking in the bush to a destination try and walk in as straight a line as possible and avoid frequent changes of direction as this can lead to disorientation. If you are lost use a map if you have one with you and try and recall the layout of the area from memory. Draw a rough map on a piece of paper, material or even on the ground. Decide on a direction to take to the nearest help and use your compass to stay on that direction (bearing).

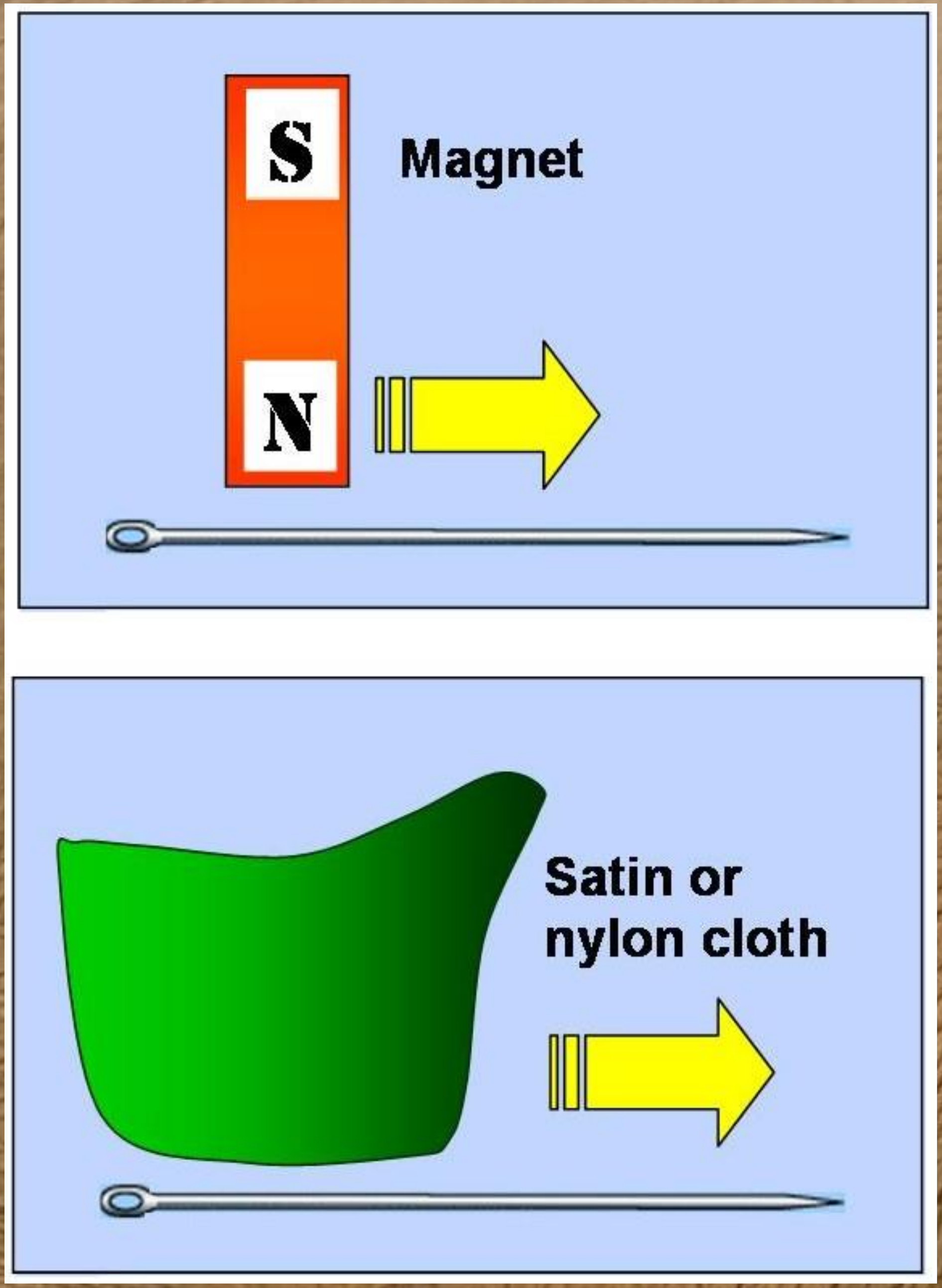
One of the survival skills we should all practice at is learning to improvise.

Improvisation could be defined as using something for a purpose other than what it was designed for. The difference between being reasonably comfortable and decidedly uncomfortable, going hungry or finding something to eat, dying from thirst or having enough to drink often hinges around the individuals ability to improvise.

A good way to practice is to look at different everyday items and figure out for yourself the different ways that particular item could be used in a survival situation. It needs some “out of the box” thinking but once you get the hang of it you will surprise yourself with what novel and useful ideas you can come up with.

What would you do if you lost your compass and did not have a navigational aid. Well you could navigate using natural indicators or you could improvise a compass. Here’s how.

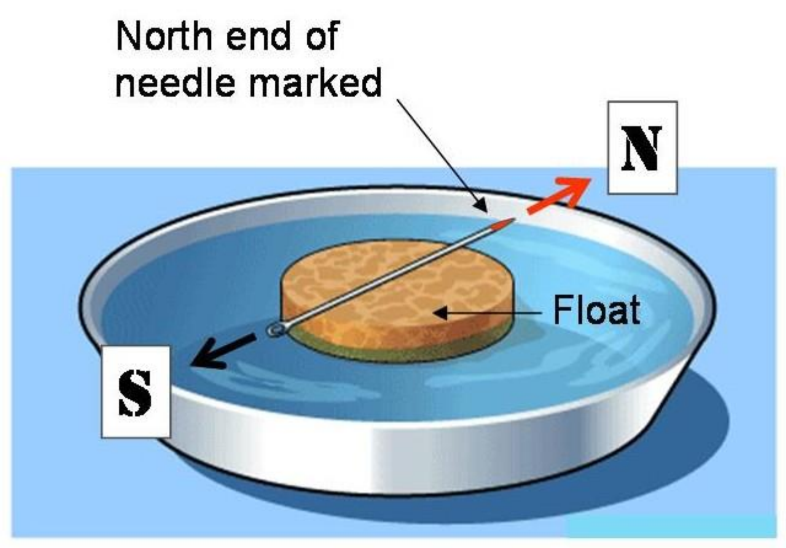
Firstly we need a small and light piece of steel which can be easily magnetized. A good choice is an ordinary sewing needle (something most ladies would have in a handbag and something you should always have in your survival kit.). Now there are two ways of magnetizing the needle. These are shown on the following page.



Method 1: If you have a magnet, stroke the needle in one direction 10-20 times.

Method 2: If you do not have a needle take material made of nylon or silk and stroke the needle, again only in one direction, for 30-40 strokes. Either method aligns negatively charged electrons on one end of the needle leaving the opposite end positively charged. The needle is thus "magnetized".

We now need to place our needle in a medium which will allow it to rotate freely but at the same time dampen excessive movement. Water will do fine for these purposes. Place some water in a small container such as the lid of a bottle. Now unfortunately the needle will sink if we place it directly in the water so we must place it on some object that is light enough to float on water. A small piece of greased paper, cork or even a leaf will work. When the needle is placed on the float it will rotate to align itself with the earth's magnetic field. All well and good but how will we now which end is south and which is north. At a time of the day when you can be pretty sure where north and south is (such as at dawn or sunset or when the moon rises or sets) place your improvised compass on the ground away from any metal object and when the needle comes to rest mark the north end of the needle in some way.



Magnetizing a compass needle with a magnet or satin cloth and then floating the needle on a leaf in some water makes a functional compass.

A quality liquid filled prismatic or flat compass should definitely find a place in your survival kit.

An extremely useful navigational tool is a GPS. If you can afford one include it in your survival kit with an extra set of batteries or two. Learn how to use the instrument by following the manufacturers instructions.

Use of a compass

When using a compass the following guidelines should be followed:

- Hold the compass horizontally when taking a reading.
- Make sure that the compass is not stored in or close to heavy-metal objects.
- When taking a bearing ensure that the hairline is exactly in the middle of the sight to avoid parallax errors.
- Hold the compass steady. This can be made easier by resting the compass against a tree or on a long stick when taking a reading.
- Keep the compass away from metallic objects when taking a bearing — remember the compass needle is magnetized and will be affected by metal objects close to it such as weapons, vehicles, fences, and spectacles for example. If the needle does not stabilise sufficiently it must be re-magnetised or replaced.
- Important bearings must be repeated a few times to make sure.
- Make certain that readings taken from the protractor are correct.
- Check for magnetic disturbances before taking your bearings.
- Make sure that the point to which you are taking a bearing has been correctly identified.
- Handle the compass carefully. It is a delicate instrument.

Use compass and chart or map for navigation and orientation

Types of maps

It is extremely important for a hunter to be able to read and interpret a map correctly

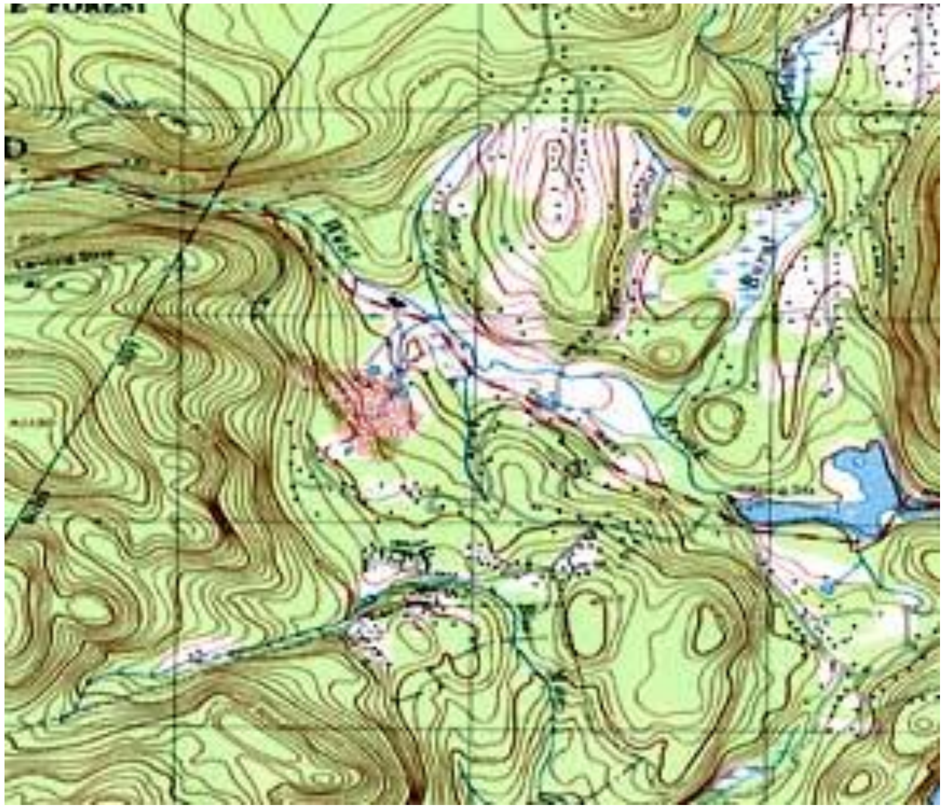
The aim of a map is to project the earth or part of the earth onto a flat surface. The map represents the surface at a reduced scale, as well as the physical, cultural and natural features of the location being mapped.
To avoid putting too much information on a map, different types of maps are used to record information:

Communication maps
Sea and air maps
Topographical maps
Political maps
Statistical maps

Name and map number

Scale

1:50 000 3285 AC LETABA 1:50 000



Magnetic declination 4^{0} west of north
Map produced in 1998

Three norths
Magnetic
True
Grid

Scale for measuring distance

SCALE
1:50 000

3285 LETABA
This map was produced in 1998 by the Geographical Survey Department Of the Government of South Africa

LEGEND
Roads
Rivers
Contours
Huts
Powerlines

Symbols used on map

A topographical map

“Reading” a map

The aim of map reading is to be able to formulate a correct mental picture of the earth’s surface or part thereof without having seen it. It is also possible to determine heights and distances on a map. Furthermore it enables you to navigate with precision. The ranger needs access to the following information to read and interpret a map correctly:

The meaning and use of symbols and geographical terms
The scale of a map and how to use it
How to determine directions on a map
How to orientate a map
How to calculate and read off grid references
Methods to determine elevation

Directions on a map

There are three north directions indicated on a map. North is always at the top of the map.

a) **True or geographic north**

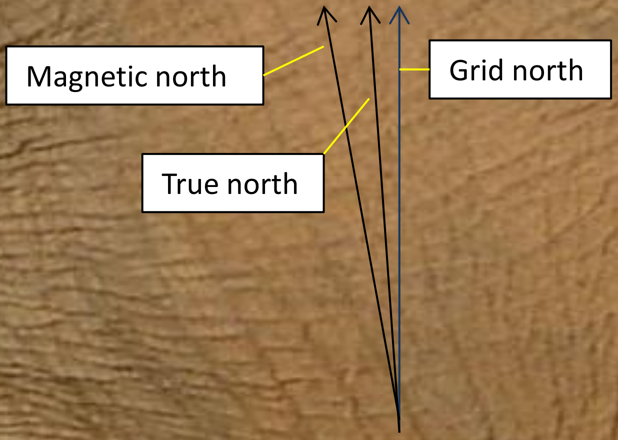
This is the direction in which a person standing somewhere on the earth's surface must travel to reach the North Pole by the shortest possible route.

b) **Grid north**

This is the direction pointing north to which all the east lines of a grid net are directed. Because grid lines lie parallel to each other, each grid line has its own north direction.

c) **Magnetic north**

A compass needle comes to rest in this direction. The position of the magnetic north pole is not constant, changing slowly over time. The changes to "compass north" are due to the following three changeable factors:



- The position of magnetic north pole
- Local magnetic disturbances
- Internal compass errors

The difference between true north and magnetic north is referred to as "*magnetic declination*".

Map symbols

The aim of map symbols is to represent physical and geographical features in schematic form. To be able to read and interpret a map correctly and intelligently it is important to study the symbols which are indicated on the map. See Figure 1.

Map scales

The scale of a map is the relationship between the actual horizontal distance between objects on the earth's surface and the distance between a schematic representation (symbol) of those objects on a map.

The relationship between the actual and represented distances is expressed as a fraction.

<u>Example:</u> 1:250 000 or 1 / 250 000

The advantage of this method is that it is international and easy to understand. The scale is just a relationship and it does not matter what unit of measurement is used.

On a map of scale 1:25 000 1 meter would be equivalent to 25 000 meters on the ground or 1cm would be equal to 250 meters.

Orientating a map

Orientating a map means to place it on the ground such that the relative positions on the ground correspond to that of the map. Maps can be orientated in one of three ways:

a) **Orientation with the aid of a compass**

This is the most accurate way to orientate a map. There are two methods, the one very accurate and other very quick.

Accurate Method

Determine the magnetic declination on the date of observation and draw it in on the side of the map. Draw in compass north if it has an error.

Lay the map down horizontally (1)

Place the compass on the map, so that the hairline of the compass coincides with compass north (2)

Rotate the map until the compass needle, hairline and compass north coincide. The map is now orientated (3)

Grid nets

To record the geographical co-ordinates of places in terms of degrees, minutes and seconds is too time consuming for field operations when using a map and compass. Grid nets are used instead so that relative positions can be indicated easily on a map.

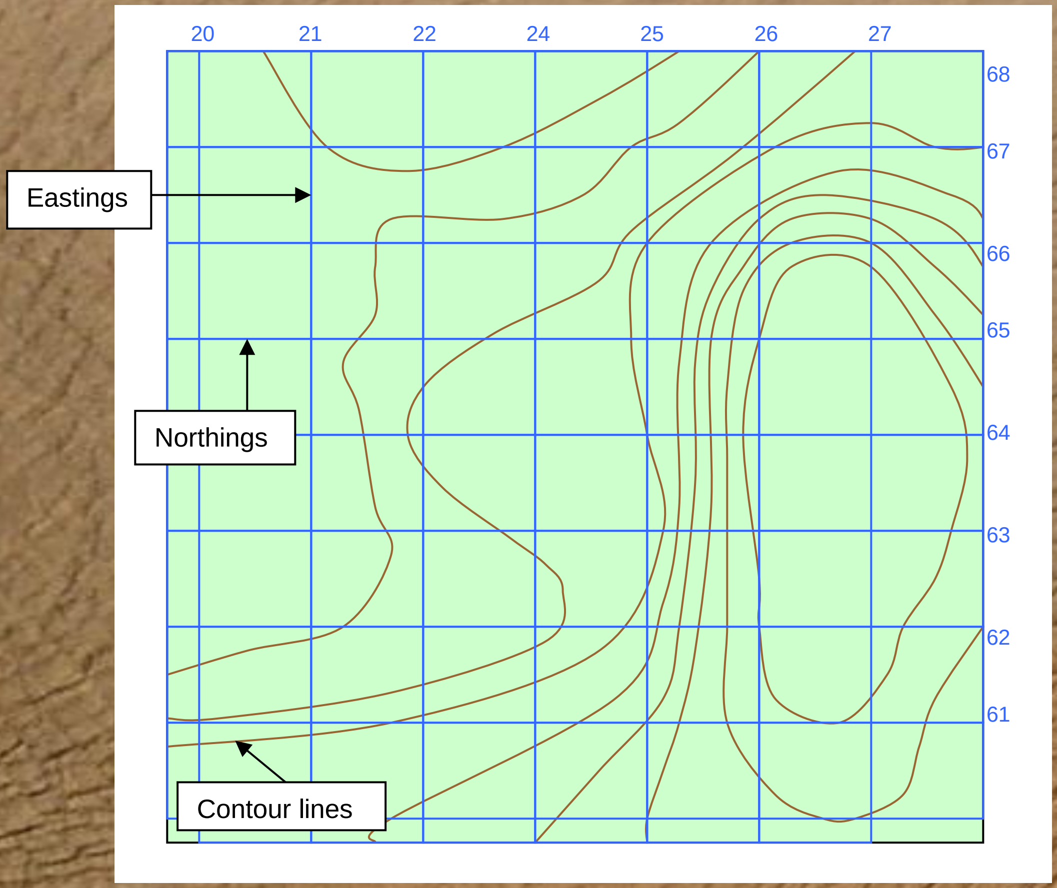
The earth is divided up into 60 grid zones of 6^0 each and numbered so that:
Zone 1: 180^0 –174^0W with 177^0W as central meridian
Zone 2: 6^0W – 0^0 with 3^0W as central meridian
Zone 3: 0^0- 6^0E with 3^0E as central meridian
Zone 4:174^0E – 180^0 with 177^0E as central meridian

Easterly lines

Straight lines equidistant from the central meridian are drawn on each 6^0 map zone to indicate distances lying EAST of the zone origin. These equidistant straight lines are called EAST LINES (or EASTINGS) and indicate GRID NORTH. The central meridian is the central east line of the particular zone.

Northerly lines

In the same manner straight lines equidistant from the equator are drawn perpendicular to the easterly lines to indicate distances NORTH of the origin of the particular zone. These lines are called NORTH LINES (or NORTHINGS).



Grid lines on a topographical map

Spacing and numbering

The spacing of the east and north lines remain constant on a map and depend on the scale of the map. On small scale maps it is 100 000 meters, medium scale maps 10 000 meters and on maps with a scale greater than 1/100 000, 1000 meters. The east and north lines on a map represent therefore distances to the origin of the zone in units of 100 000 meters, 10 000 meters, or 1 000 meters depending on the scale of the map and are numbered accordingly.

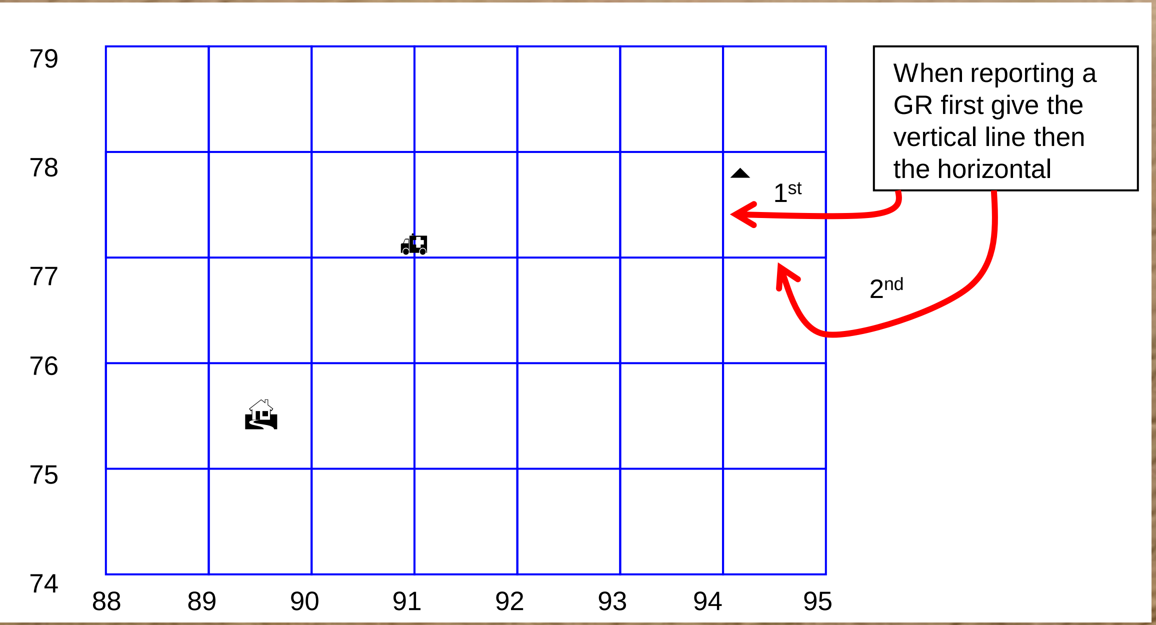
6 Plotting position

Grid reference (GR) system

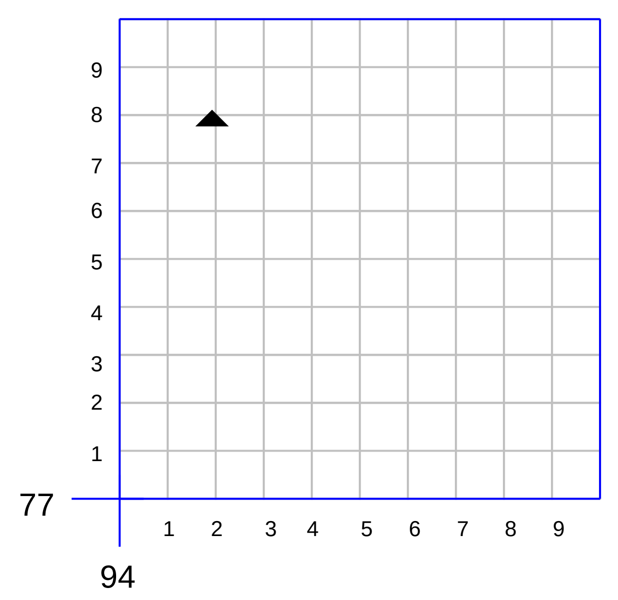
There is always an equal number of figures in a grid reference. The first half of the letter sequence gives the easterly location and the second half of the grid reference the northerly location - i.e. first read the north (perpendicular) lines (which indicate distance east of the zone origin) and then the east (horizontal) lines (which indicate distances north of the zone origin).

In a six figure grid reference (GR) the first two letters of each half are read off directly from the map and the third letter of each half estimated. The third letter indicates a position within a grid square of 1000 x 1000 meters to the nearest 100 meters. The origin of a point within a grid square is read in relation to the SW corner of the grid square. For general field work a six figure GR is normally required. A more accurate 8 figure reference can also be given.

Some examples of how to indicate a GR are illustrated on the following page



The Grid Square in which the black triangle is located would be indicated by the grid lines 94 (vertical) and 77 (horizontal). We can say the black triangle is in grid square 9477. This is a 4 figure GR.



If we wished to be more accurate we can estimate the position of the triangle within the 9477 grid square by mentally dividing this square up into ten small squares and seeing within which squares the triangle falls.

A 6 figure GR for the position of the black triangle would be 942778. The six figure GR for the house in the top map would be 895755 and the vehicle 910772.

Determining distance on a map

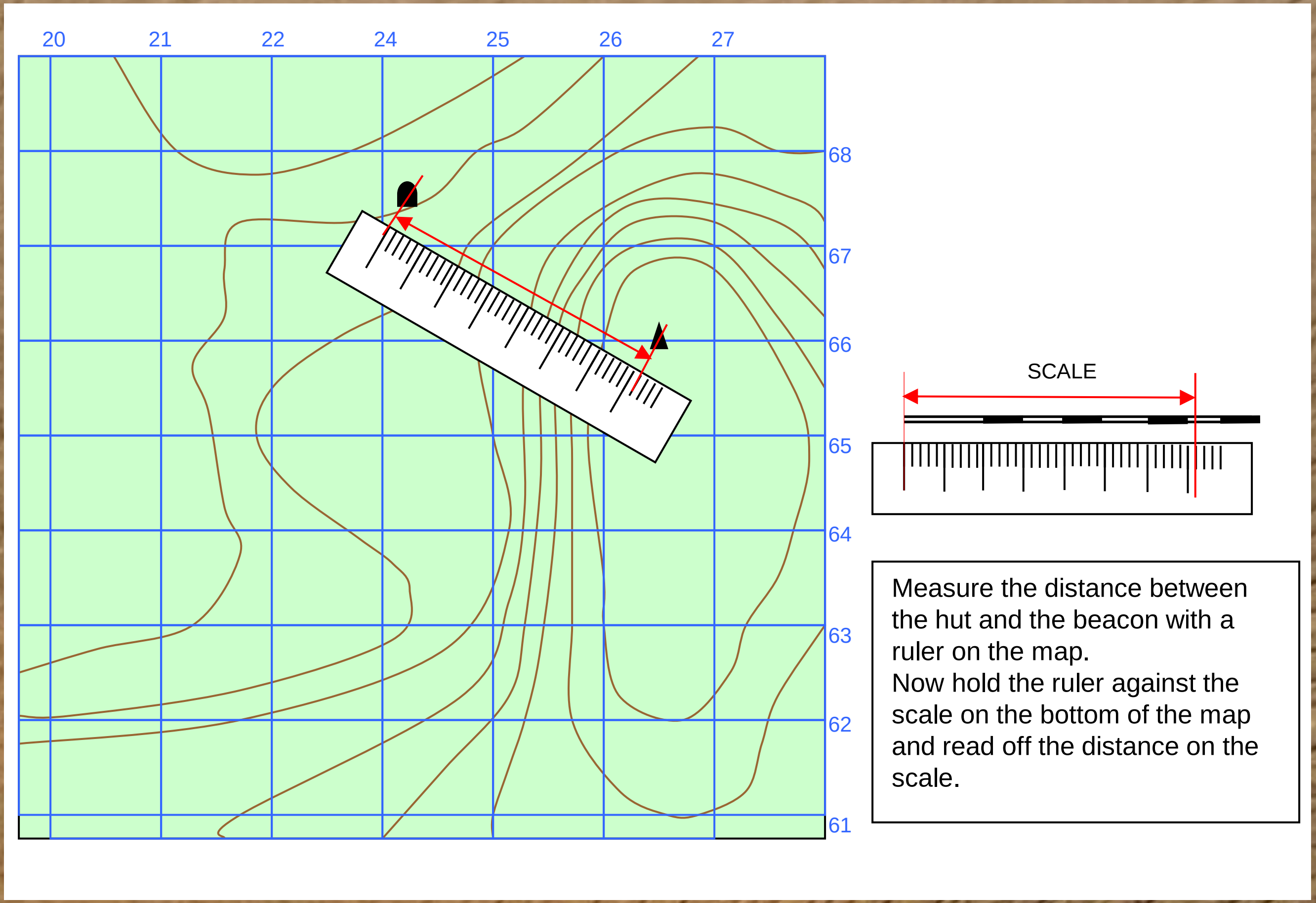
Decide on which distance you require to know.
Measure the distance with a ruler and compare it to the scale which will be indicated on the map to determine the physical distance on the ground.

The grid squares can also be used to measure distances.
If a quick estimate is required the grid squares between points can be counted. This will only be an approximation.

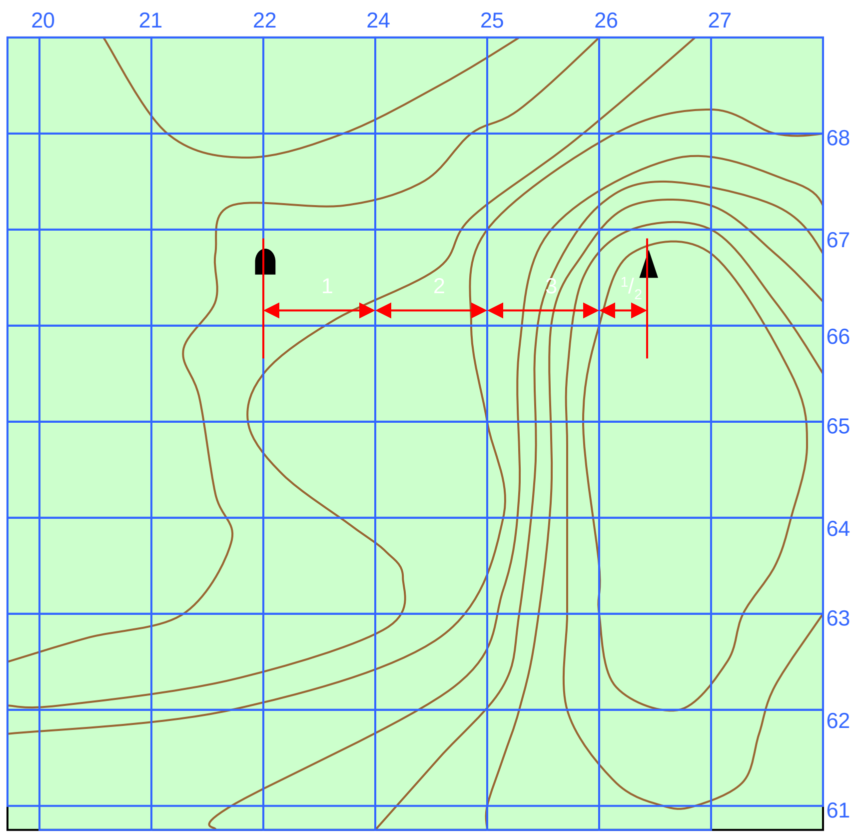
If the distance you wish to measure consists of bends and curves use one of the following methods

> Using the edge of a piece of paper lay it along the different legs or bounds of the route you wish to measure and mark off with a sharp pencil to obtain a straight line which can then be compared to the scale on the map. This will be demonstrated practically.

Using a thin piece of wire or a length of flexible grass or string bend and lay it along the distance to be measured. Straighten it out and compare it to the map scale.

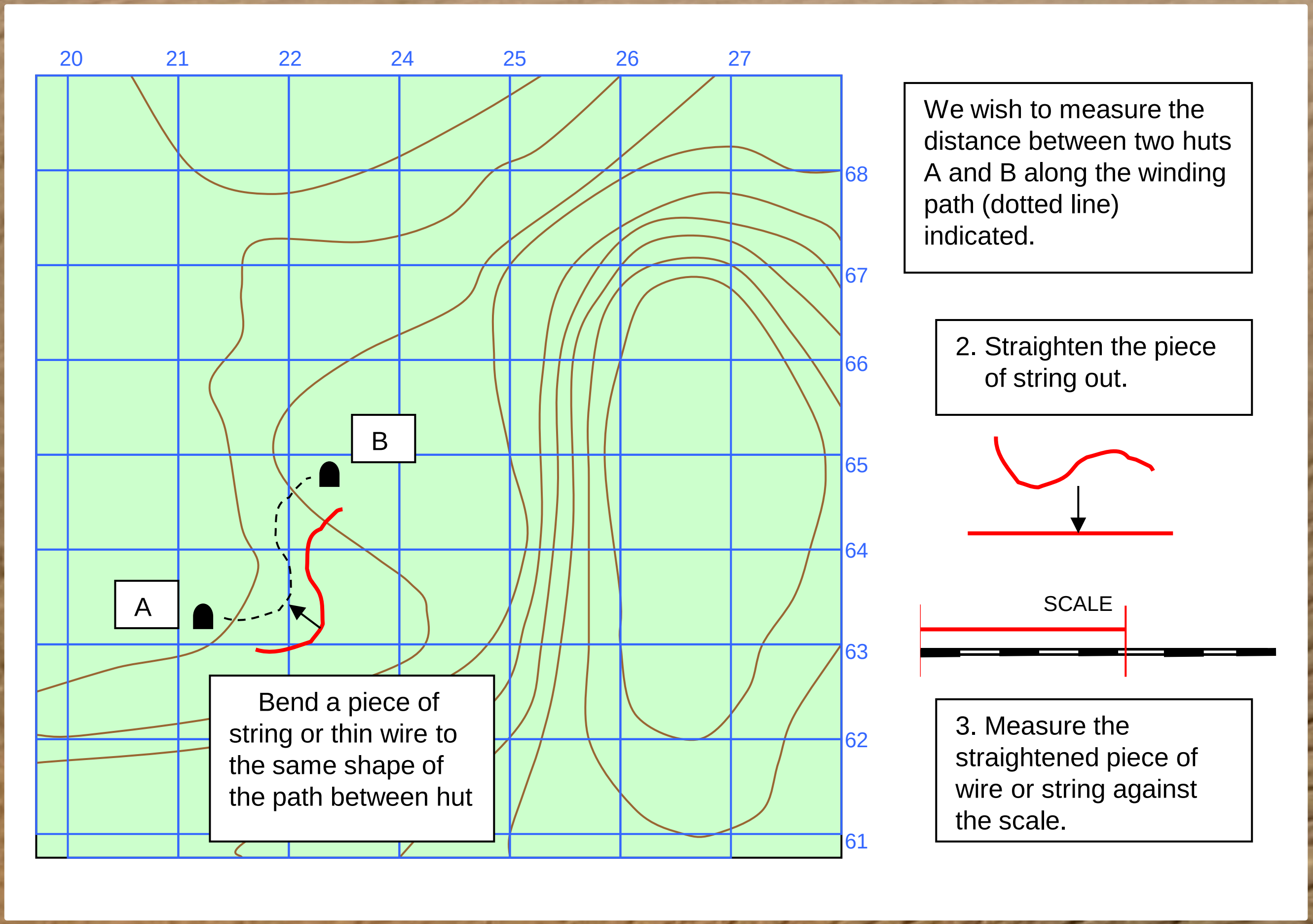


Measuring distance by measuring with a ruler and comparing it to scale.



If we know the scale of the map (e.g. 1 grid square is equal to one square km) then by counting the number of squares we can determine the distance between two points.
In this example the house is $3^{1}/_{2}$ squares from the beacon.
Therefore $3^{1}/_{2}$ x 1km

Measuring distance by counting grid squares and part thereof.



Measuring distance along a non-straight line.

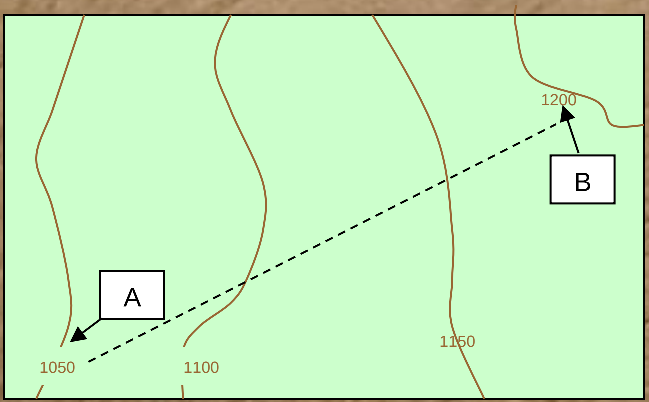
Reading contours

Although a map is a flat (two dimensional) object the contours indicated on it (brown lines) can be read to interpret the map in three dimensions. One can then see in your minds eye what the terrain would actually look like in real life (in three dimensions – length, breadth and height).

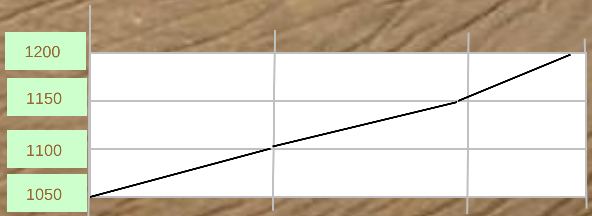
A contour line is a line joining points having the same altitude / elevation above sea level.

On a map the height between contours (between the brown lines) is either 50 feet or m. This will be indicated on the map. The gradient steepness will be indicated by how close the contour lines are together. If the contour lines are very far apart it indicates that the terrain is fairly flat. If the contour lines are closer together the gradient may be gentle. Closer together still and the gradient indicated is moderate. Very close together indicates a very steep to sheer cliff gradient.

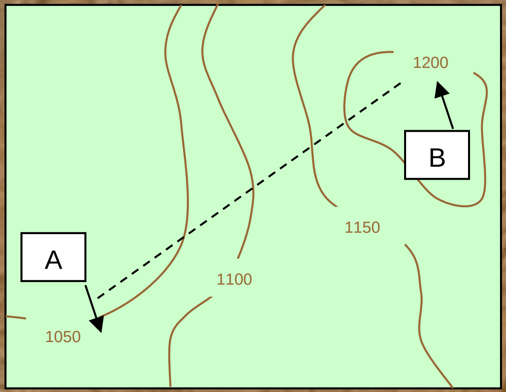
Contours can also indicate hills, depressions, saddles, and drainage lines.



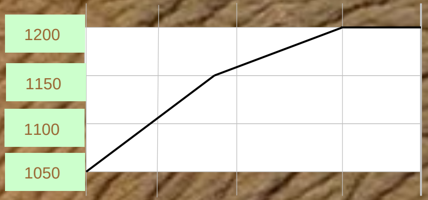
The climb from point A to point B is 150 feet (vertical) – the gradient is moderate as indicated by the contours being reasonably far apart. In real life the gradient would look that that shown below.



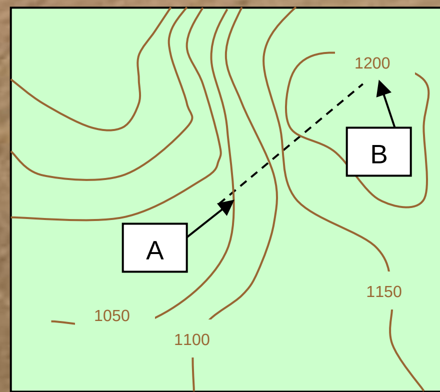
Slight gradient contours



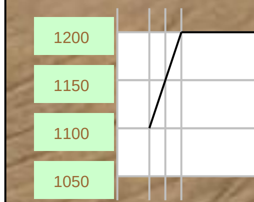
The climb from point A to point B is 150 feet (vertical) – the gradient is steep as indicated by the contours being closer than in Figure 12. In real life the gradient would look that that shown



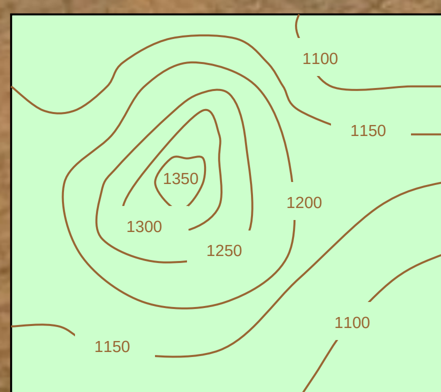
Moderate gradient contours



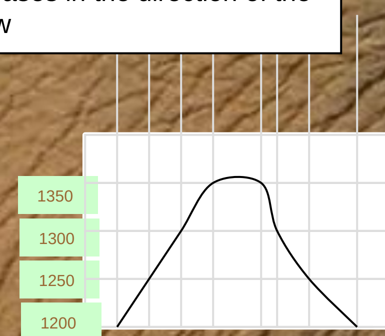
The climb from point A to point B is 150 feet (vertical) – the gradient is very steep as indicated by the contours being close together. In real life the gradient would look that that



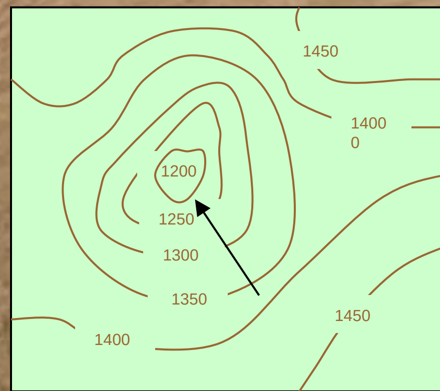
Very steep gradient contours



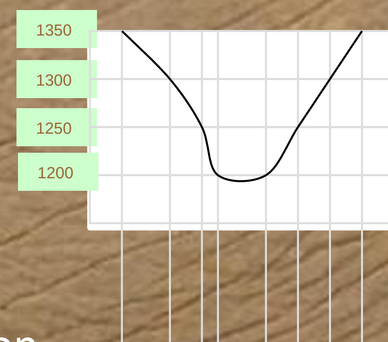
Note in a hill the elevation increases in the direction of the arrow



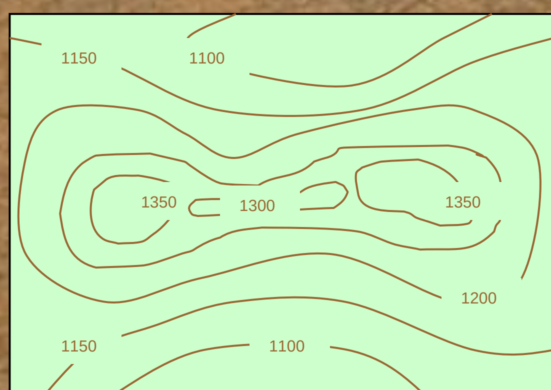
Contours indicating a hill

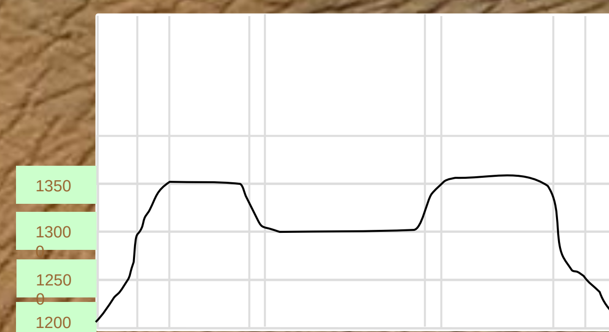


Note in a depression the elevation decreases in the direction of the arrow

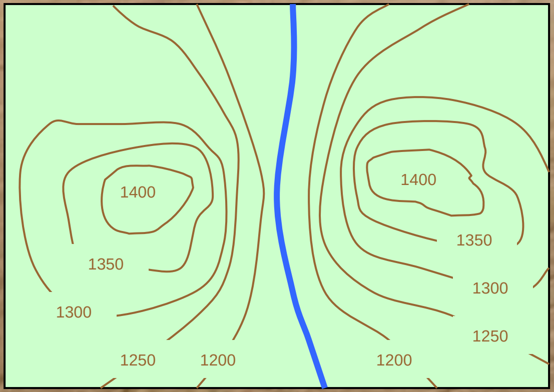


Contours indicating a depression





Contours indicating a saddle

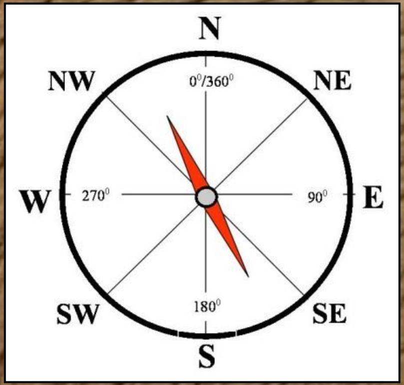


Contours indicating a drainage line.

Compass north

The four cardinal pints on a compass are north, south, east and west. North lies at $0^0/360^0$, east at 90^0, south at 180^0 and west at 270^0. The other cardinal directions are shown below. The direction in which the compass needle points when it comes to rest is called magnetic north. Compass north and magnetic north should be the same. It often differs however as a result of:

External or local magnetic disturbances.
An internal compass fault.



Magnetic disturbances

The presence, above or below ground of iron or other metal objects or power lines will always affect the accuracy and workings of a compass. These are referred to as local magnetic disturbances. A power line will influence compass readings 90 – 100 meters away, a vehicle 9 meters away and a pocket knife 50cm away. Objects which can be seen can be easily avoided but if the source of disturbance is underground it will be more difficult. To determine if there are unseen disturbances take a compass reading between two objects. The difference between the readings should equal 180^0. If not it could indicate that there are unseen sources of magnetic disturbance and /or a possible compass error which must be checked for.

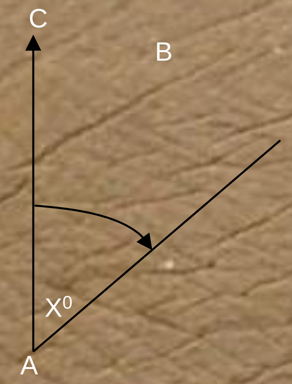
Compass errors

A compass error is caused by a defect in the compass. If your compass has an error of greater than $2\text{-}3^0$ it would not be advisable to work with it.

Directions on a tactical map

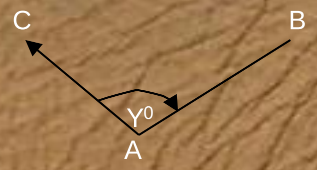
The directions on a tactical map are always given as the angle measured clockwise from grid north to any other point or line. For accuracy sake it is always best to work with grid bearings that are determined with the aid of a protractor.

From point A on the map a bearing is taken in a clockwise direction to point B. The angle x^0 is measured from AC to line AB.



Magnetic directions

For map reading the compass is the instrument of choice for determining directions on the ground. Bearings taken with a compass are measured in a clockwise direction from the magnetic direction to any other point or line.



A magnetic bearing is taken from point A on the ground to point B. The angle y^0 is measured clockwise from AC to the line AB.

Plotting position on a map
Map versus terrain comparison
Using a GPS

Comparing your map with the terrain.

This method is applicable were there are prominent and easily recognisable features in the surrounding area which are also indicated on the map. It is not a very accurate method as it is based on estimates. The following will be of assistance to the observer:

Distances to prominent features
Relative positions
Elevation of surrounding features

Using a GPS

When a GPS is switched on and given time to locate satellites it will give an accurate grid position which will be displayed on the GPS screen as degrees south and east (latitude and longitude.

Use GPS for geo-referencing locations and for navigation and orientation

What is a GPS and how does it work?

GPS stands for Global Positioning System - At the end of the 1970's, the United States Department of Defence, conceived a system which allowed any element of the military to know their precise position anytime and anywhere on the earth's surface. The Global Positioning System (GPS) was designed and built to fulfil this task.

In essence, the GPS system is made of a constellation of satellites constantly orbiting the earth, at an average altitude of 20,000 km, scattered on 6 equally spaced orbital planes. As a result, at least three satellites are always visible at anytime from any place on the surface of the earth. Each satellite emits a coded signal, which contains essential GPS Navigation/GPS Location information - like its position and the exact timing of the signal emission to earth. Therefore, only a simple receiver is needed to measure the elapsed time between emission and reception of the signal. The satellite to station distance is simply deduced from this travel time.

Three different measurements made on three different satellites give the three distances needed to determine the three coordinates of the station (GPS systems) position (the location of the receiver): latitude, longitude, and altitude.

This type of measurement is known as "pseudo-range" measurements in GPS jargon. Every satellite emits two types of pseudo-ranges: A precise code (P code) which enables a position precision of around 10 meters and a coarse code (C/A code) which allows a precision of around 100 meters. The precise code is encrypted and restricted to the U.S. military receivers. Civilian applications are based on the pseudo-ranges measurements is this of the C/A code. However, even using the C/A, incredibly precise location positions are possible for every day use.

GPS Navigation is used to help you see where YOU are right now, and to help you get from Point A to Point B. There are numerous devices made for GPS Navigation, from hand-held units, to those that are installed in cars and commercial vehicles. These are basically mapping systems. Each has very limited recording (tracking) capability, and generally do not have the ability to create and upload detailed logs of vehicle travel. Many businesses have already invested in mapping systems to increase productivity by improving route planning, and personal navigation systems are becoming wide-spread.

GPS Tracking is used to precisely record a log of all vehicle (or personal) activity and travel over an extended period of time. GPS Tracking is useful in eliminating time-consuming and poor quality vehicle use logs; as well as, increase productivity, and accountability, by maximizing business use of your vehicles, while decreasing or eliminating personal use. They are also great to keep track of where the kids have been. The best units provide second by second tracking for the highest accuracy of position AND speed travelled, while having built-in motion sensors so data is only collected during actual travel allowing for much longer recording.

GPS Location is used to provide real-time positioning of a vehicle or the GPS device, so you know where it is right now. These usually provide minimal tracking capability or none at all, and are not a replacement for GPS Tracking. GPS Location is mostly used for fleet vehicles, emergency location positioning, or as an aid in recovery of a vehicle or asset. GPS Location involves "Pinging" the device via satellite or by cell phone, and having it "phone" home with its current position via satellite cellular technology. This means that there is a recurring cost for GPS Location that does not usually apply to GPS Tracking. In GPS Navigation signals are being received simultaneously from multiple satellites the intersection point of the various signals fixes the actual position on the ground.

Using a GPS to establish position

The GPS is switched on and given a few minutes to search for satellites. Once satellites have been located a signal is transmitted to and received back from all the satellites with which the transceiver is communicating. An internal processor computes the points of intersection of all the incoming signals and displays this as a position on the earth’s surface. Quality GPS equipment is accurate to within 5m. The altitude of the position is also computed and displayed on the screen.

4.4.3 Waypoints and track back navigation

If you wish to navigate with a GPS you will periodically enter “waypoints” to which you will assign a number or name. The internal computer will remember these waypoints and if at any time you wish to move to a specific waypoint you enter the name or number of the waypoint and key in the command “go to”. An arrow will appear on the screen indicating the direction in which you must walk to head towards the waypoint entered. The GPS will also indicate the distance to the waypoint. By entering waypoints you can also “back track” on the route that has been covered. A specific grid reference can also be entered and the command “go to” entered to take you to the grid reference.

Advantages and disadvantages of GPS equipment

Advantages:

Very accurate

Can be used at night and in cloudy weather conditions

Indicates position and elevation

Can indicate direction and distances to waypoints

Can determine speed of travel and estimated time of arrival

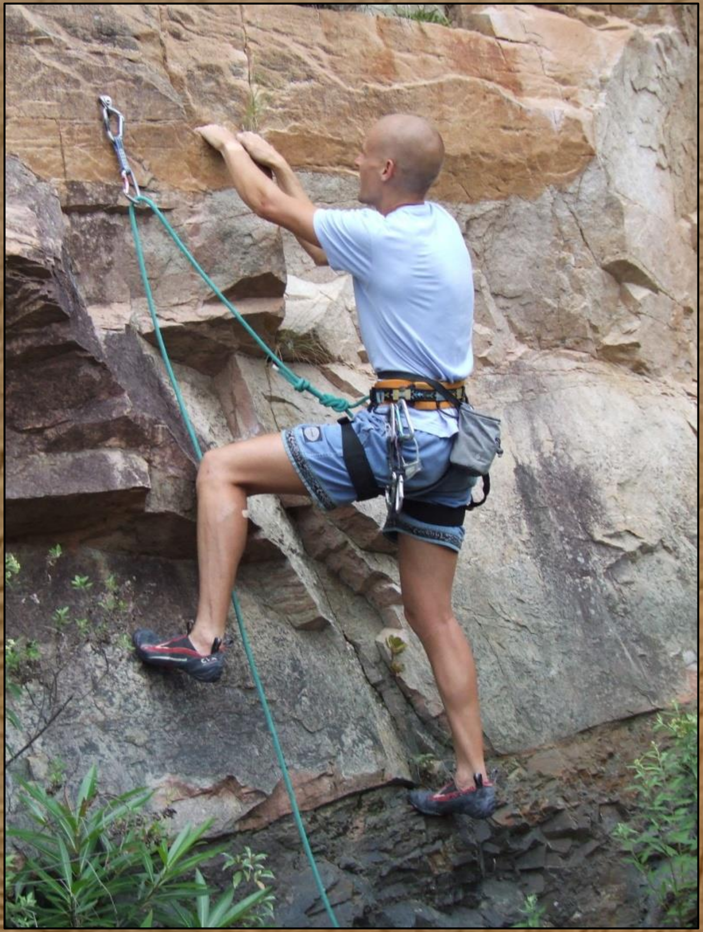
Disadvantages

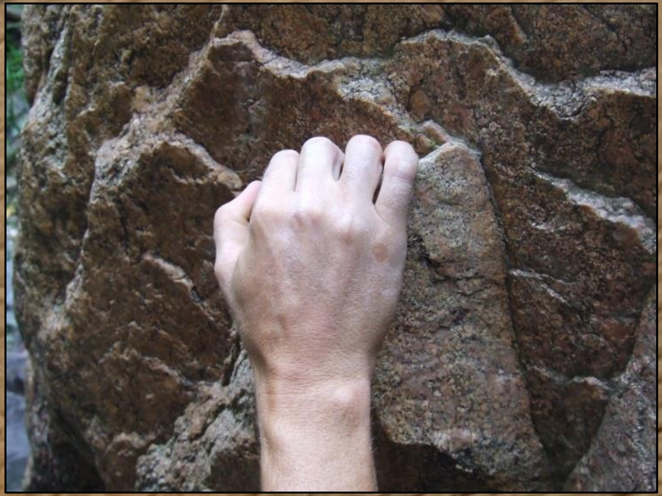
Dependent on batteries

Satellite frequencies can be changed in the event of military emergencies.

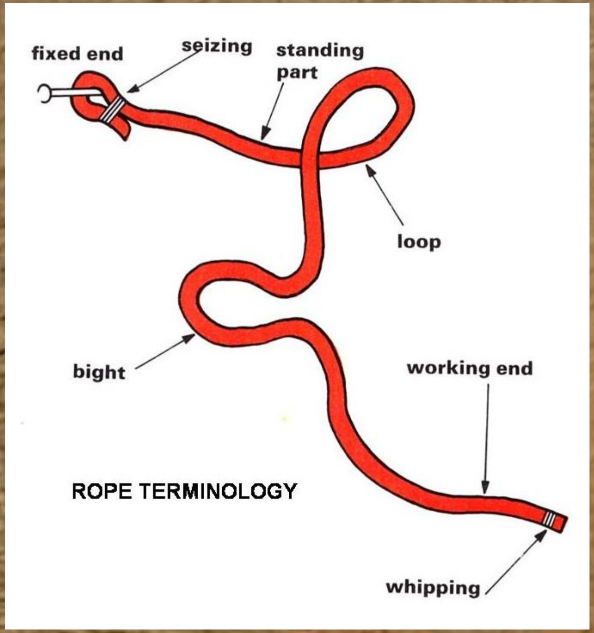
Solar activity and “magnetic storms” can interfere with signals

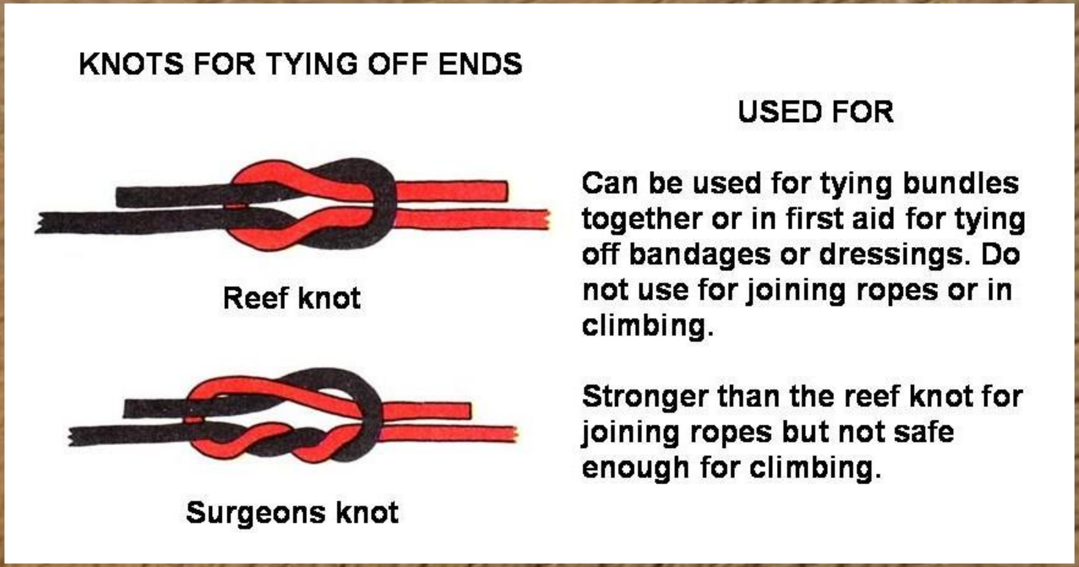
Basic rope work and climbing skills





All hunters and outdoor enthusiasts should have a basic knowledge of tying knots and lashings. The ability to tie the right knot for a particular task will stand you in good stead for the tasks you might have to accomplish. This might range from tying up a suspect, building a raft, making traps in a survival situation, applying first aid, building shelters, constructing small bridges, crossing rivers or rock climbing. The knots illustrated in the following figures should be practiced until you can tie them with your eyes closed. You should also know what knots are used for what purposes. First familiarize yourself with rope terms





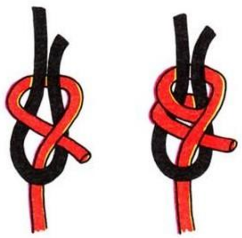
Knots for tying off ends

KNOTS USED FOR JOINING ROPES

USED FOR

Double fisherman's knot

Used by climbers to join two ropes and construct straps. Can be difficult to untie if heavily stressed.



Sheet bend and double sheet

This is a fast and secure way to join two ropes. If the rope is going to bear a heavy load use a double sheet bend. A good knot to join two ropes of unequal thickness. Do not use this knot for climbing.

Figure of 8 bend

A knot with many applications and often used in climbing. Half hitch the ends to secure the knot. Use this knot when joining ropes of the same diameter. A useful knot to act as a block and prevent a rope running through a block.

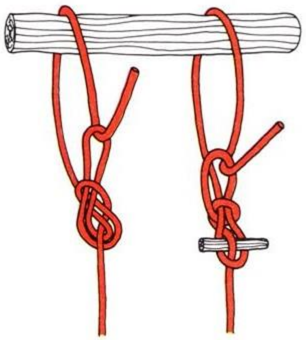
Tape knot

This is the knot usually used when joining climbing straps together for slings and belays. Tape the ends down to stop them flapping.

Knots used for joining ropes

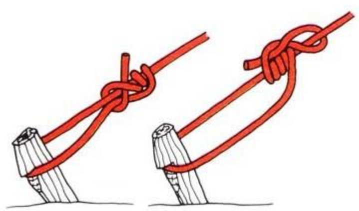
KNOTS USED FOR GUYLINES AND TENSIONING

USED FOR



Wagoner's hitch

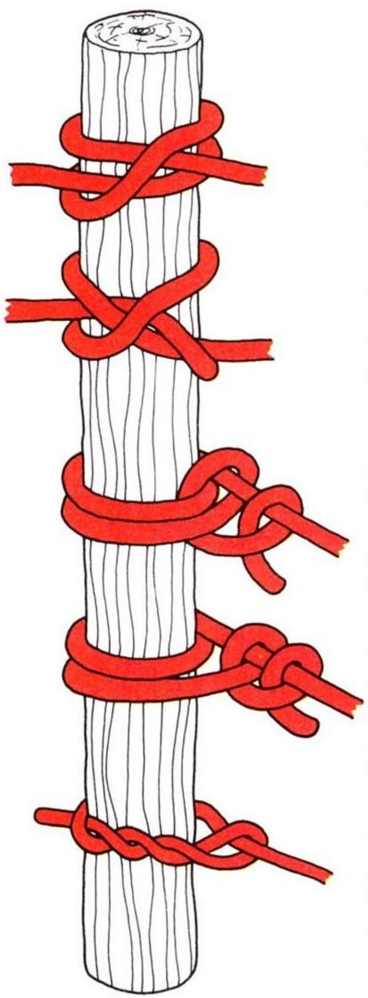
A very effective way of tensioning a rope for rope bridges with no difficult knots to untie at the end. Make sure the peg you use (on the right) is strong enough. The modified figure of 8 loop on the left requires no peg and is therefore more reliable.



Adjustable knot (left) and the tarbuckle knot (right)

The adjustable knot is useful for guylines. It has the advantage that it can also be used to join two ropes to form an adjustable sling. The tarbuckle knot is good for tensioning and adjusting guylines.

Knots used for guylines and tensioning



KNOT AND USES FOR SPARS AND POSTS

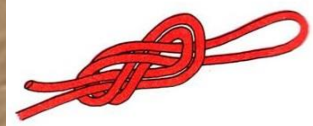
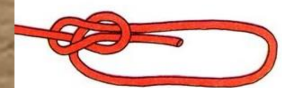
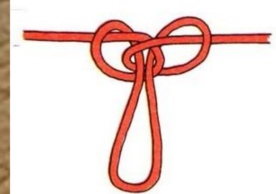
Clove hitch
Can be used at the end or the middle of a rope. Used when lashing spars together.

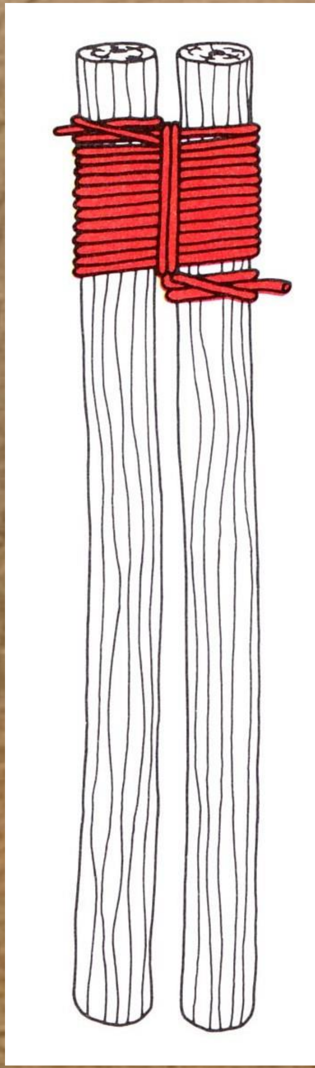
Constrictor knot
Binds down tight on itself. Used if there is to be vibration as it will not shake loose. May have to be cut loose after use.

Fisherman's bend
One of the most secure ways of tying off to a post as the knot binds itself shut. However it cannot be tied under load. It is usually used to secure rope bridges.

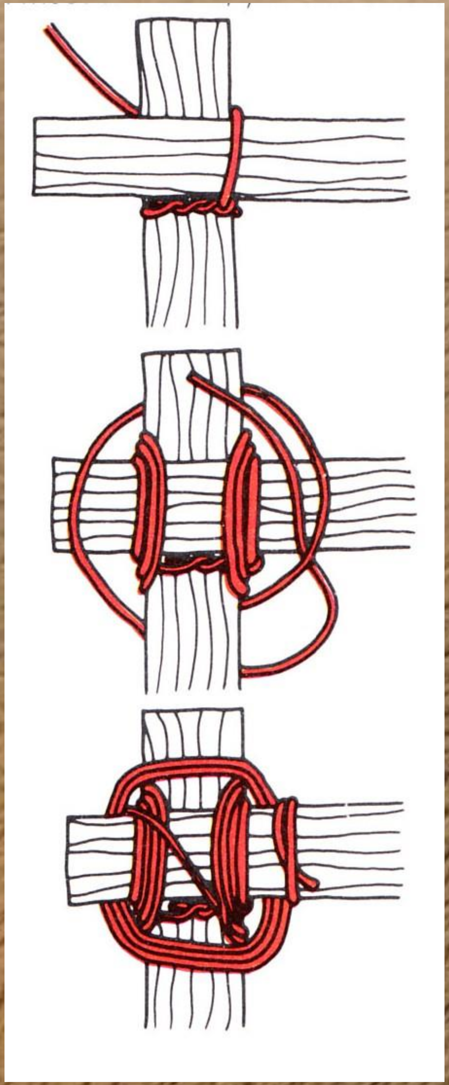
Round turn and two half hitches
Can be tied under load although it is not as strong as a fisherman's bend. The two half hitches should form a clove hitch on the standing part of the rope.

Timber hitch
A quick and easy way to tie off that is secure. The knot is only secure when it is under load.

CLIMBING KNOTS	USED FOR
 Rethreaded figure of 8	The knot most commonly used by climbers for tying themselves onto a rope. The knot is tied directly onto a harness or karabiner. Always secure the end with a half hitch.
 Bowline	A traditional knot used for tying onto a rope. With practice it can be tied with one hand which is an advantage over the re-threaded figure of 8.
 Alpine butterfly	Used for tying into the middle of a rope where the strain will come from both sides of the knot. It has uses during rescues and during obstacle crossings.
 Guide knot	This is the knot to pass down a cliff to someone who does not know how to tie knots. The figure 8 acts as a stopper to prevent the persons hand being crushed by the triple overhand knot slipping tight.

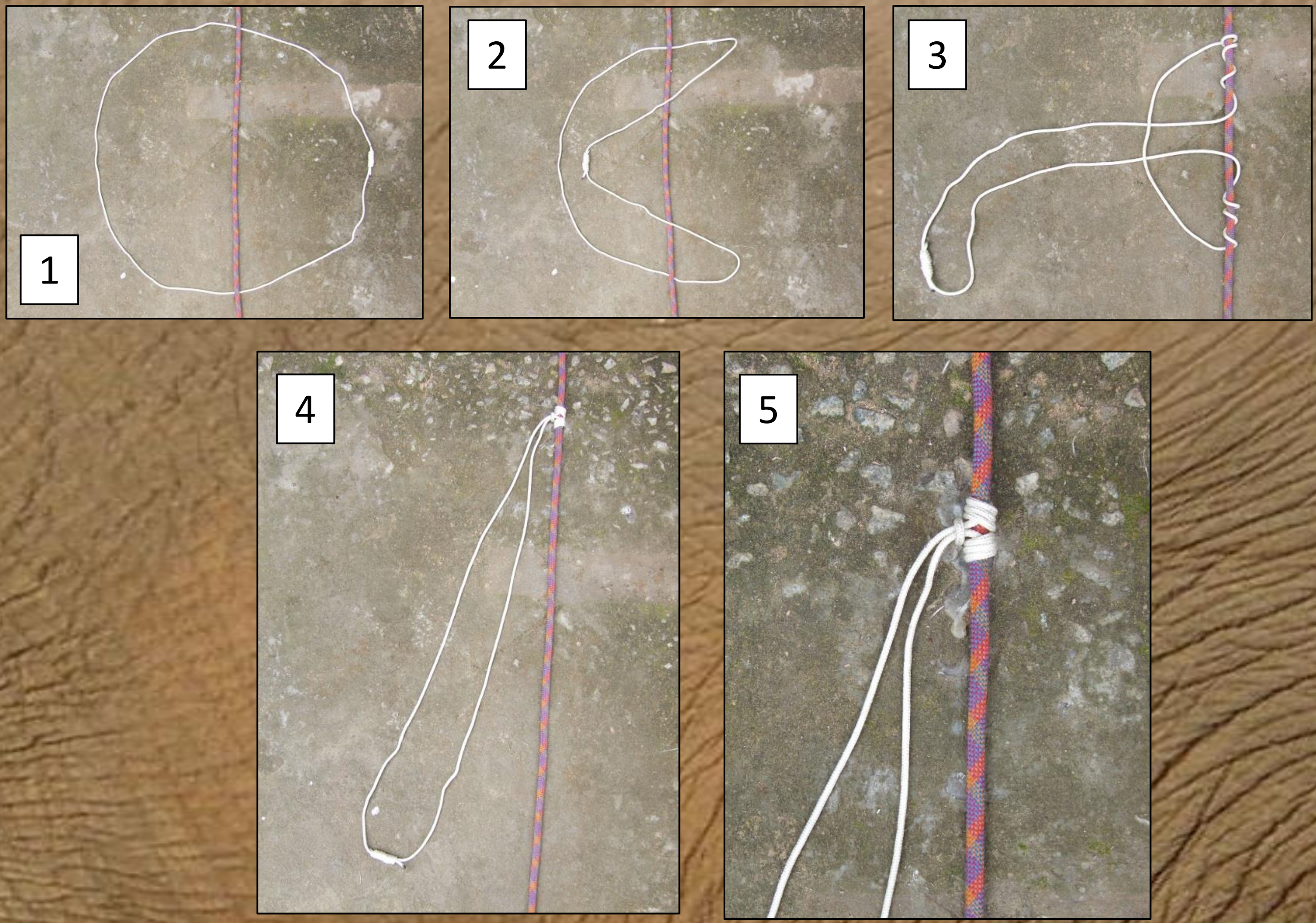


Sheer leg lashings



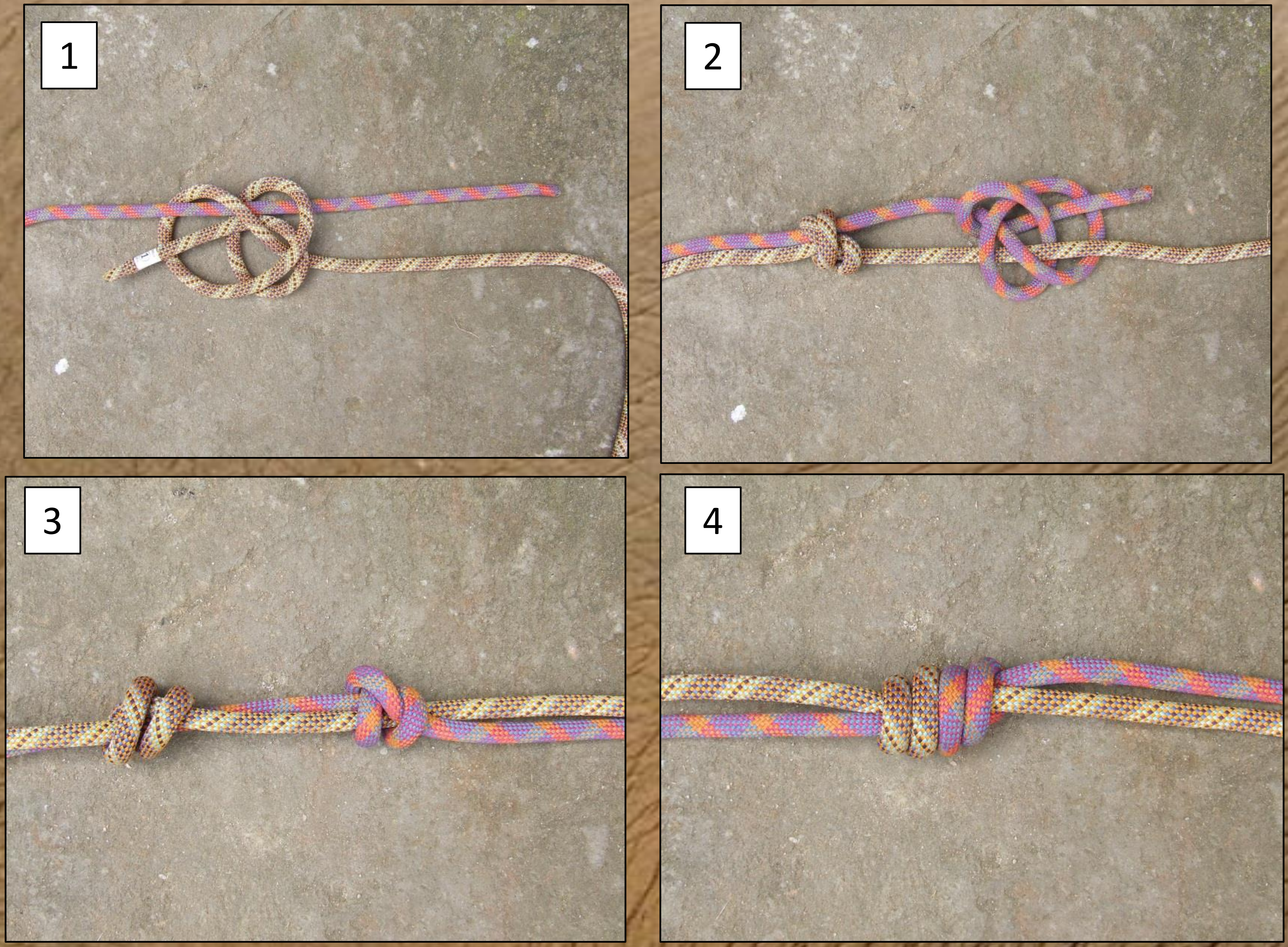
Square lashings

Some more climbing knots



The Prussik knot – used to climb up a rope

French Prussik knot



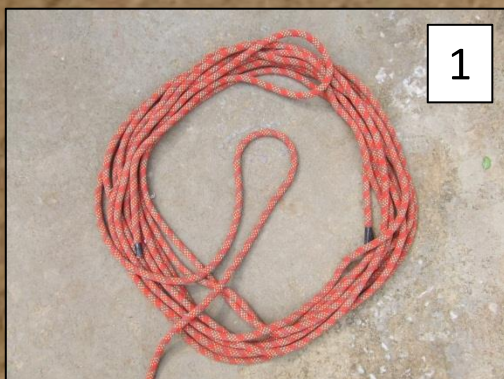
Fisherman's bend – used to join two ropes

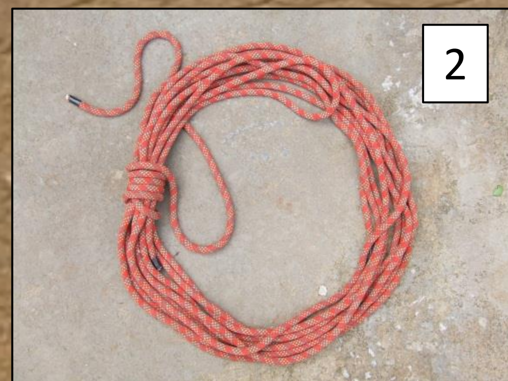
Friction hitch

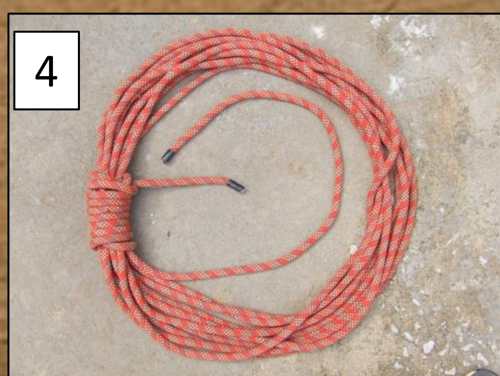
Overhand knot

Carrying a climbing rope

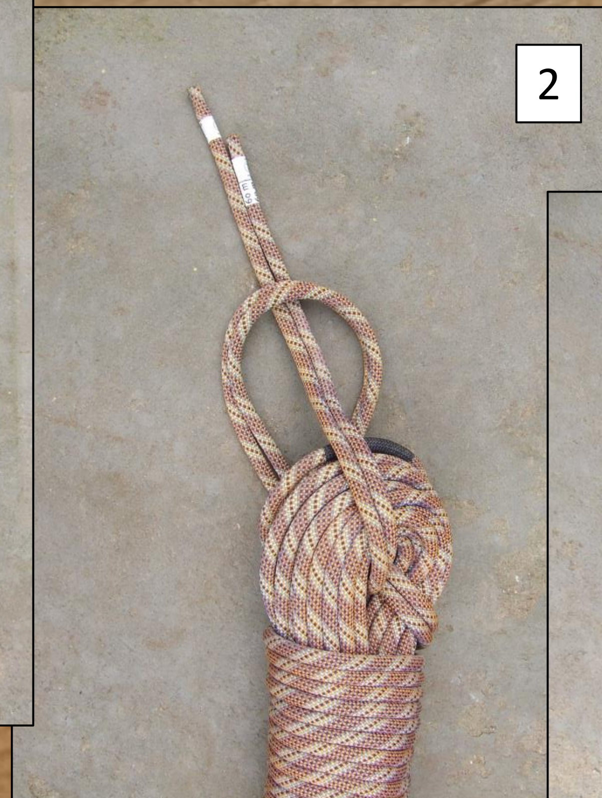
A climbing rope can be 50m or more in length and can be awkward to carry if not done properly. It is also important to keep it from dragging in the dirt. The mountaineers coil illustrated on this and the following age is used to prepare a rope to be conveniently carried.







Another method of carrying a rope is the Alpine coil illustrated on this and following pages.



The mountaineers coil (left) and the Alpine coil (right).

Basic climbing techniques

As a hunter you should be familiar with knots used in climbing and basic rock climbing techniques as well us the basic equipment. These skills could quite conceivably be required during search and rescue operations, or other field activities.

Equipment

- **Ropes and slings**

There are basically two types of climbing ropes.

Static ropes which have very little stretch and are used mainly for abseiling.

Dynamic ropes which have quite a bit of stretch and are used mainly for climbing.

Slings are lengths of nylon strapping.

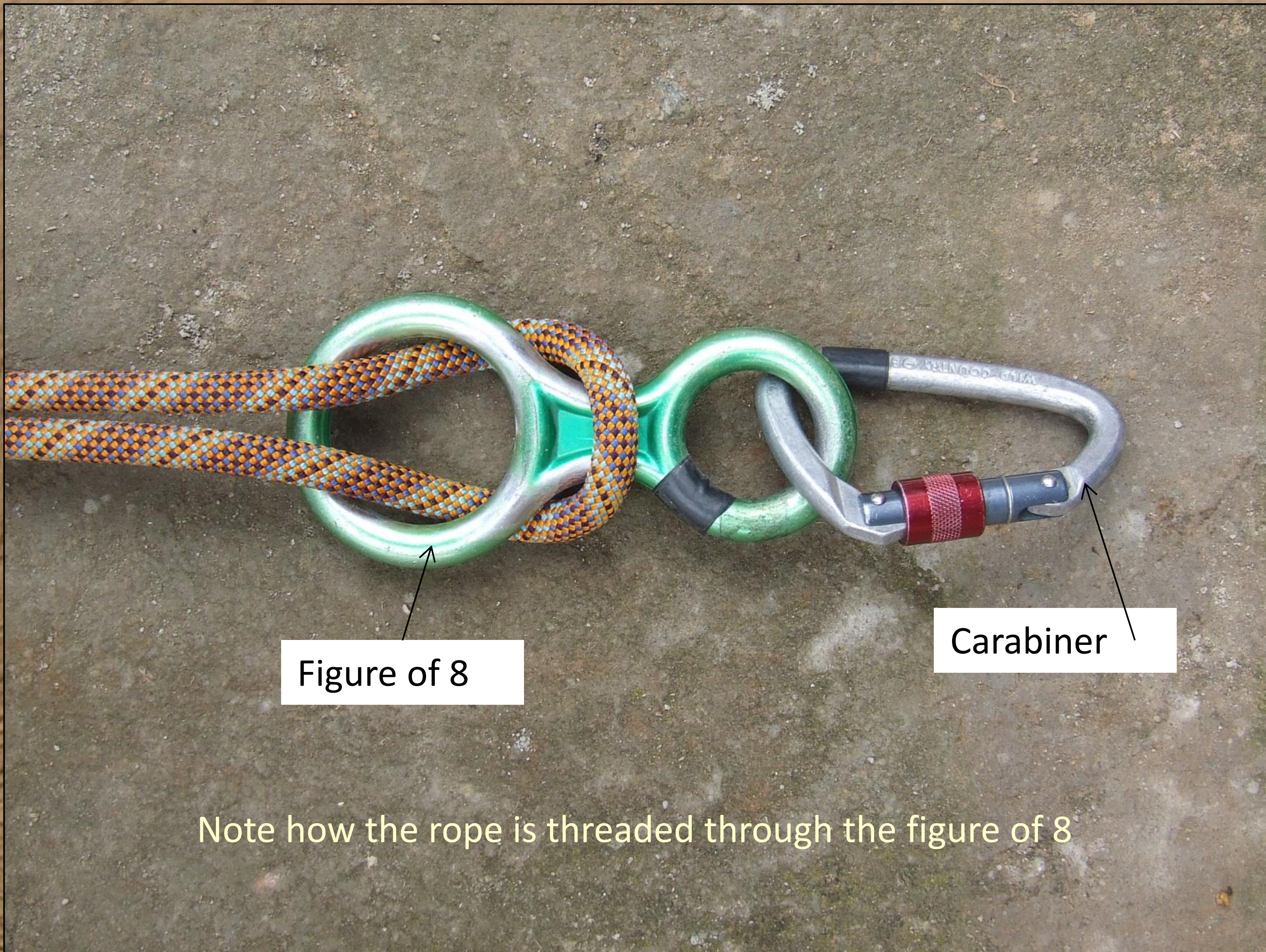
A dynamic climbing rope

Climbing ropes of different thicknesses (left) and slings (right)

Carabiners

A carabiner is a metal alloy piece of equipment that you attach to your harness and to which you pass rope through or attach additional pieces of equipment such as a figure of 8 used when abseiling. The type most used is the screw-gate carabiner which locks the opening with a threaded collar to prevent the carabiner opening accidentally.

A bent gate carabiner (left) and screw-gate carabiners (centre and right)



Note how the rope is threaded through the figure of 8

Belay and descending devices

A belay device is a piece of equipment used to arrest the fall of a climber by the person belaying the climber from below. The figure of 8 is the most popular device used for a controlled descent when abseiling. The figure of 8 can also be used as a belay device.

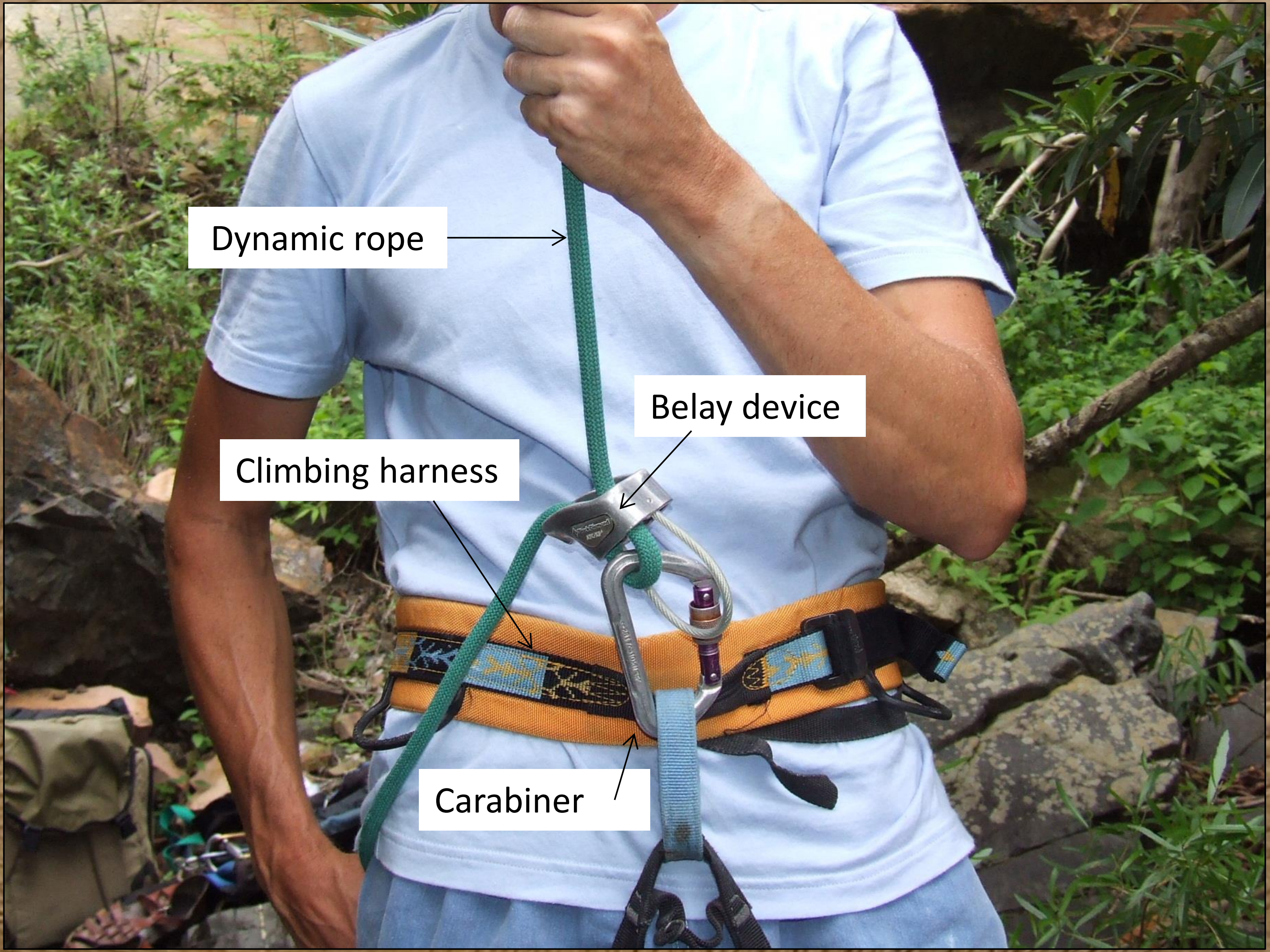
Harness and helmet

A climber wears a safety harness to which ropes and equipment are attached. The harness when attached to a rope passing through protective devices anchored into or attached to rock will catch the climber if he falls. Helmets should be worn to protect the climber from falling rocks and head injuries.

Safety climbing harness (left) and safety helmet (right)

A belay device (left) and a figure of 8 (right)

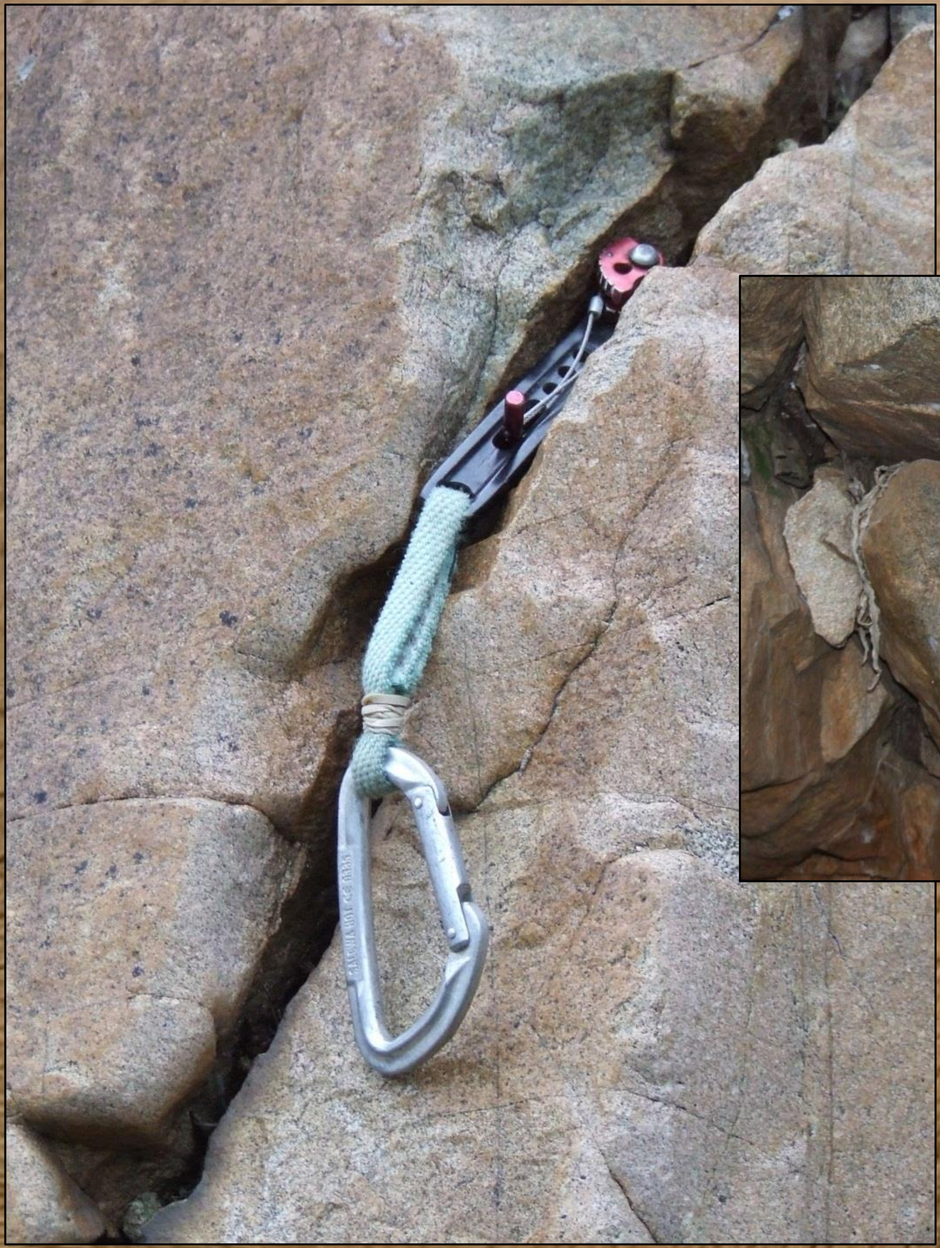
A climbing helmet provides protection from objects falling from above and during a fall.

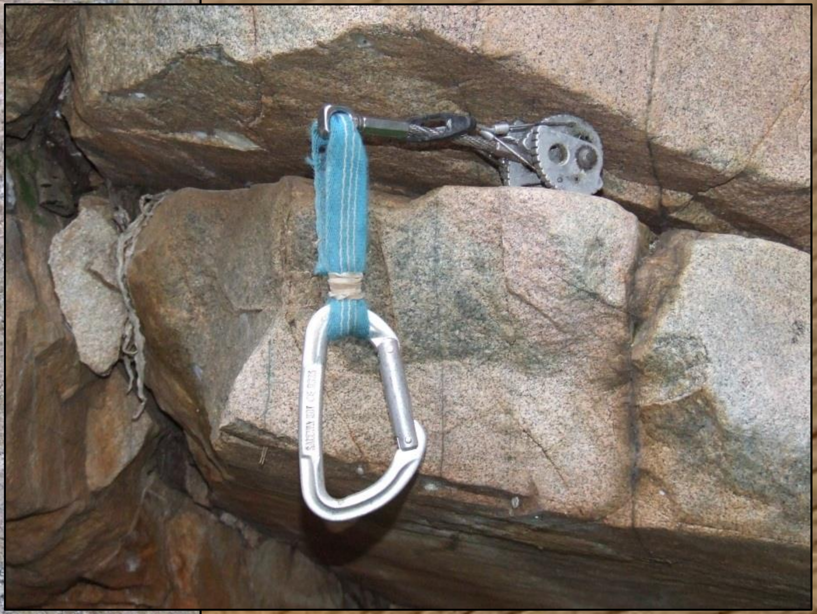

Dynamic rope
Belay device
Climbing harness
Carabiner

Anchors and “protection”

Various devices are available which can be hammered or drilled and epoxied into rock or attached to cracks in rock through which a climber can pass rope through whilst climbing. If the climber falls at any stage he will be caught by the last piece of protection put in place. Devices called “friends” and alloy blocks called nuts, attached to strong cable are devices wedged into cracks as protection.

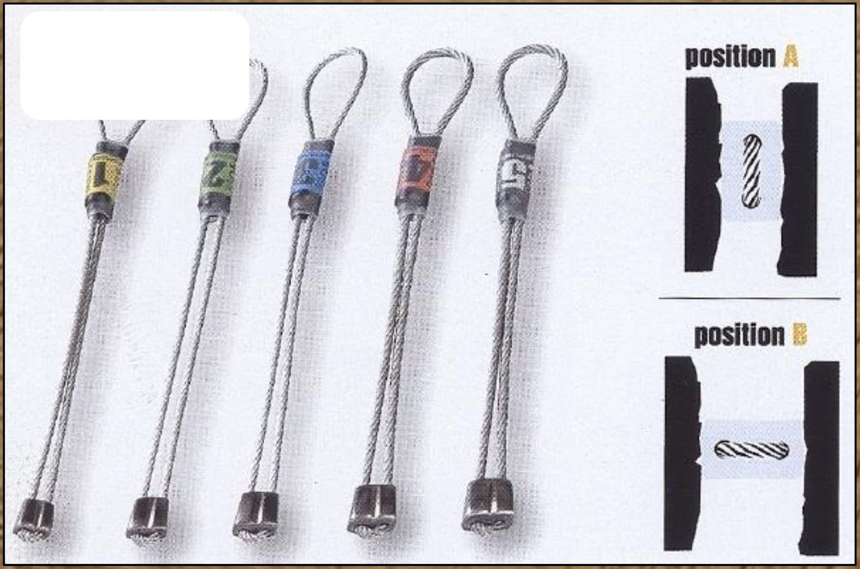
Example of protection devices which would be epoxied into a hole drilled into rock such as the bolt (left) or wedged into cracks such as the “friend” or cam (centre and right)

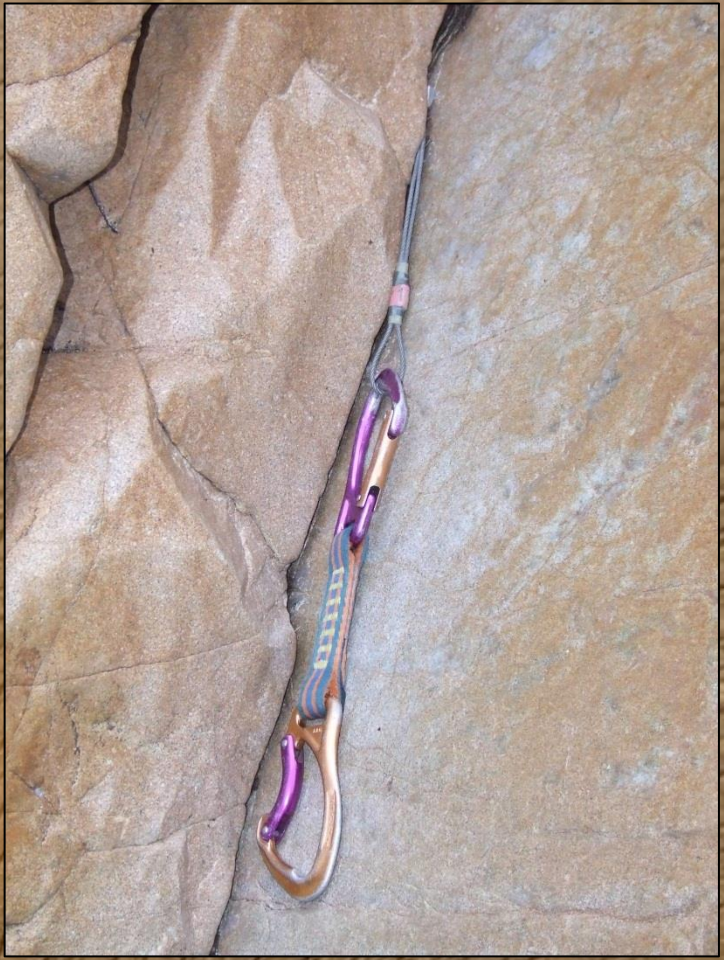




“Protection” in place. A climber can thread a rope through the carabiner.

An assortment of nuts and wedges. On the right is a nut in place with a quickdraw attached.





Quickdraws

As a climber is climbing he attaches a quickdraw to protection and then passes his rope through one of the quickdraw’s carabiners

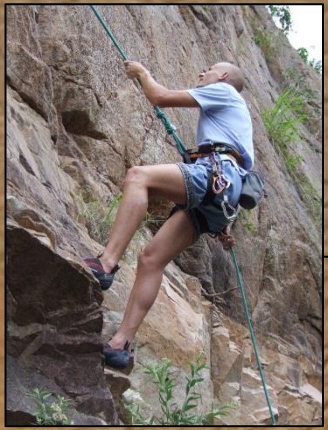
Climbing techniques

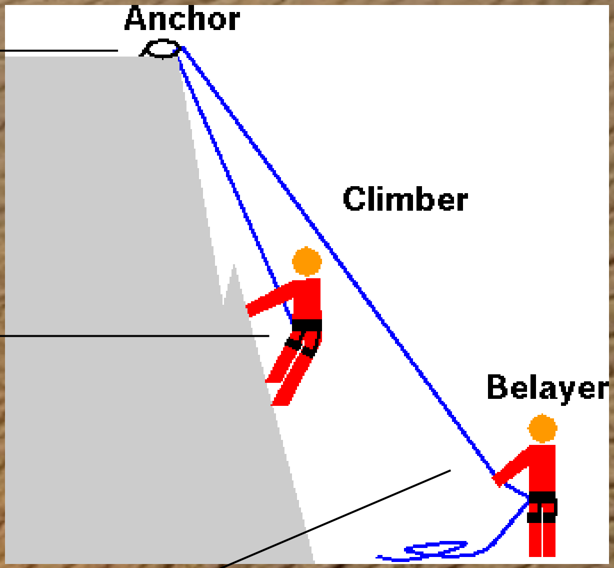
Top-Roping and Belaying

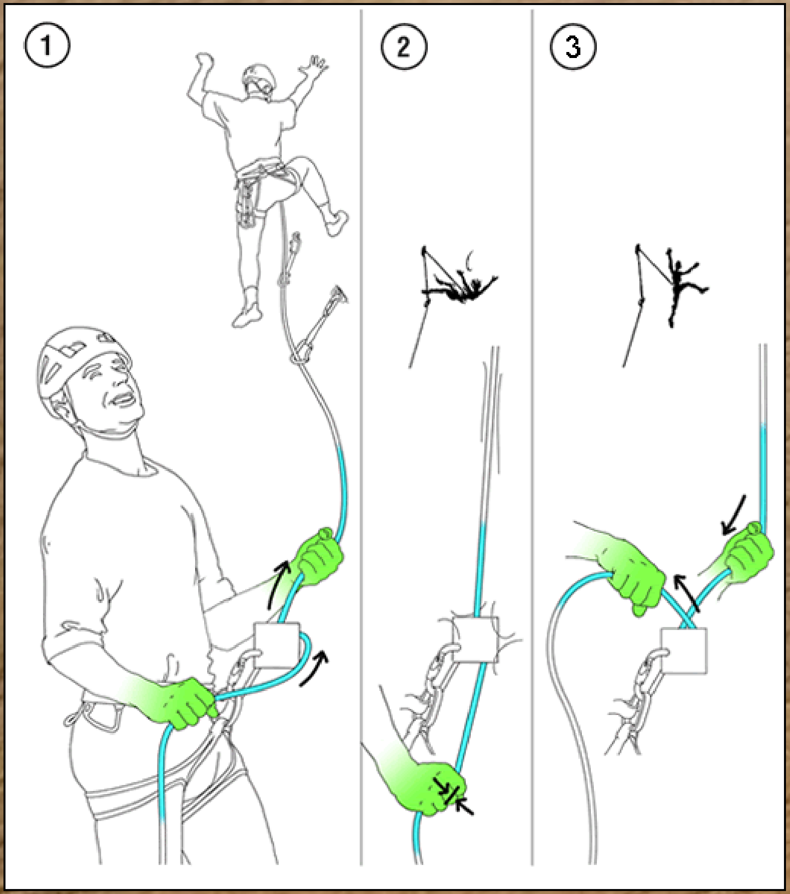
In top-roping, a rope from the top of the climb always holds the climber, making most slips off the climb harmless. As shown on the following pages the climber is attached to one end of the rope, the middle is passed through an anchor at the top of the climb, and the other end is held by the person belaying from below.

The anchor's carabiners with the rope passing through are suspended below the top of the climb to prevent the rope from rubbing. When bolts or protection are far from the top of the climb, substantial lengths of webbing are needed to place the carabiners correctly.

The anchor at the top of the climb is assembled from loops of webbing connected to carabiners attached securely to the rock. The rope is passed through some of the carabiners, and the others are attached to either pieces of protection, wedged into a convenient crack, or bolts, which other climbers have drilled into the rock.

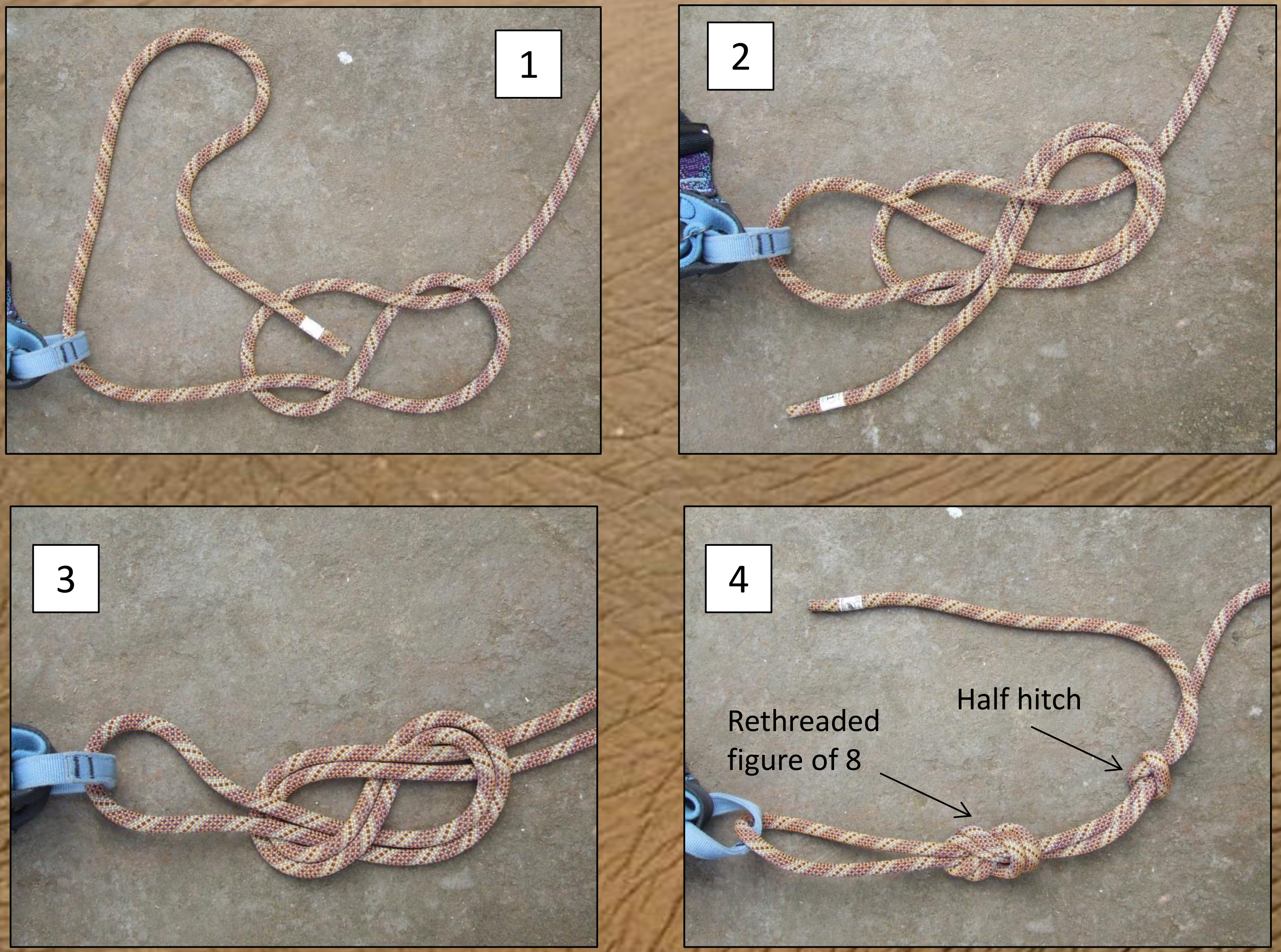




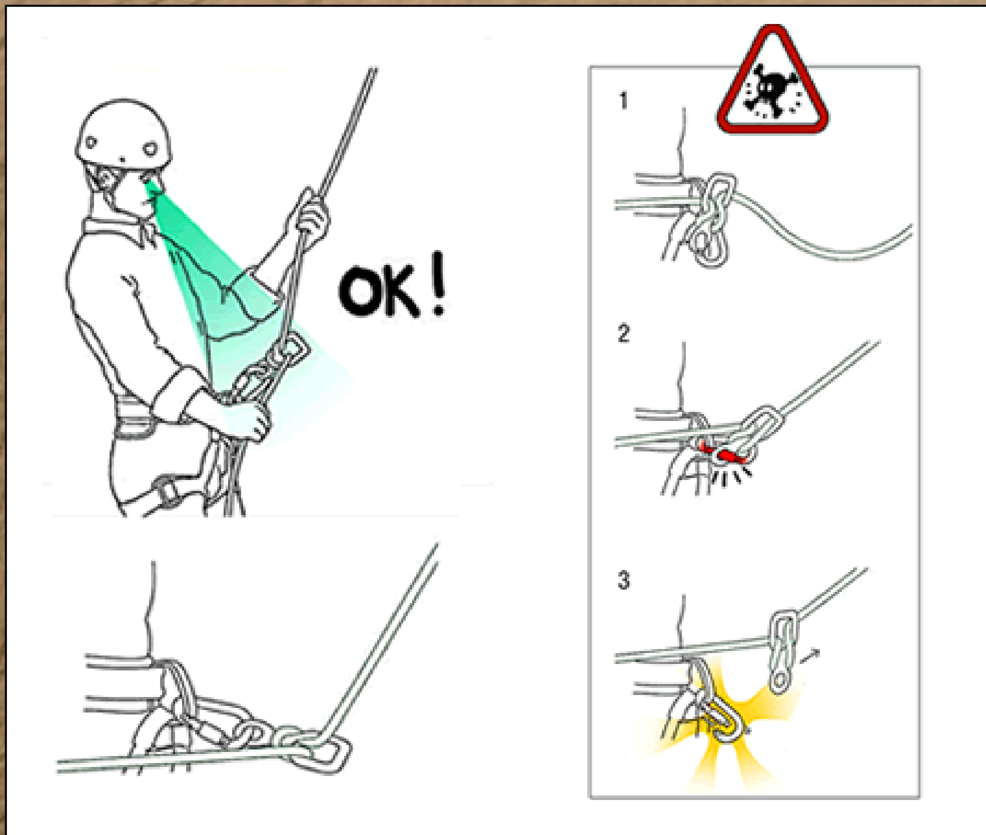


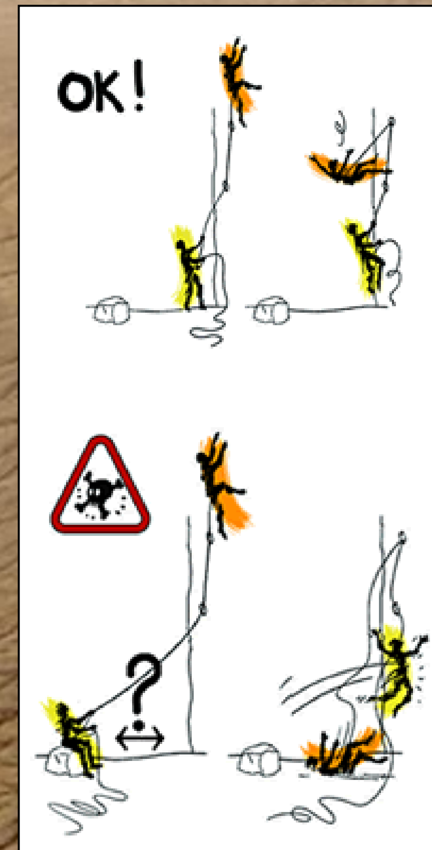
Top roping and belaying: 1. As the climber ascends the belayer lets out some rope to give the climber a little slack. There must not be too much slack in the rope as if the climber falls he will fall further before the belayer can arrest his fall. 2 and 3. If the climber falls or thinks he is going to fall and calls out "watch me" the belayer immediately pulls down on the rope to lock it into the belay device. The belayer must also stand firm and be ready to hold the mass of the falling climber.

The climber attaches himself with a "rethreaded (or double) figure of 8 knot to the loop of the harness which is prevented from coming undone with a half hitch knot. This is illustrated on the following page.



The rethreaded figure of 8 knot with a half hitch.





Top roping and belaying: The belayer must ensure that the belay device is in the correct position. The rope should pass only through the belay device. It should not lie across the gate of the carabiner as this can force the gate open causing the belay device to become detached (see 1,2 and 3 above). The belayer must also position himself below the climber and not off to one side as shown above right.

Not all climbs can be top-roped because of two requirements:

•There must be a safe way to the top to set the anchor before the climber starts. Most popular top-roped climbs have an easy way to hike to the top.

•The climb may be no longer than half the length of the rope; when the climber starts, the rope must cross the full length of the climb twice.

The belayer stops the rope with a belay device attached to his harness if the climber slips. The belay device makes it easy to apply enough friction to stop a falling climber. If there is some danger of the belayer being lifted into the air, he can be anchored down.

The belayer must keep the slack in the rope to a minimum since when a climber slips, any slack must be taken up before the rope can stop the fall. To take up this slack, the belayer pulls the rope downward as the climber climbs. While doing this, the belayer must never release the rope fully to ensure the climber could never fall far.

Top roping is a good and safe way to teach people to rock climb. They top anchor ensures that the climber is safe from falling (if the belayer does his work properly).

Lead Climbing

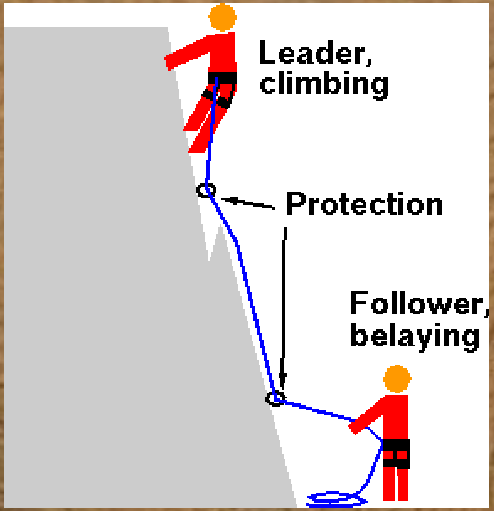
In lead climbing, two people, a leader and a follower, ascend the climb in pitches: sections of the climb shorter than the length of the rope.

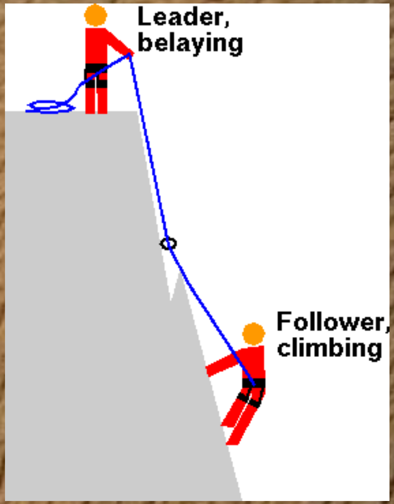
First the leader climbs the pitch, wedging pieces of protection into the rock and attaching the rope to them with carabiners. Once the leader makes it to the top, he anchors himself to the rock and belays the follower, who climbs the pitch, removing the protection. Finally, both the leader and follower are at the top of the pitch with all their gear, ready to climb the next pitch. The leader's job is dangerous. Unlike top-roping, where slipping off the rock usually doesn't result in a long fall, a leader can fall twice the distance from the last piece of protection before the rope can help. A ``quickdraw''--two carabiners attached with a loop of webbing - is used to fasten the rope to a piece of protection. One carabiner is attached to the loop on the piece of protection; the rope is passed through the other. This provides some separation of protection a rope, allowing the rope to twist without dislodging the protection, pass more smoothly past the protection, and go more directly up the climb. Ideally, so the rope is not forced to go around friction-increasing corners, the protection should be along in a straight line between belay stations.

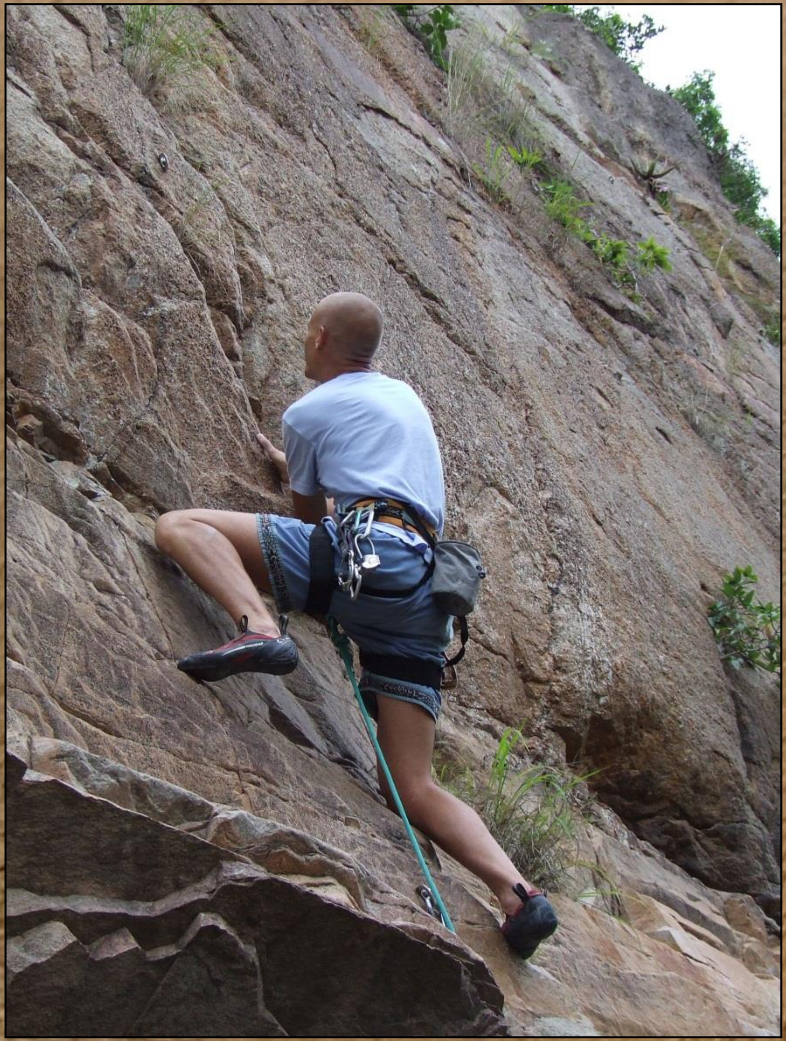
This is not always possible, so longer pieces of webbing in the quickdraw are used to make the path of the rope straighter. Lead climbing places fewer restrictions on what can be climbed than top-roping. The two requirements are:

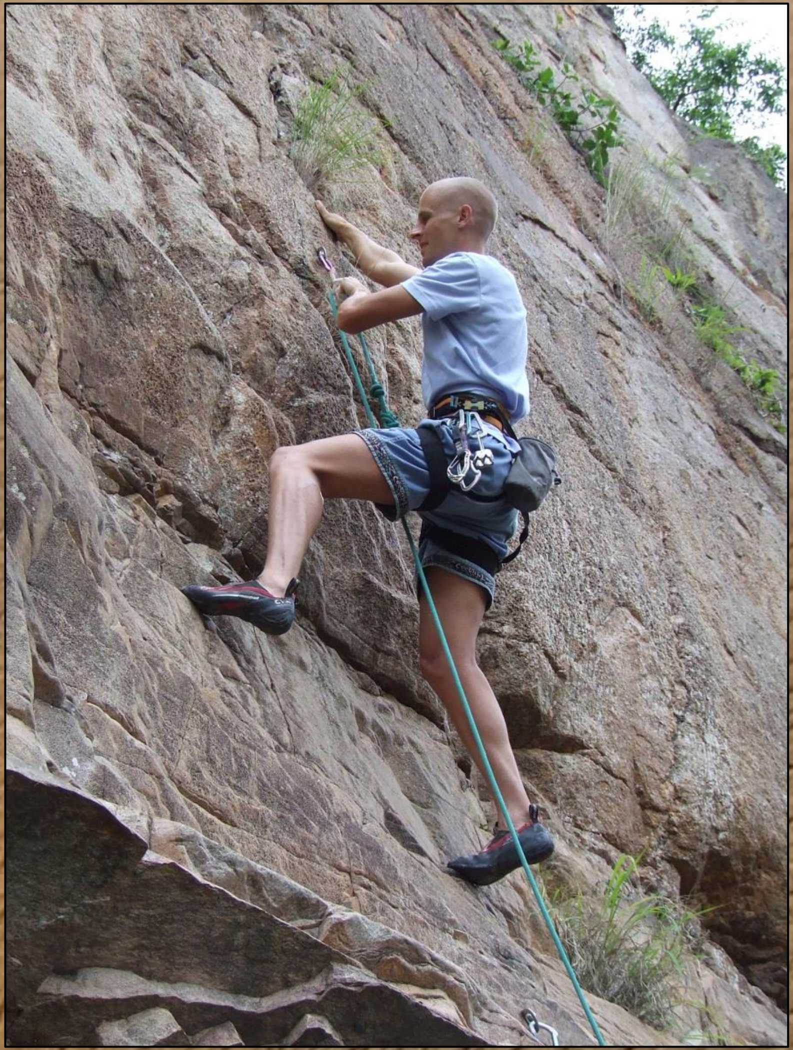
(1) There must be places for a belayer to be secured to the rock (``belay stations'') spaced no farther than the length of the rope. Most popular lead climbs satisfy this.

(2) There must be places to attach the rope to the rock. In rock with many cracks, protection, especially cams (friends) and nuts, can easily be used. Occasionally on smooth rock, other climbers have drilled permanent bolts into the rock that can be used with a quickdraw to attach the rope to the rock.









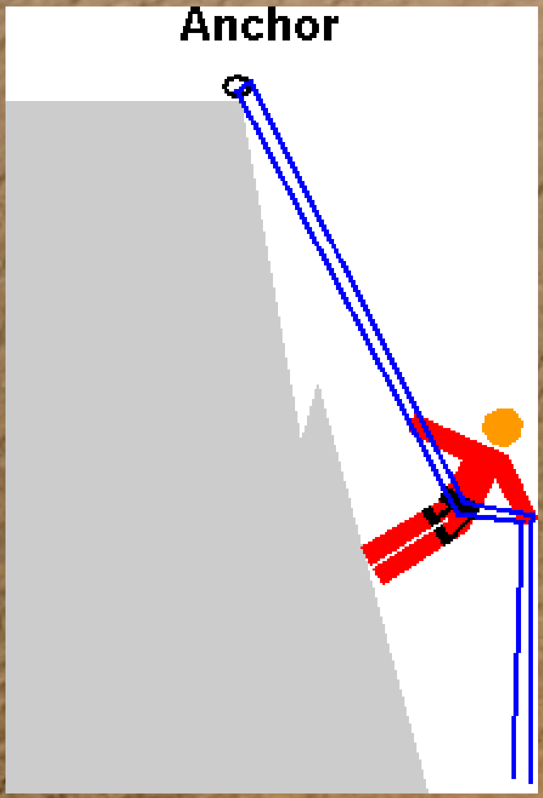
A climber leading a climb and placing protection as he ascends.

Getting down from a climb

There are three common ways to get down from a climb: walking, rappelling (also known as abseiling), and lowering.

Abseiling (rappelling)

Rappelling is a scheme for lowering yourself with the rope. As shown on the following page, the centre of the rope is passed through an anchor at the top of the climb. The person descending wears a harness and attaches himself to the rope with a belay device, which he uses to control his descent. Unlike climbing, it is best to be nearly horizontal while rappelling. In this position, the body is pointing more directly at the rock, giving the feet better friction and leading to more control. Starting a rappel is the most difficult part. It is very disconcerting to switch from standing to being supported completely by the rope. Moreover, it is necessary to get below the anchor before the rope can help. If the anchor is below the top of the climb, climbing down is necessary.



Abseiling

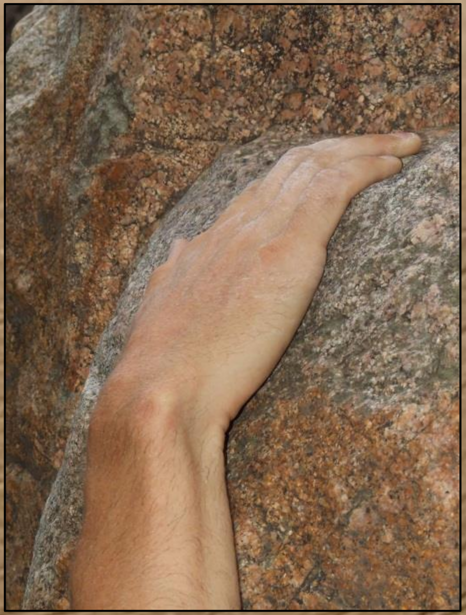
Once everybody has descended, the rope is recovered by pulling it through the anchor. The anchor cannot be recovered, but this is not usually a problem. In many cases, other climbers have placed a permanent anchor at the top, often a pair of bolts drilled into the rock connected to a ring with some chains. Another possibility is to use the base of a tree as an anchor. Since the rope is under little tension when it is pulled through the anchor, this abrades the rope and tree only slightly, and can be done occasionally. A single rope can only be used to descend half a rope-length, but two ropes can be tied together to rappel a full rope-length. This is useful, for example, when descending a multi-pitch lead climb via the same route used for the ascent. The belay stations usually spaced a full rope-length, can be used as rappel anchors. Three or more ropes cannot be used to rappel in this manner, since doing so would require rappelling past a knot and pulling a knot through the anchor, which are generally impossible.

Lowering

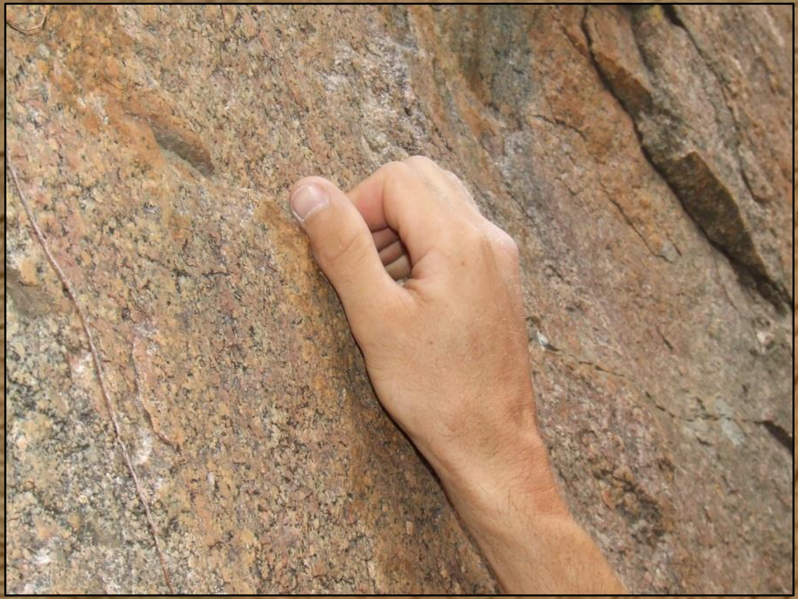
In a top-roped climb, the belayer can lower the climber. The climber places her weight on the rope, and the belayer slowly lets out the rope, using the belay device to control her rate of descent, much like rappelling. This is the most convenient way to descend after completing a top-roped climb. Although there is usually a way to walk down, it can be inconvenient to finish a top-roped climb because you must climb above the anchor, which is often suspended below the top of the climb.

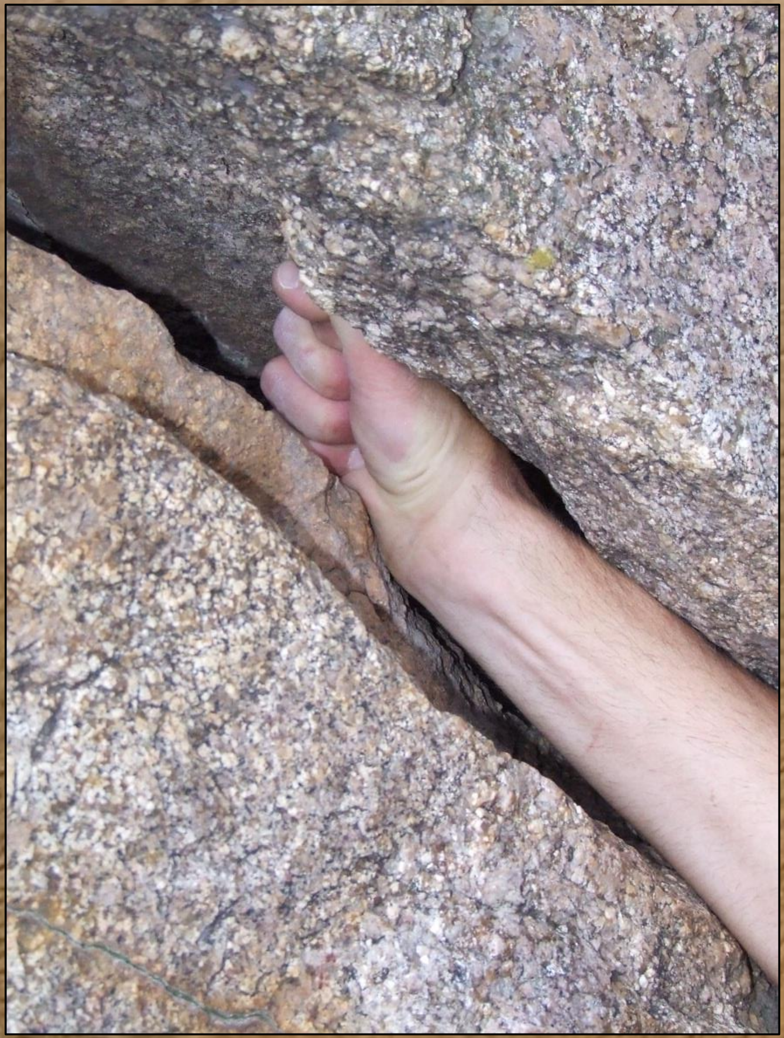
Foot and toe holds

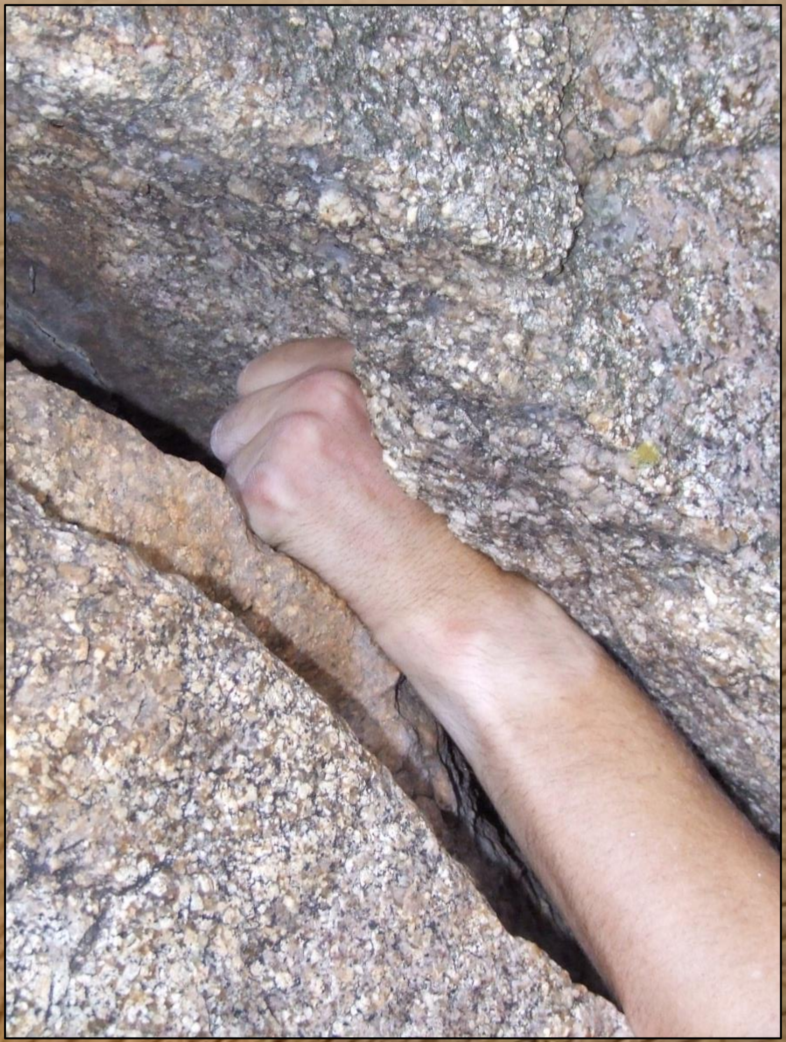
When climbing you must use different hand and foot holds to keep from falling off. Always make sure you have three points of secure contact with the rock before moving a hand or foot to look for a new hand or foot hold. The type of foot or hand hold you will use will depend on the surface you are climbing – sometimes you will have large secure foot or handholds but at times all that you may have within reach will be a fingertip or toehold available. You should learn how and when to use the different hand and footholds.



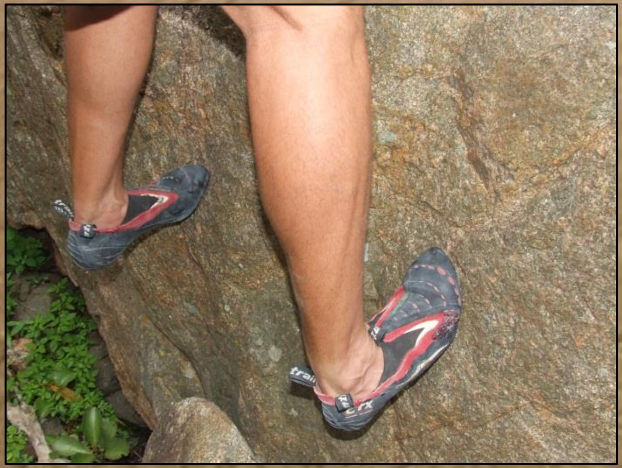
Handholds



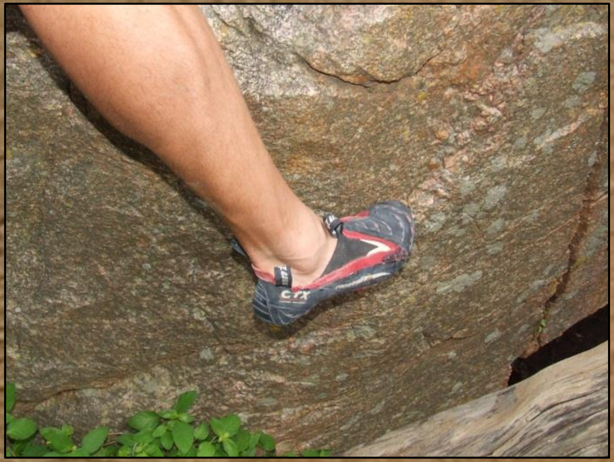




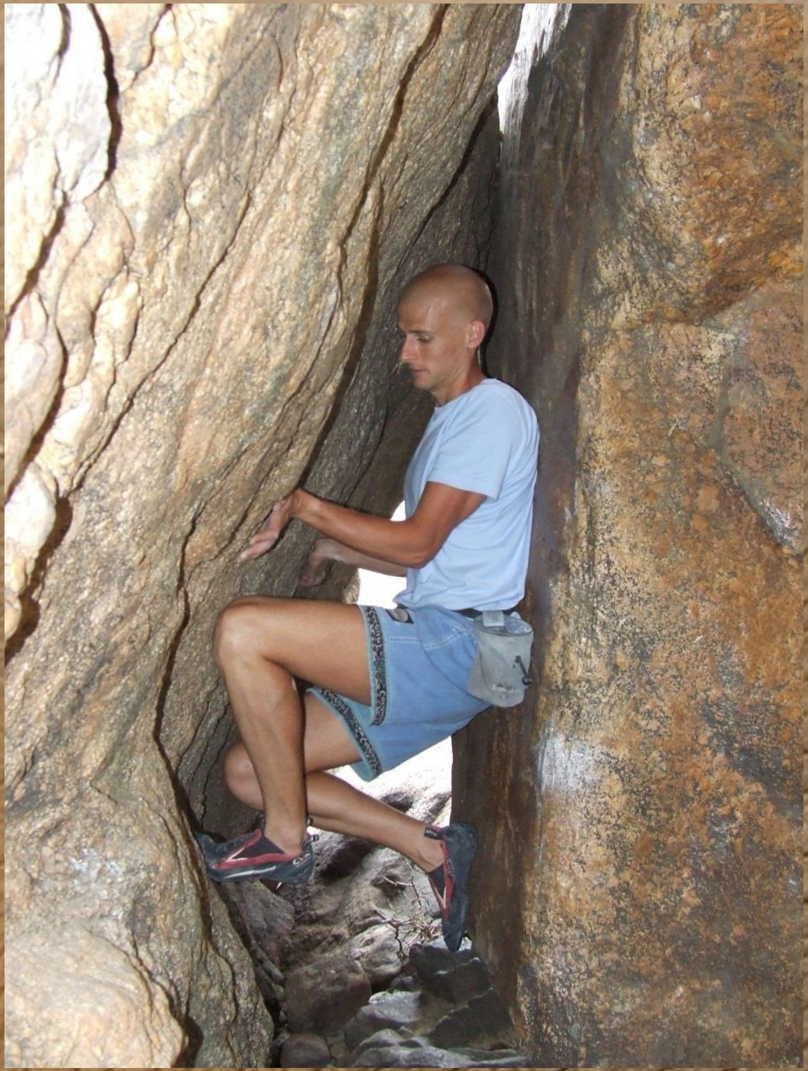
Handholds



Smearing



Toehold



Footholds

Water crossings

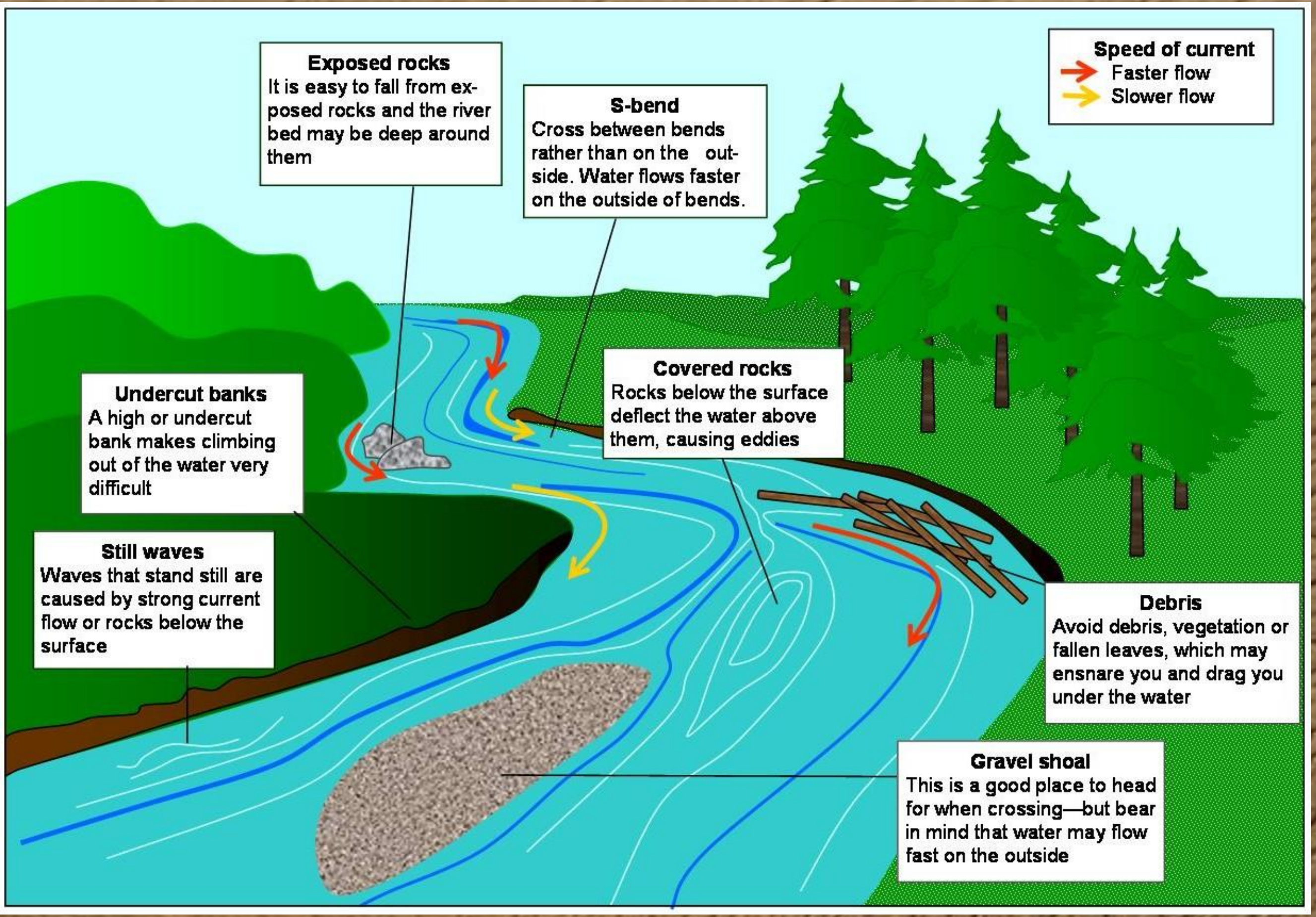
During the course of their duties hunters are sometimes required to cross water obstacles. Rivers and streams are always dangerous. Even if water appears to be calm and still moving, shallow and safe you must assume that there are hidden dangers. Headwaters are easier to cross than water downstream but always exercise extreme caution when crossing fast water. Slower waters are generally deeper than fast ones and may contain treacherous weeds, mud banks and hidden obstacles. Never wade, swim or attempt to cross water obstacles if there are easier options available and always ask yourself the question: "Do I really need to cross?" Only if the answer is a definite "yes" should you attempt it and then make use of a good water crossing technique. It is impossible to assess the depth of most rivers without getting wet. Underwater obstacles are not always visible from the bank, and it is not easy to determine current velocity and strength.

What to do if you have to cross a water obstacle?

Figure on the following illustrates some aspects to consider when crossing a river.

Walk up and downstream to look for a bridge, ferry or pontoon that can be used to cross the river.

If none of the above can be found look for a place where the water is shallow and the current is not strong. This might be a wider part of the river. The current is usually stronger and the water deeper in narrow parts of the river. Once you have located a suitable area you must now decide on the method you will use to cross.



River crossing techniques

Wading

Wear some kind of footwear to protect your feet and give you a firm footing. Be ready for deep mud, holes, vegetation or sudden changes in current strength and water depth. Study the water before you enter it, watching to see what the waves and current do and whether there are signs of underwater obstacles. Always cross slowly.

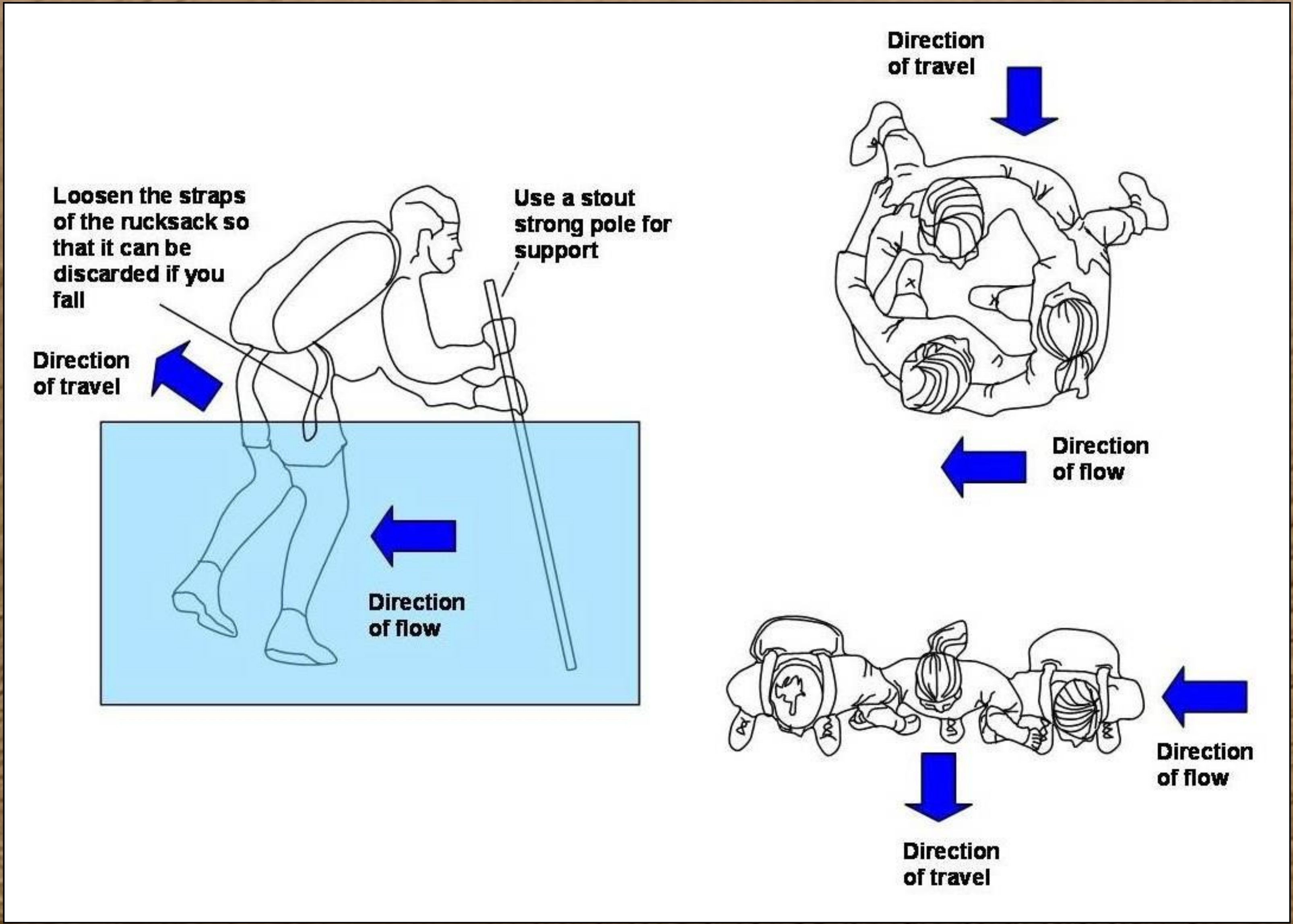
Crossing alone: Use a pole as your probe, then in the water as a third leg, maintaining a tripod shape. Place the pole upstream of you and lean on it as you lift your leading foot, moving your foot sideways across the current and replacing it firmly on the river bed. Take short, shuffling paces, to ensure that the current does not force your leg backwards and cause you to fall over.

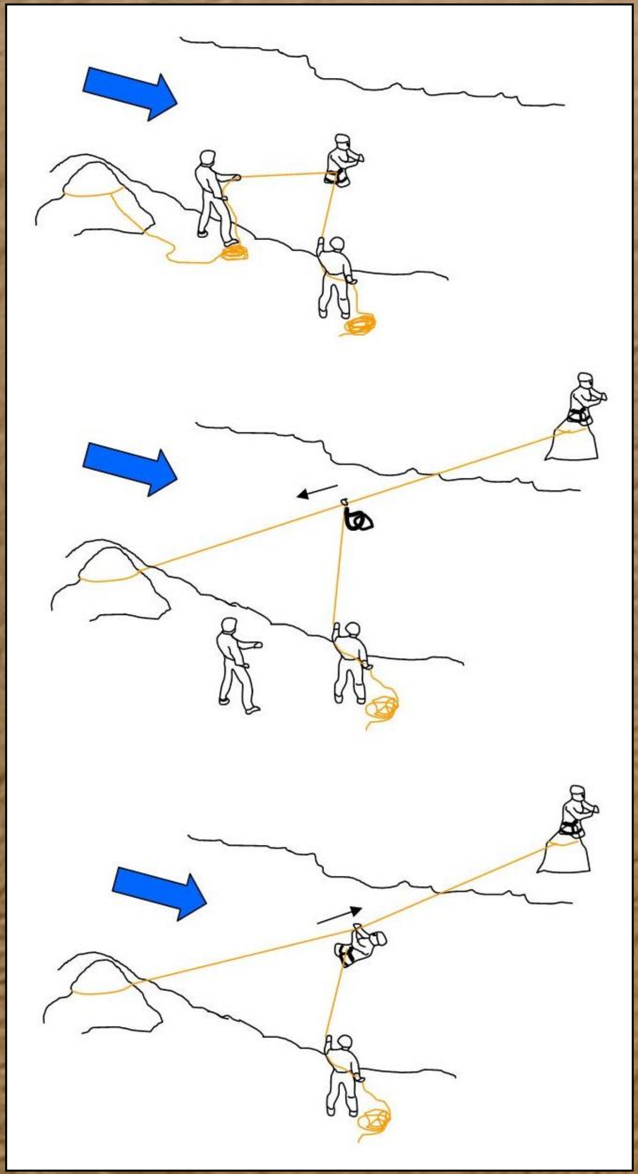
Crossing in a huddle: Three people can form a tripod shape to cross a river. Link arms closely and lean in towards the centre, bending forwards slightly at the waist. The strongest person should be upstream, and he should make the first moves. The others should support him in case he falls. This is a very stable formation and is very effective in shallow fast water.

Crossing in a line: Several people can cross in a line with the strongest person upstream, and the others providing stability, supporting anyone who might fall. The leader will decide where to cross, and he should take the first steps. The others should link arms with him, with the weakest and lightest person in the middle. Cross slowly and carefully. Keep well balanced, putting each foot down deliberately.

Using ropes

Zip line technique: The strongest swimmer puts on a climbing harness and attaches a karabiner and rope to the harness. He then swims across paying out the rope behind him. A second, lighter piece of rope is also taken across. The end of the strong rope is held loosely by two helpers. If the swimmer should get into difficulty he can be hauled back to safety by the helpers. Once across, the swimmer attaches the rope to a tree or rock and the rope is stretched tight. He now attaches the harness and karabiner onto the main rope and onto the lighter rope. The assistants haul the lighter rope back to recover the harness and karabiner which is then attached to the second person who clips onto the main rope with the karabiner and enters the water. In fast flowing water the current will carry him across. If the current is not strong he can pull himself across on the rope.


Direction of travel
Loosen the straps of the rucksack so that it can be discarded if you fall
Use a stout strong pole for support
Direction of travel
Direction of flow
Direction of flow
Direction of flow
Direction of travel



1. Swimmer attached by harness to rope carries the safety rope across plus a lighter line to send harness and carabiner back.

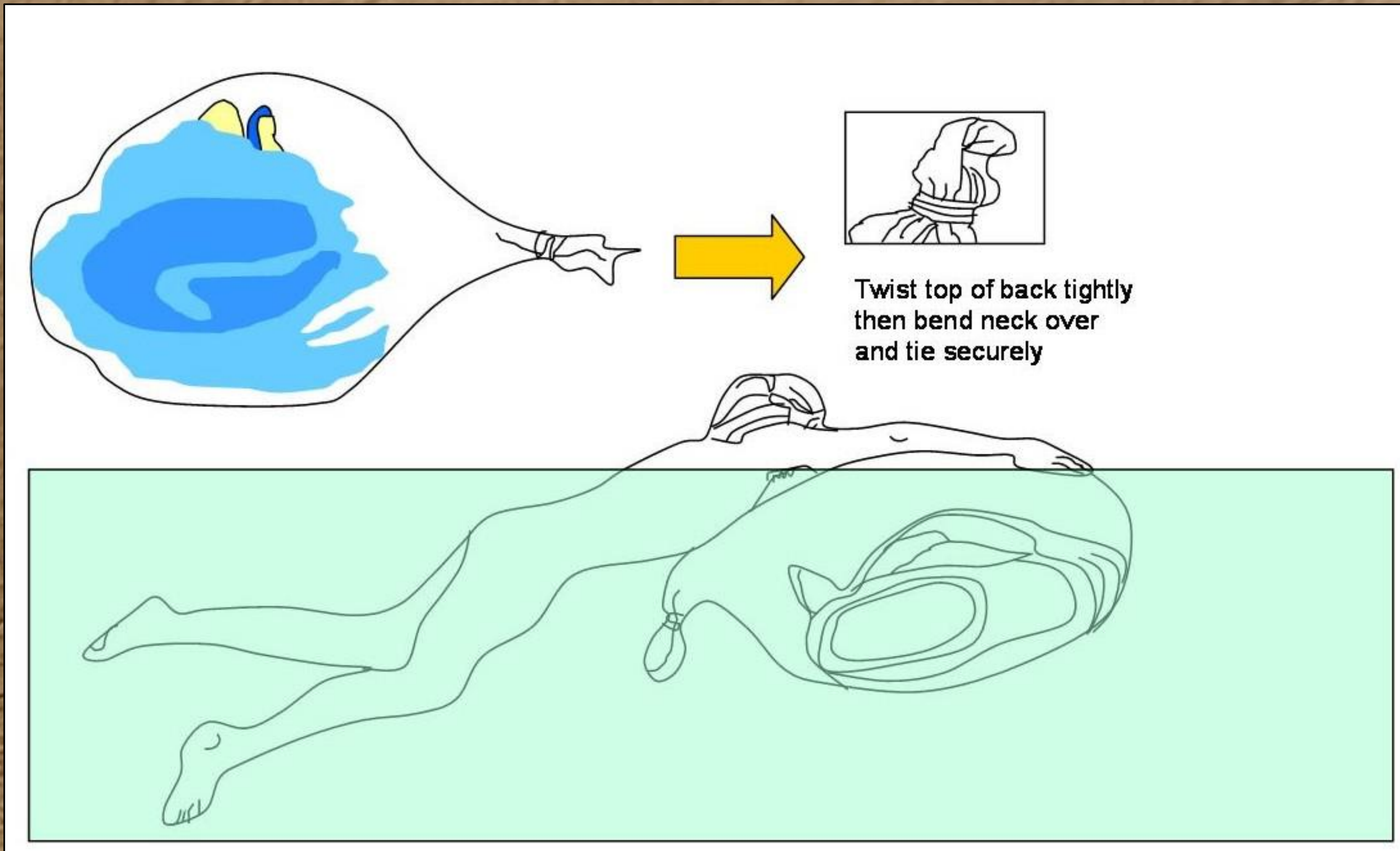
2. The safety rope is firmly tied to a rock or tree on the opposite bank. Harness and carabiner hauled back across for second person to cross.

3. The second persons dons the harness and clips onto the rope. He either pulls himself across or is carried across by the current. The harness and carabiner is sent back to the third person who now unties the safety rope around the rock and attaches the end to the harness which he puts on. The first two to cross now haul the third person across.

River crossing using ropes – "zipline" technique (blue arrow indicates direction of current flow)

Swimming

If the water is too deep to wade you may have to swim across. Make a float to assist you using a sheet of plastic, large plastic bag, a waterproof poncho or a tarpaulin. Before entering the water, look for a suitable landing on the opposite bank. Remove your clothes so that they remain dry and bundle them with your gear in a waterproof bag. Twist the top of the bag tightly, then bend the neck over a tie securely to prevent water getting in. Enter the water with care. Cross upstream of your intended landing point and let the current carry you to it. Keep your body weight off your bundle, but hang on to it with your arms. Kick your legs to provide propulsion.


Twist top of back tightly
then bend neck over
and tie securely

The art of improvisation

The art of improvisation

We have become used to a society where everything we need is ready made. Seldom nowadays do we have to make something for ourselves and so we have, by and large, lost the art of improvisation.

What is meant by the art of improvisation? Improvisation is using something for a purpose for which it was not really intended.

A weapon is an object of offence or defence, an implement with which you can protect yourself inflict injury on another or which can be used to procure food.

A tool is an implement or object which is used to make something, which is used to facilitate a task or which can assist in procuring food.

In a survival situation a weapon can make the difference between having food or not having food – it can make the difference of being able to protect yourself or being vulnerable to attack by man or beast or both.

Whenever you find yourself in a survival situation and you do not have a weapon then start thinking about making one. Objects which would normally be considered useless rubbish suddenly take on great value and significance

Bushcraft and survival skills are often to do with improvisation. Improvisation could be defined as using something for a purpose other than what it was designed for. The difference between being reasonably comfortable and decidedly uncomfortable, going hungry or finding something to eat, dying from thirst or having enough to drink often hinges around the individuals ability to improvise.

A good way to practice is to look at different everyday items and figure out for yourself the different ways that particular item could be used in a survival situation. It needs some "out of the box" thinking but once you get the hang of it you will surprise yourself with what novel and useful ideas you can come up with. If you are sitting around the campfire with your hunting buddies it can lead to some enjoyable discussions and useful suggestions by "brain storming" improvisation ideas. An empty tin can what could I do with it? What about a length of discarded electric chord or some old aluminium foil? Items we, under normal circumstances, might consider to be useless or even rubbish may, under survival conditions, become a literal life saver. In the pages that follow we are going to look at some examples to get you started.

Cutting weapons and tools

Weapons and tools work by crushing, cutting, penetrating, abrading or colliding with. With this realization you can now let your imagination run wild for any object that can crush, cut, penetrate or collide with is a potential weapon. Look around you – you are surrounded by weapons. All that is needed is a little imagination and ingenuity.

Cutting weapons must have a sharp edge. If possible the material used should be able to retain a sharp edge and should preferably be of such a nature as to be easily sharpened.

Cutting weapons or tools can be made from glass, hard rock like obsidian, or metal. What immediately comes to mind for "cutting" weapons are glass and steel and certain types of rock such as obsidian. The lid of a tin can, normally thrown away as garbage, can be turned into useful survival tools – one of which is for a cutting tool or weapon. A piece of round metal bar or wire can be hammered flat and the edges sharpened on a smooth stone. Broken glass can have a very sharp edge that can be fabricated into a very useful weapon. Sharp cutting tools or weapons can be obtained by "flint knapping" suitable rocks. Weapons with cutting edges include spears, arrows, knives, slashers, swords and so on.



Improvised cutting weapons.

A crushing weapon or tool is usually a heavy object which is brought into heavy contact with another object, person, or animal. Once again one does not have to look far to find a crushing type weapon. A heavy stick, rock, wheel spanner readily come to mind. Good examples of crushing weapons are “knopkerries” made of wood or a heavy stone attached to a stick


Crushing weapons or tools can be made from rocks or hard wood. Here (top left) a rock is used to break open a coconut. Clubs (right) made from hard woods or rocks affixed to handles make effective crushing weapons.

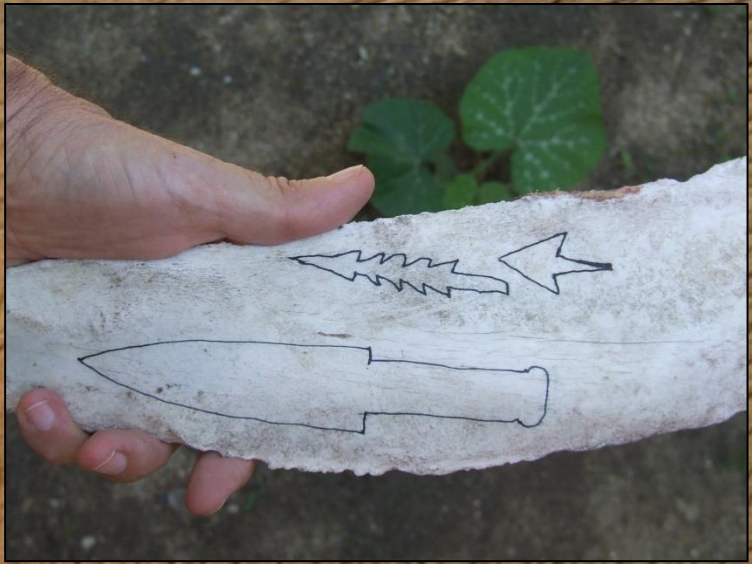
Horns and bones are an excellent source of potential weapons and tools. If you find an animal carcass or skeleton in the bush don't just walk past it. See all the potential in the materials available such as bone and sinew.

Remember how may Philistines David slew with the jawbone of an ass!

Bone material can be fairly easily shaped by abrading into any desired shape. The materials for abrading bone are readily available in the natural environment.

To abrade means to “wear down through abrasion”. Sandpaper or a file works by wearing down a surface through abrasion. In a similar way rough stones, and even some plant materials can be used to wear away, shape, sharpen or smooth down surfaces for a particular purpose.

With a little imagination, survivors will be delighted to discover that they are surrounded by a variety of useable weapons and tools wherewith they can defend themselves, procure food, or use to make articles of survival value. All that is required is ingenuity and improvisation. A vertebra from a large animal can make a very handy battle ax. Flat bones have the potential for making arrow or spear points or knife blades.



Piercing or penetrating tools usually have a sharp point but do not necessarily have to have sharp cutting edges although in many cases such as with knives, spears and arrows this is the case. It is fairly easy to make piercing weapons. A sharpened wooden stake, or sharpened bicycle spoke would be obvious examples. In more primitive bows and arrows the latter have sharp points but not very sharp cutting edges

A sharpened stake, length of wire or pointed blade (be it an arrow, knife, spear) make for effective piercing or penetrating weapons.

A colliding weapon implies a projectile being launched from some launching device and the object colliding with an intended target and by virtue of it's weight (mass), velocity, and / or sharpness can penetrate the target, but in some instances does not have to do so to be effective. Examples are arrows, spears, bullets, stones, rocks or other objects which are given an initial launch by hand or some propelling device such as a bow, atlatl or catapult.

The top of a tin can tied into a split stick makes a handy cutting or slicing tool. Large leg bones can be used as hammers or war clubs.

The branches of the raisin bush and other tree species make excellent bows and arrows. The rib from a large animals such as a buffalo or elephant also has the potential to make an effective bow. Flint and pieces of tin can be fashioned into a knife, spear or arrow point. The flat scapula bone makes a handy digging tool.

Now lets look at how we can put some everyday items like the humble garbage bag – the type you line your rubbish bin with. They are usually made of thin plastic material and may be coloured black, white or green. They also come in different thicknesses. Every survival kit should have at least one. A large rubbish bin bag can be folded to fit easily into a small survival kit and when you realize how valuable it can be you will never be without when you are out in the bush. I usually have at least three in my survival kit.

Whenever you think in terms of survival remember the priorities: in the short term you need air to breath, water to drink, the ability to make fire, to stay healthy and to construct a shelter to be able to keep yourself warm in the cold and cool in the heat. Food only comes into consideration in medium to long term survival because you can go for long periods without succumbing to hunger induced weakness. You may suffer hunger pangs in the beginning but these will subside after a couple of days.

Now back to our garbage bag. Think water, shelter, and container.

Water is a priority. If you find yourself lost and without water it could be fatal within as short a time as three days under hot bushveld conditions.

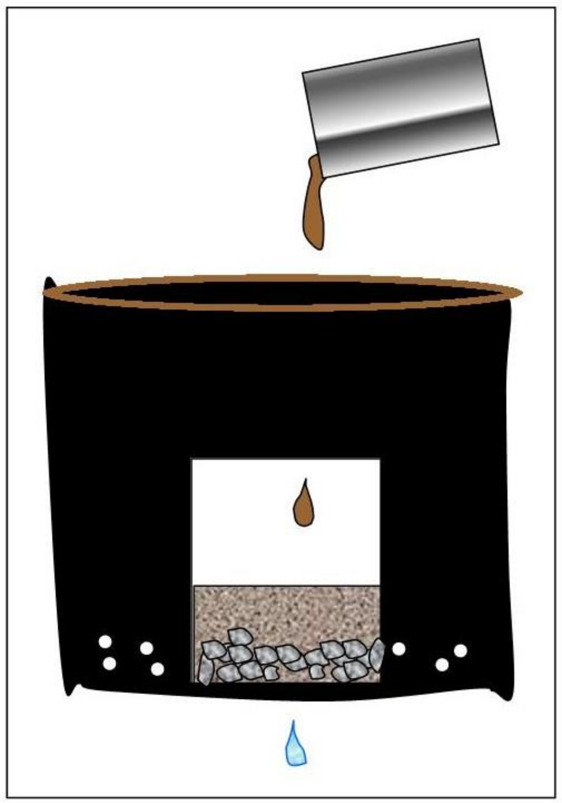
A brief thunderstorm with a quick shower of rain might pass at a critical time but perhaps the soil is so dry that within a minute the rain has soaked away leaving you parched and dry. If you had a plastic garbage bag you could have quickly placed it in, or created a hollow for it, taking care to weigh down the edges with rocks or sand because quick downpours are often associated with strong gusts of wind and you don’t want your garbage bag to blow away. Quickly creating a small catchment dam with your garbage bag as you see a rain squall approaching might just catch up enough water for you to make the difference between living or the alternative – dying. You will be surprised at how much water can be collected in this way within a minute or two. The garbage bag can also be used to construct a solar still. You were shown how to do this in an earlier section. An alternative to the solar still is to tie the bag onto the end of leafy (green) branches. The leaves continually transpire and give off moisture which will be trapped inside the plastic and provide a little drinkable water.

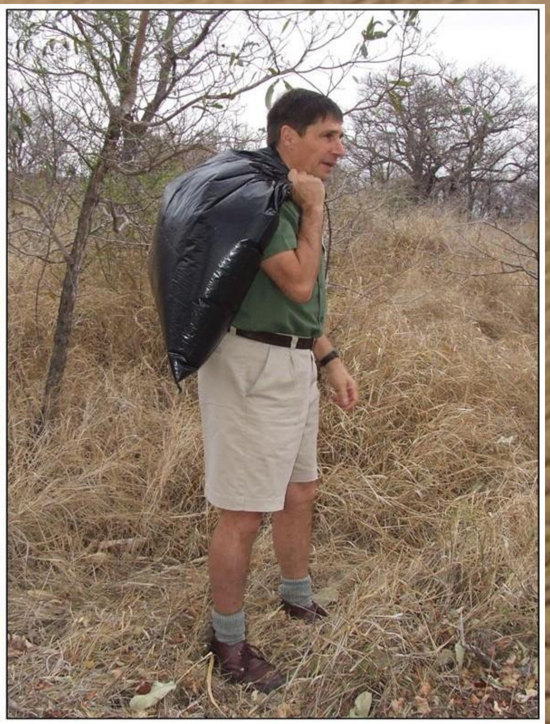
The bag can be used to filter water to remove dirt and solid particulate matter. Make small holes in the bottom of the bag. Place a layer of small stones in the bottom, followed by a layer of clean sand. Pour the dirty water in the top and as it passes through the sand large particles of dirt will be trapped and the water will emerge a lot cleaner. It can now be boiled to purify it.

And of course we must not forget the obvious - the bag is a useful water container. It can be used “as is” or cut up to make several containers – for food, water, and items of equipment.

Using a garbage bag for water acquisition

A filter (left below) and a useful container (below) – more uses for our garbage bag.





If the weather turns wet and /or cold, staying warm and dry becomes a survival priority. A raincoat can be made of the garbage bag by cutting a hole for your head to fit through. An option is to cut armholes as well which frees your arms up to carry out other tasks. In really cold or wet weather it may be advisable not to cut armholes into the bag as this provides more access for rain or wind to enter and your priority would be to stay warm and dry.

The plastic material is also good for cutting wind out and helping you to retain body heat. Instead of cutting the hole for your head in the centre of the bag you can cut a corner off and use the corner as a head covering to keep your head dry and warm. It is very important to keep your hair / head dry in cold weather as most of your body heat is lost from the top of your head. A normal size bag used to line garbage bins is big enough to keep your torso dry. If you have two bags (they are compact enough to keep two in a small survival kit) you can use a second one to keep your lower body and upper legs warm and dry by cutting two holes for your legs to fit through. Bits of plastic can be used to make mittens to keep your hands warm or a mask to keep sand out of your mouth during a dust or sand storm. Wrapping your feet and socks with plastic will keep them warm and dry and keep prickly grass seeds out of your socks. In cold, windy or rainy weather a plastic bag can be used to construct a small shelter wind break, or lean to, to provide you with some shelter. A large bin liner would be preferable to the smaller type as it will afford better cover.

From a first aid point of view a plastic bag can be cut up to provide wound dressings, an occlusive dressing to seal off a sucking chest wound, improvising a tourniquet, or cut into long strips to tie on a splint to immobilize a fracture. It also makes an excellent sling for a broken arm or shoulder.

Using a plastic bag for shelter, warmth and keeping dry.

An inflated garbage bag can provide a useful emergency floatation device if you have to cross a river or body of water. You can place your clothes inside the bag before partially inflating it to keep them dry as well. If you have brightly coloured garbage bin liners (e.g. red, white, orange, blue) the bag can be cut up to make signaling panels which would make you more visible to search and rescue aircraft. Clack plastic shows up well on light soils.

Putting a plastic bag to first aid use.

For helping to acquire food the bag can be tied on to a suitably shaped branch to construct a net to catch insects with (to eat or use as bait to catch fish). It could also possibly be used to catch small fish. Make small perforations in the bag to allow air or water to pass through when using it as a net.

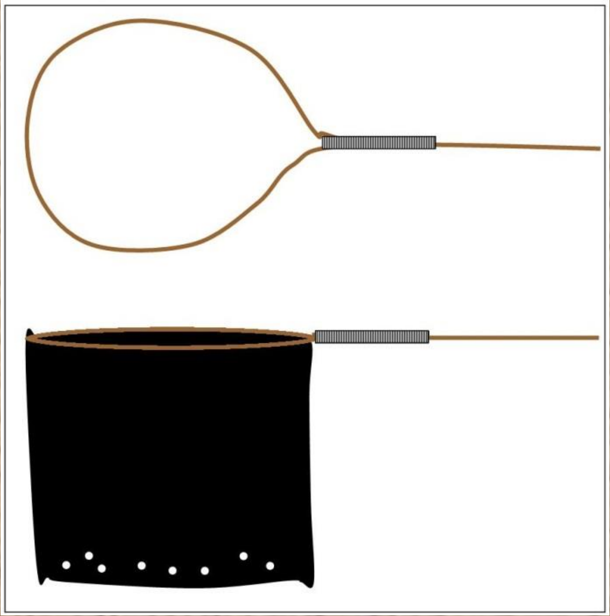
Refer to the section on water crossings

A garbage bag being inflated to use as a flotation device (left) and laid out (above) for signaling.

When a plastic bag is twisted it has high tensile strength and could be used as a rope to lift someone out of a hole or to lower someone off a ledge, or even to tie someone up with. A couple of bags may be joined together in an emergency to make a tow rope to tow a vehicle or help extract it from being stuck in mud or sand.

A portable shower (left), a fishing net (bottom right)) and a strong tow rope (bottom left) all constructed from a garbage bag.

You can make a portable shower by pricking small holes in the bottom of a bag and filling it with water.



Well these are just a few ideas that the humble old garbage bag can be put to use for – other than of course what it was designed for. There are possibly scores of more useful applications but this will hopefully help you to understand what improvisation can mean in practical bush and survival situations.

Now let's look at an item most of us would throw away without realizing its survival – a tin can.

We usually open a tin can, empty out the contents and throw away the lid and the empty can. A tin can have umpteen uses in a survival situation and should never be thrown away. One wonders how often it must have occurred in the past where people have become lost on a hike in the mountains or in the bush whilst hunting and have had a tin can of food with them and at some point have opened the can, eaten the contents and then thrown the can away (or hopefully at least, buried it). Perhaps they have been stranded or lost in the wilds and walked past an empty can without seeing its potential. In the modern world rubbish can be found in even the most remote places on earth and rubbish can become like a treasure trove of useful implements when you have little or nothing to begin with.

So let's take a look at a tin can from a survival perspective and some of the uses it can be put to.

The most obvious use is what it was designed for – to be a container. You can carry virtually anything in a tin can – water, food, sand, small implements and so on. Wire is also found in most places and by punching two small holes in the side of the can with a pocket knife, piece of glass, sharp stone, piece of metal or a nail you can attach a wire handle to make a useful carrying container.

This container can also be used as a cup or as a small cooking pot. The ability to be able to boil water is of cardinal survival importance and a tin makes it possible for you to boil water to purify it and make it safe to drink. You can also use the tin as a pot to cook food in, prepare medicinal potions, make hot drinks or sterilize instruments. When heating contents in the tin over an open fire take care not to burn yourself when lifting the tin. Use a piece of cloth or a small branch shaped to suit to lift the hot tin by the wire handle.

The tin itself can be used as a stove. This method is especially useful where there is not much firewood or combustible plant material and was used by soldiers in the North African desert during the Second World War and was known as a Benghazi stove. Fill the can about half full with sand and then add some petrol to the sand to wet it. Get the stove burning by lighting some tinder on the top. It will burn for about five minutes – long enough to boil water or fry an egg (you will find eggs in bird nests if you take the trouble to look).

You will need food at some stage and a tin can be made into a useful trap. By burying it in the ground so that the top of the tin is at the same level as the ground you will have made a pit trap in which small crawling insects, frogs and even small mammals such as mice can fall into and be eaten or used as bait to catch fish. Add a little water at the bottom of the tin to drown whatever falls into it.

Being able to signal for help can be life saving and this is where the lid of the can be useful. Using some sharp object or tool punch a small hole into the centre of the lid - you now have a heliograph or signaling mirror. Make sure one side of the lid is polished as smooth and bright as you can get it to have a good reflective surface.

You can now signal to vehicles, search parties or low flying aircraft by aiming the mirror towards the persons you wish to signal to and reflecting the bright rays of sunlight towards them. You aim the mirror by looking through the centre hole towards the person / vehicle or aircraft you wish to signal to.

Because the tin is made of metal you can make cutting tools from the material. The edges of the lid can be sharpened to fashion a sharp cutting tool. It can be partially bent over to create a blunt end to hold onto without fear of cutting yourself or mounted in a piece of wood. Arrowheads can be fashioned from pieces of tin. If you don't have anything to cut the tin with it can be bent back and forth to break pieces off until the desired shape is acquired.

By punching a few small holes in the bottom of the tin and adding layers of gravel and sand you can make an effective water filter. This will remove particulate matter before boiling making it more palatable. It can also serve as a shower by punching some holes in the bottom.

Cutting tools (top) and portable shower or water filter (right).

Small, reflective pieces of tin can be used as fishing lures and spoons. These can be attached to fishhooks, from your survival kit if you have one, or from hooks fabricated from lengths of wire or even thorns.

In windy conditions it might be difficult to keep a candle burning. This problem can be solved by making a small candle lamp as shown below.

A tin can makes a wonderful fire carrier. Make a few holes in the bottom and side of the can then place glowing coals or smoldering dung (cow, buffalo, elephant and rhino dung works well) in the can.

The coals or dung will continue burning slowly for many hours and then when you need to make fire you will already have glowing coals to start with. This is especially useful f you have run out of matches or your lighter is empty. Talking of a lighter – remember that even if it does not have any fuel left that it has a flint which can make a spark!

Making a predator call

If you are in a survival situations the use of “calls” can be used to lure an animal or bird closer. Making a predator call is easy and works effectively. All you need is a stick, a small piece of plastic and some cordage.

1. Split the stick
2. Insert the piece of plastic so that it just sticks out beyond the stick
3. Tie the ends off with cordage / twine and
4. Blow…..

The sound that emanates will be that of a bleating animal in distress such as a hare or small antelope and the predators will come running to investigate.

Making fish glue

Adhesives find application in thousands of ways in day to day life. If we need glue for some purpose it is a simple matter to head off to the nearest department of hardware store to buy some. In some survival scenarios we may not have the luxury of stores close at hand and will then have to fall back on our ingenuity and ability to improvise.

the basis for connective tissue in animals. It does a good job of holding animals together. Remove that collagen and it can be used to hold other things together as well. If you doubt the strength of primitive glues put a thin layer of hide glue on a pane of glass and see what happens. As the glue dries and shrinks chips of surface glass are pulled free. Hide glue has in excess of 10 000 pounds of tensile strength!

In future articles we will look at making glue and adhesives from various animal products. In this article we will learn how to make "fish glue". Fish skin glue is a moderately strong glue, but weaker compared to the weakest hide or sinew glue. Old literature reports fish glue as weaker but more flexible than animal glue.

The procedure for making fish glue is described:

Cut off the heads and tails of the fish. Remove the skins making sure to scrape off, flesh, fat and scales. Wash the skins and then cut them into strips. Place the skins in a cooking pot.

Add water to the skins and bring to the boil. Allow to simmer for a few hours until the amount of liquid is reduced down to a concentrated watery toffee consistency.

The fish glue can be stored as is and has a long shelf life especially if liquid boric acid is added as a disinfectant.

Fish skin glue does not jell at room temperature but remains liquid. Fish glue can be dried as a solid. It is poured out onto a tray and when it has the consistency of leather it is peeled away and allowed to dry. Once dry it is broken into flakes. Like hide glue, fish glue has an unlimited shelf life.

Fish skin glue is stronger than white wood glue.

Making cordage

It has been said that the world of ancient cultures was tied together with fibre. This statement was true both literally and figuratively. It is a point lost on modern people who only think nowadays in terms of diet when the word "fibre" is mentioned.

You will be amazed at the many ways we use string rope or cordage in our daily living. We sew things together with fine thread, we bind objects or people together with string, or rope or leather, we pull heavy objects with cables or strong rope. We climb with rope or tie fletches and points onto a primitive arrow with cotton, floss or sinew. You will soon discover the many uses for string or cordage when you don't have any.

Cordage making is an important skill in many aspects of wilderness living. Cordage and other means of binding may be improvised from materials which may be found in nature. Plant materials can be used and animal products. Skins from hunted animals may be cured and then cut into long strips or "riempies" which are strong and can be used for many applications. What we will focus on is making string from animal sinews.

The tendons or sinews of animals is made of connective tissue and is extremely strong – it has one of the highest tensile strengths of naturally occurring materials.

The hunter or outdoorsman should learn to not waste anything. In our last article we learned how to make a strong adhesive from fish skins and heads which we would normally throw away. When we skin an animal and process a carcass often the tendons which attach large muscles to bone are discarded or fed to the dogs. What a waste of valuable material – especially in a survival situation.

Cut out the long tendons and dry them in the sun for a couple of days

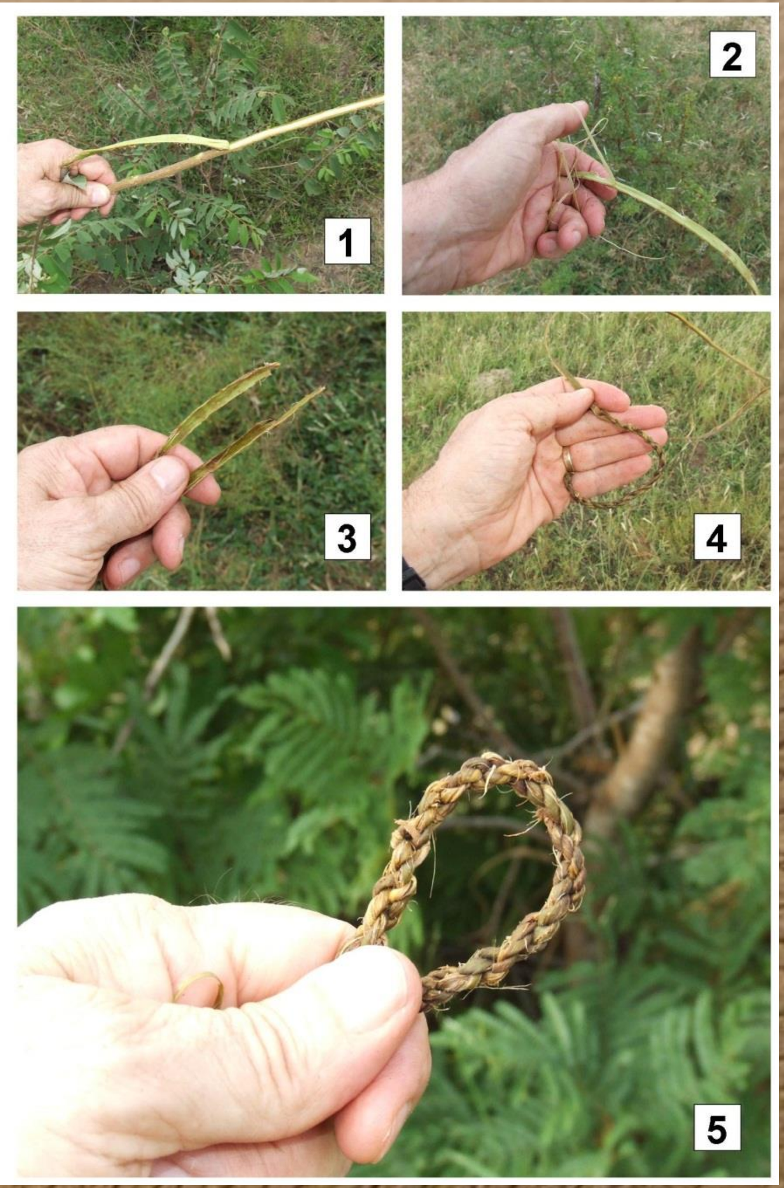
When the sinews are properly dried collect two round rocks from a river which do not have sharp edges. Place the tendon / sinew on one rock and pound it with the other rock (watch your fingers) until the tendon takes on a frayed appearance.

The individual fibres can now be stripped off the tendon. If you need fine thread for mending clothes, tying on arrow heads or sewing a pair of "vellies" strip off thin pieces of sinew.

If you require stronger cordage to make a bowstring or rope to tie a shelter together for example, a thicker bundle of fibres can be stripped off or thinner strips woven together as shown on the next page.

Now we look at how to make cordage from plant fibres. Although there are many options we will look at two commonly found plants in parts of the African bush.

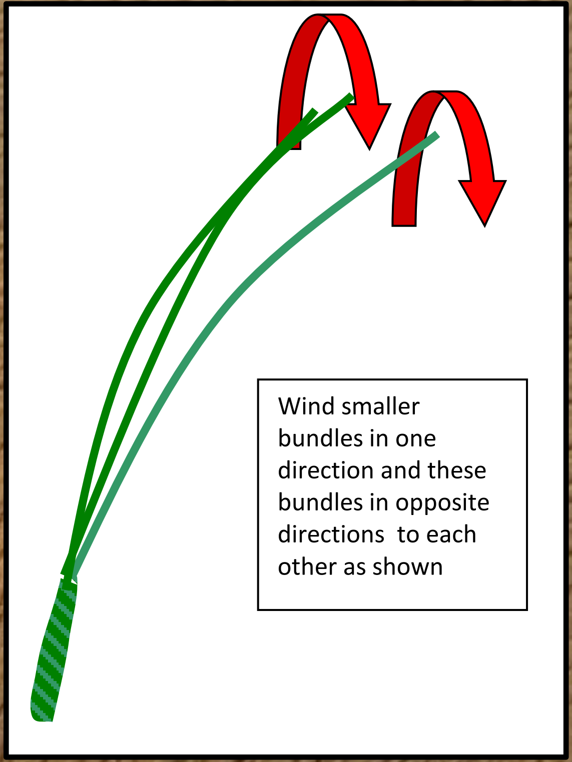
Almost all the different *Grewia* species (raisin bush family) have stringy inner bark which is excellent for making cordage. Look for long branches and remove the bark which comes off quite easily (1). You will see an outer woody layer and a white inner layer. Carefully peel these two layers apart (2). The outer layer can, in some species, be quite brittle and is not suitable for making cordage (3) but the inner layer is flexible and supple and excellent for plaiting cordage 4 and 5). Cordage of any required length and thickness can be made by splicing ends together and plaiting bundles of cords together. The cordage is very strong and can have multiple uses. The bark is also used for weaving baskets.



The “mother in law’s tongue, piles root or *Sansevieria* succulent plant has excellent fibres which can be stripped from the leaf and plaited into string or cordage.

What we have to do is to first separate the fibrous material from the fleshy component of the leaves. This is accomplished in the following way. Take a green leaf and place it on a flat, smooth rock. Now take a fist sized smooth round rock (a river stone is a good choice) and softly pound the leaf between the two stones. The fleshy juice will be expressed out of the leaf to expose the plant fibres as shown. Use smooth stones for this process. Using rough stones will cause the plant fibres to shear or tear resulting in short fibres. We want long fibres.


Pounding and separating the fibres.



Plaiting the fibres.

Bird lime

Trapping can take on so many different forms and there are literally hundreds of methods and techniques. Survival depends on ingenuity and often the simplest methods work best. We are going to look at a very simple but nevertheless effective method for catching small birds. It is often easier to capture smaller creatures for food than larger ones.

We will look to a plant in the mistletoe family to provide us with what we need. It is also known as “voëlent” in Afrikaans. This is an evergreen hemi-parasite, often forming rounded clusters on the host. The leaves are spear shaped and dark green in colour

The plant bares greenish fruits.

Collect a handful of these berries and open them up. This will reveal a white, sticky pulp. Scoop this pulp out and chew it for awhile. The initial taste is somewhat bitterish, which causes copious salivation but this disappears after awhile and you are left chewing a white substance with the consistency of chewing gum.

The chewed pulp is removed from the mouth and is found to be extremely sticky. This sticky substance is now smeared onto branches which are likely perches for small birds. Seed or other attractants can be used to lure birds to sit on the branches.

Chewing the latex (right) and applying it (below). Note how sticky it is! Mistletoe flowers and fruits (bottom right).

Trees around waterholes are good areas to try as seed eating species such as waxbills, mannikins, sparrows, weavers, queleas and doves will frequent these sites regularly and there is a good chance of catching them.

Chewed birdlime smeared onto a likely perch will trap a small bird sitting on it.

Useful plants

There are hundreds of species of plants in the natural environment which have great survival value in terms of food, medicine and tools. There are books written on the subject . We will look at a few examples in this chapter.

Buffalo thorn

The well known buffalo thorn *Ziziphus mucronata* is one of the most useful survival trees in the African bush. It is a small to medium sized tree with rough bark and a wide spreading crown. Extremely sharp thorns are present on the twigs – one straight and the other curved and the leaves are glossy and bright green which gives the tree its Afrikaans name which translated is "shiny leaf wait a bit" ("blinkblaar wag 'n bietjie"). The zig-zag shaped twigs are very characteristic. The tree flowers from October to April and bears fruit (small reddish brown berries) from February to August. The tree is found in wooded grassland and woodland.

Use by wildlife

The highly nutritious leaves are browsed by a wide variety of animals including eland, giraffe, impala, springbok, nyala, kudu and warthog. Many bird species eat the fruit and larvae from a number of butterfly species feed on the leaves.



Food and beverage

The fruits can be eaten or brewed to make beer. They can also be dried and ground down to a meal and cooked into a porridge. The seeds from the fruits can be roasted and used as a coffee substitute. Young leaves which appear in the early spring can be picked boiled and eaten as a sort of spinach. With a little salt the “buffalo thorn spinach” is tasty and nutritious.

Medicinal uses

Roots, bark and leaves all have medicinal uses. Leaves can be chewed, pulped and applied to painful boils, sores and septic wounds or boiled and applied as a warm to hot poultice. The boiled leaves can be packed into an old tea bag (with the tea leaves removed) or in gauze and applied to a wound or boil. This keeps the leaves together and makes it easier to reheat the poultice. The leaf poultice not only promotes healing but reduces inflammation and brings pain relief as well. An infusion of the roots is taken to relieve diarrhoea and dysentery. Powdered bark and leaf in water is used as an expectorant (assists in getting rid of phlegm) in coughs and chest ailments and is also used as an emetic (induces vomiting).The active ingredients that promote healing are peptide alkaloids.

Implements, tools and other uses

The hard wood makes excellent firewood and the thorns can be fashioned into useable fish hooks in an emergency. The branches can be packed to form an impenetrable barrier – useful if you have to sleep out in the bush at night where there are large predators around. Climbing into the tree would also be a useful option as it would afford good protection. If there is a buffalo thorn in the vicinity you have a friend.

Raisin bush (*Grewia)* family

Shrubs belonging to the raisin bush or *Grewia* family are particularly prized by bush dwellers as it provides a number of useful resources.

There are quite a number of species belonging to this genus and differ somewhat in appearance ranging in size from shrubs to small trees, but all are useful. They are characterised by serrated alternate leaves that are three veined from the base, hairy and often of two colours.

Tools and implements

The wood is tough and springy easy to work with and ideal for making bows and arrows. Some species such as *Grewia flava* (brandy bush) are more useful for this purpose than others because they produce long shoots with few side branches. Excellent arrow shafts can be made from the wood and is almost exclusively the wood of choice for making both bows and arrows by Kalahari bushmen. Bows have good memory retention but are limited in terms of draw weight so are intended primarily for short range shooting. Because of the lack of kinetic energy and momentum which can be produced by these bows Bushman rely on poisoned arrows to kill their larger prey. Smaller prey such as birds and hares can be killed with arrows without poison. The tough branches are also woven together to make traps. Thicker branches are used to make axe handles, assegai shafts and walking sticks.

Cordage

Almost all the different *Grewia* species have stringy inner bark which is excellent for making cordage. This was described elsewhere in this CD. The cordage is very strong and can have multiple uses. The bark is also used for weaving baskets.

Food

The common name of this family – "raisin bush" – comes from the edible berries which vary in size according to the species from 5-10mm in diameter. Fruits are green to begin with but ripen to a yellowish orange to brown and in some species to almost purple. They can be eaten raw and have a pleasant sweetish taste. There is not much flesh around the pip. The berries are fermented to produce an intoxicating drink. The dried berries of some *Grewia* species are ground down into a meal from which porridge is made. The berries contain about 30mg/100g vitamin C, 64% sugar and 4% protein.

Medicinal properties

A root infusion of *Grewia caffra* (climbing raisin) is used to treat bladder ailments. The bruised bark of *Grewia occidentalis* (cross berry) is soaked in hot water and used as a wound dressing.

Use by wildlife

The leaves, young shoots and berries of the *Grewia* species are relished by a wide variety of game and birds and are a valuable browse plant to have on a reserve or game farm.

Tamboti

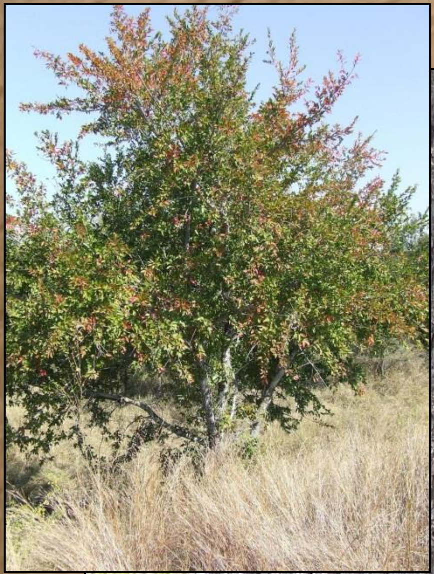
Description

The Tamboti tree – *Spirostachys africana*– is a very attractive tree mostly found growing along drainage lines in poorly drained brackish soils, sometimes singly but often in clusters. The tree can grow as tall as 18m but is usually smaller with heights of 5-7m being more common. The dark greyish brown bark is very characteristic and forms small rectangular blocks arranged in rows (see Figure 1). The leaves are bright green in the summer months and turn into beautiful yellow, gold and red hues in autumn. See Figures 2 and 3. The leaves are finely toothed and have two small glands at the base. When a leaf is broken off from a branch, milky latex will appear at the stalk which is a good diagnostic feature. Milky latex is also exuded from the branches or trunk if it is damaged. The tree is semi-deciduous for as old leaves are shed new ones begin to appear. The tree flowers from July to January (catkin like spikes) and bears small three lobed fruits between October to February.

Use by wildlife

Although all parts of the tree are extremely toxic to man there are a number of species that readily browse on the leaves or feed on leaves that have fallen to the ground.

Tamboti



Elephant, giraffe, kudu, nyala, black rhino and bushbuck browse on tamboti and during dry months of the year when grazing is poor impala can often be observed in small groups under tamboti trees eating leaves which have been shed and are lying on the ground. Porcupine are very partial to feeding on the bark of tamboti tree, sometimes ring barking them which results in the ultimate death of the tree. The fibres from the tamboti bark are readily seen in porcupine scat A small moth lays eggs in the green fruit of this tree. The eggs hatch into small larvae which then pupate just before the fruit falls to the ground. Violent movements of the pupae inside the fruits actually cause the fruits to hop up and down – especially if exposed to hot sunlight. The ground under tamboti trees seems to be alive at the time when thousands of the fruits are hopping as high as 4cm into the air.

Uses and warnings.

This wonderful tree has a number of uses for man. It has one of the most beautiful timbers on planet earth and can be made into the most exquisite furniture and gun stocks. The heartwood is a dark, rich brown colour whereas the sapwood is pale to dark yellow giving the effect of a flame. The wood is heavy, hard and durable but difficult to work with because the sap is poisonous and the sawdust highly irritant. If latex or sawdust gets into the eyes it can cause blindness. Latex on the skin can cause blisters. The wood is oily and requires special processes to glue together when making furniture.

There are a number of medicinal uses for this tree but the parts used must be used in minute amounts due to its toxicity. Severe toothache can be relieved by placing a small drop of fresh latex in a cavity. There is a momentary feeling of sharp pain followed but total relief. The cytotoxic phorbol ester content of the latex is believed to destroy the exposed nerve in a badly decayed tooth. The latex can be used to poison fish but avoid getting the latex on your skin, into the eyes or in the mouth. Small quantities of bark are used by some rural communities as a purgative. But the action is violent accompanied by severe stomach cramps and has resulted in deaths so this is not advised. Small amounts of latex are also said to be applied to infected boils to speed up healing. Small pieces of wood are placed in amongst clothing as an effective insect repellent that works particularly for clothes moths. The wood is pleasantly fragrant and some rural peoples such as the Herero in Namibia make perfumed beads that are worn around the neck. Do not use the wood for making a campfire as the smoke is highly irritating to the eyes and bronchial passages and can result in headaches and nausea. Although the smoke has unpleasant side effects when it gets into the eyes or is inhaled, some people smoke their clothes with it as the smell of the smoke is pleasant and similar to that of sandalwood and imparts a pleasant scent to the clothing and also helps to repel insects.

Porcupine often ringbark trees as shown in this example of a *Syringa* tree (above). Porcupine scat has a lot of fibrous bark content from the tamboti trees they feed on.

Of interest to bowhunters is the fact that the latex is used as an arrow poison in Namibia.

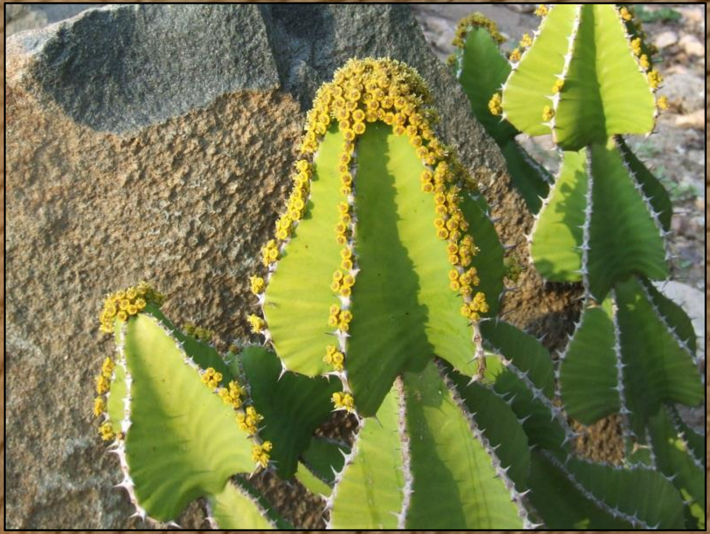
The tamboti tree is truly one of the most useful of trees but is also one that should be used carefully and with circumspection.

Lebombo Euphorbia

Description

The Transvaal candelabra tree – *Euphorbia cooperi* – belongs to the large Euphorbiaceae family comprising some 2,100 species and is one of the most diverse groups of flowering plants on earth. They all produce a toxic sap or latex. They resemble cacti. Many of the herbaceous, leafy species of Euphorbia are commonly called "spurges." This word is derived from an old French word “espurgier”, which means "to purge." The sap of many herbaceous Euphorbia species have traditionally been used as a purgative, or laxative but this should not be attempted with the Transvaal candelabra tree as the latex is reported to be the most poisonous of all the Euphorbia species. The milky sap or latex is deemed to have a protective and defensive function in helping heal wounds and in deterring animals from attempting to feed on the tree. There is a wide variety of chemical compounds present in Euphorbia sap, some of which are toxic and potentially carcinogenic (cancer causing). Compounds known as terpene esters are common and often account for the extremely caustic and irritating properties of the milky sap, either by direct contact with the skin or even by exposure to the air and inflammation of the eyes or mucous membranes.

The Lebombo *Euphorbia* showing the poisonous white latex.



The tree has a single stem with numerous green branches at the apex giving a rounded candelabra effect (hence the name – a candelabra is a multi branched candle holder). The leaves are tiny (1 x 2mm) and easily escape notice. This species is sometimes found in bushveld but prefers rocky outcrops where it can grow from 7-10m tall. The stems form four segments and spines ("thorns") cover the ridges of the stems. Flowers and small fruits (3-lobed capsules) are found on the terminal ridges of the branches. Old branches fall off to leave holes which spiral up the grey coloured stem.

Use by wildlife

Wild animals generally avoid browsing on this species. I seem to recall reports of kudu having been blinded by the sap and having mouth ulcerations when attempting to feed on the tree during severe droughts. Insects are however strongly attracted to the flowers and assist in the pollination process. This in turn attracts a variety of insectivorous bird species.

Uses

In a survival situation fish poison can be prepared by soaking grass wrapped around a small rock in the latex and then throwing it into a pool. An alternative is to throw cut branches into the water.

Obviously the body of water must be fairly small otherwise the dilution effect of the large volume of water will render the poison ineffective. The latex does not actually kill the fish, it "stupefies" or stuns them, causing them to float on the surface where they can be easily caught by hand.

“Balsemkopiva”
Minor wounds and burns are fairly common injuries that occur in a hunting camp. Someone bumps into you and you spill boiling hot coffee onto your legs. It is an all too frequent occurrence that people cut themselves whilst preparing food for cooking or when dressing a carcase with a sharp skinning knife. Anyone who knows hunting knows that wounds, cuts, scrapes, scratches and burns go with the territory and so it is useful to know of some plants that can be used to treat this conditions, A useful group of plants comes to mind known generically by the name *Bulbine*. The one we will discuss in this article is *Bulbine frutescens* known in Afrikaans as “balsemkopiva” and in Zulu as *ibhucu.*
Plants belonging to the *Bulbine* genus are aloe-like plants the leaves of which are filled with a clear gel, similar in appearance and consistency to the gel obtained from *Aloe vera*.The plant has long spiky looking fleshy leaves which exude a clear gel when broken Bright yellow flowers are born terminally on long stems which together with the leaves make the plant reasonably easy to identify in the wilds. The plant is often found growing in grassland, rocky ridges and is widespread. It flowers in the spring and is found widespread in eastern and northern parts of South Africa. *Bulbine frutescens* is a perennial herb with the grey green leaves arranged evenly around the base of the stem.

Medicinal properties

The parts of the plants used are the fresh leaves and the roots.

Fresh leaf gel is applied directly to the skin or as a warm poultice. The leaf sap can be used to treat wounds, burns, itches, rashes, ringworm, and cold sores ("fever blisters") caused by the *Herpes* virus. The leaves contain an anti-biotic known as chrysophanol and glycoproteins which are the principal component bringing about the healing of burns and wounds.

This truly is one of the most useful and effective of our medicinal plants.

Use by wildlife

Insects and butterflies feed on the flower nectar but it is not generally eaten by animals because the leaves are bitter.

Implements, tools and other uses

The plant is often planted in gardens because it grows easily, is attractive when in flower and is drought resistant. It is also useful having such a useful medicinal plant close at hand.

“Balsemkopiva” -*Bulbine frutescens*


Corkbush

Description

The cork bush – *Mundelia sericea* is not very well known but is also a useful bushveld plant. The tree does not grow much taller than 3m and is often found in a shorter shrub-like form. It is semi-deciduous and prefers sandy, well drained soils on rocky ridges, sand flats and sometimes close to rivers. The characteristic bark is grey in colour, deeply fissured and corky. Leaves are greyish green in colour and covered with silvery silky hairs. The attractive flowers which bloom between October to January are mauve or lilac in colour. The brown seed pods are covered in golden-brown velvety hairs.

Use by wildlife

Leaves are browsed by livestock and game such as kudu, elephant, eland and impala. A number of butterflies breed on cork bush. Sunbirds are partial to the flower nectar.

Medicinal uses

A bark infusion is used as an emetic (a substance which produces vomiting) in cases of poisoning.

Corkbush bark leaves and flowers

Uses and warnings.

The bark contains a chemical known as rotenone which is an effective fish poison and an effective insecticide. Pieces of bark are placed between clothes and in drawers to keep fish moths away. Both the seeds and the bark are pounded and dropped into small pools of water to poison fish which can then be cooked and eaten. The cooking process breaks down the poison rendering it safe to eat. The poison is also toxic to crocodiles.

Sickle bush

Some plants can be both a pest and a blessing. One such plant springs quickly to mind because it can under certain conditions become a real problem but at the same time is one of the most useful plant species in the veld. Many will know it by its common name – sickle bush or, in Afrikaans, “sekelbos”. The botanical name is *Dichrostachys cinerea.* The name of this thorny bush or small tree aptly describes the curved thorns (actually referred to as “spines”) which resemble the curved shape of a sickle. When veld has been mismanaged through incorrect fire management (burning too infrequently) or overstocking this species can encroach and form dense, sometimes even impenetrable thickets. This effectively excludes these areas as suitable habitat. Because little ground cover remains under these dense stands fire is almost an impossibility because of a lack of combustible fuel (i.e. grass and herbaceous plants) and the only way to resolve the problem is by mechanical removal or chemical treatment of the sickle bush.The bush is quite attractive with emerald green compound leaves and a very pretty lavender and yellow flower which appears from October to February. The flowers resemble small Chinese lanterns. The fruits consisting of bunches of contorted pods appear from May through to September.

Sickle bush (above), flowers (top right) and pods (above).

It is reported that extracts of leaves and bark and bark in powdered form are applied to wounds to bring about healing. This may indicate some antibiotic properties. Powdered roots are sniffed to stop nose bleeds. Leaves and roots are smoked by some rural tribes as a cure for congestion and head colds. There are also reports of chewed leaf paste being applied to snake bites. This should however be investigated further before confirming its efficacy.

The species is found mostly as a bush but can grow as tall as 7 meters. The bark on young branches is green and hairy but dark grey-brown and deeply and fissured on the stem and older branches. From a usefulness point of view this is quite an outstanding species.

Use by wildlife
The pods and young twigs are relished by a variety of animals including kudu, giraffe, impala and nyala. The larvae of the satyr charaxes butterfly feed on this species.

Medicinal uses
This is one of the most important medicinal plants in Southern Africa with a wide variety of practical applications to the bush visitor or dweller. Whereas some of its uses have not been confirmed through clinical trials I can confirm one of its uses having put it personally to the test on numerous occasions. When the chewed leaves are applied as a paste to itchy rashes caused by bee stings, coming into contact with hairy caterpillars, stinging nettles or the hairy stems of wild hibiscus relief occurs literally within seconds. This is due to antihistaminic properties contained within the leaf. The leaves also have properties which reduce toothache when chewed and also alleviate diarrhoea.

Marula

Identification

Marulas are the survivors dream. It is a medium sized, single stemmed tree that grows to a height of about 15 meters. The rough bark is mottled and made up of contrasting pale brown and grey patches.

This tree which grows in many parts of Africa is well looked after by the local inhabitants because they are fully aware of the uses of its fruits.

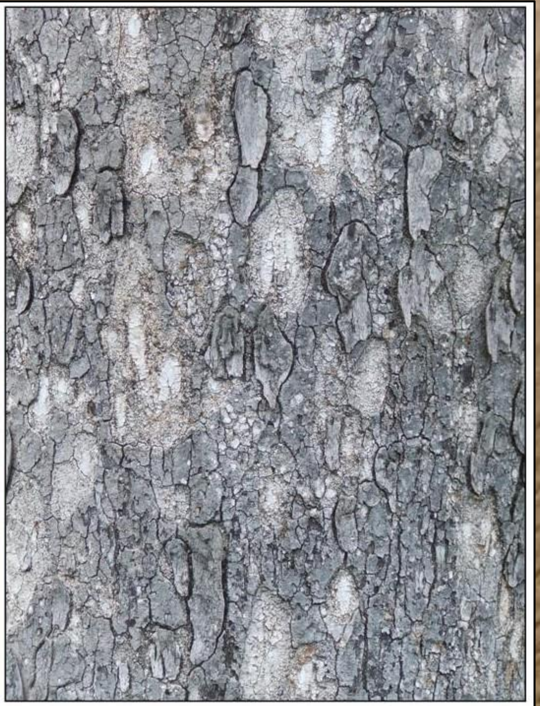
The tree has a round to spreading crown and loses its leaves in the winter. The leaves are compound with 7-13 pairs of paired leaflets and a terminal leaf. Marula trees are found in the north eastern parts of South Africa. The fruit is green when unripe turning to pale yellow when ripe and is found on the tree between January to March. The marula fruit has a diameter of about 30mm .

Uses

Food value

The astringent and very pleasant tasting fruit is much sought after by both humans and animals. Elephant are particularly partial to marula's and their dung is full of the fruit during the fruit bearing months of the year.

The fruit is highly nutritious with a vitamin C content of 2 - 4 times that of orange juice. It also contains calcium, magnesium, phosphorous, potassium, and the sugars fructose, glucose and sucrose. Trees can produce between 500kg – 3 tonnes of fruit per year. The fruit pip also contains small nuts which are highly nutritious and tasty if somewhat difficult to extract. The arrow in Figure 3 shows where nuts have been taken out of a pip. The little caps are prized off and the kernels fished out of the recesses with a sharp pointed instrument like a piece of wire, nail, or knife point. The fruit can be used to make beer, syrup, liqueur, jelly and sweets. The high pectin content makes it ideal for jelly and in this article we are going to show you how to make jelly and syrup concentrate for a delicious cool drink.



Marula tree (top left), bark (above right), leaves and fruits (left).

Marula drinks and jelly
Start by collecting fruit that has fallen off the tree. Select greenish to pale yellow fruit. Fruit that is greener has a higher pectin content so pick more greener than riper fruits. Wash the fruit. Place the marulas in a pot and add enough cold water to cover fruit. Bring to the boil. Allow the water / fruit mixture to boil for about an hour. Now take a piece of cloth and cover a jug or other container with it. You are now going to pour the water off the marulas through this cloth to strain it. Once the juice has strained through the cloth this is poured back into a pot and the fruits are discarded. Now add sugar to the juice at a concentration of one cup of sugar to every cup of liquid. Stir the sugar in until it is dissolved. The juice is now going to be concentrated by boiling. As the volume of liquid is reduced by boiling it should begin to thicken. If it does not do so readily it might be an indication that the pectin content is too low (you have used too much ripe fruit and too little green fruit). To help the process to "jellify" you can do one of the following:

Add lemon juice (juice from one lemon for every 3 – 4kg of fruit).
Add ½ teaspoon of citric acid or tartaric acid for every 3 – 4kg of fruit
Add 1 teaspoon of cream of tartar for every 3 – 4 kg of fruit.

Allow the concentrated liquid to cool.

Prepare containers for the jelly concentrate by sterilize jars and lids for 5 – 10 min. in boiling water. Spoon or pour warm jelly into containers. Place wax paper cover between lid and top of jelly. This prevents contact with metal which could reduce the shelf life of the jelly.

You now have a delicious jelly which can be used on bread or toast or with meat or as a topping with ice cream. Use your imagination. To make a delicious cool drink place some of the jelly concentrate into a glass and add water. Stir briskly to dissolve the jelly in the water.

Marula beer

Marula beer is a very popular drink enjoyed by rural communities and is prepared by allowing juice extracts to ferment. Marula liqueur is also produced commercially.

Marula sweets

Marula sweets can be made by reducing the fruit concentrate and allowing it to solidify into a toffee like constituency.

Marula nut oil

Marula nuts contain up to 56% oil which can be pressed from the nut and used as a preservative. The nuts can be eaten raw or roasted and are also high in protein.

Marula juice, jelly and jam – all delicious!

Medicinal value

The bark contains nearly 21% tannin and some alkaloids and decoctions (boiling the bark in hot water) made from the bark are used to treat diarrhoea and dysentery. The anti-diarrhoeal effects have been experimentally linked to procyanidins which is also found in the bark. The moist inner bark contains antihistaminic properties and can be rubbed onto insect bites and hairy caterpillar stings to relieve itching. Burns and abscesses are treated with an essence extracted from the leaves. Chewing fresh leaves and swallowing the astringent juice is an effective remedy for indigestion.

Other uses

Marula is popular wood for carving. Cordage can be made from the inner bark.

Utilization by wildlife

Marula leaves and fruit are utilized by elephant, giraffe, eland, kudu, waterbuck, and warthog. Meyer’s parrots feed on the kernels of green fruit.

Sourplum

We are discovering that there are many useful trees and plants in the veld that have medicinal, food and other values. This month we will look at another very useful tree known as the sour plum or “suurpruim” in Afrikaans. It has the botanical name of *Ximenia caffra*.

Identification

The sourplum is a small deciduous tree (loses its leaves in winter) that is partly parasitic on other bushveld plant species. The tufted leaves are alternate, single, borne on short side branches, bright to dark green in colour and are folded lengthwise. Young branches are spine tipped. The tree is rather shapeless and untidy looking. Fruit about 40mm in diameter is green at first turning orange and becoming bright red when ripe (see Figure 2). The bark on young branches is green to pale brown in colour and dark grey and rough on older branches and stems. The tree flowers from August to October and bears fruit from November to February.

Uses

Food value

The fleshy red fruits are good to eat.

They are sweet when first bitten into but quickly become sour and tart. They are very refreshing. The fruits contain hard shelled nuts which are also delicious to eat. The ripe fruits can be used to jam and jelly by boiling the fruits and then concentrating the extract. The fruits have a vitamin C content of 27% and the nut an oil content of 65%.

Medicinal value

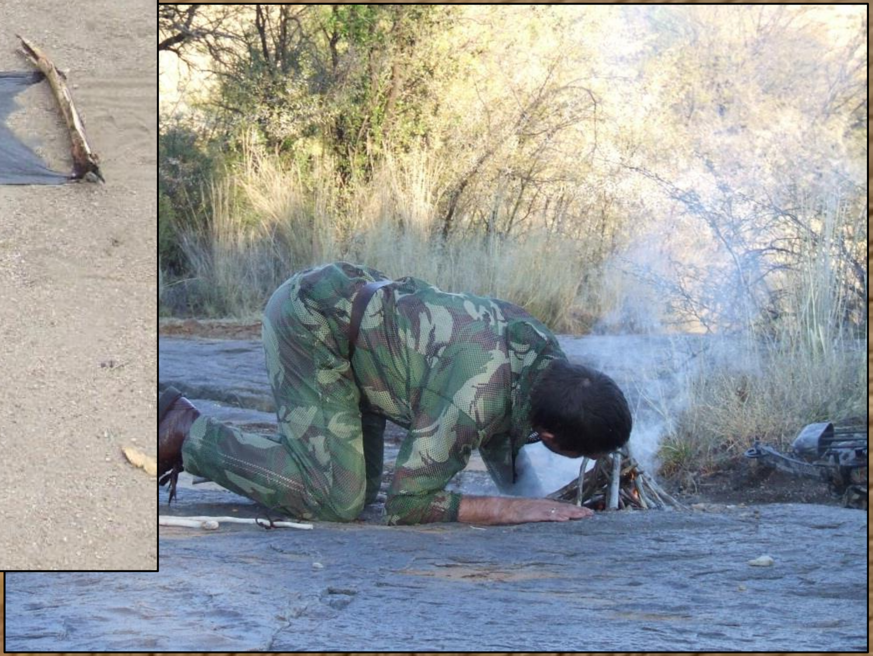
The sourplum is an important medicinal tree and has a variety of uses to alleviate medical conditions.

The lubricant oils obtained from the seed have been used as a cosmetic and as a skin ointment. Porridge from a decoction of the roots is eaten twice a day to relieve nausea associated with pregnancy. Powdered root is applied as a dressing to wounds. Root or leaf infusions are taken for abdominal pain and cramps and root infusions and decoctions to treat diarrhoea.

Extracts of root and bark are used to treat systemic sepsis and rheumatism. Powdered leaves are taken orally to break fevers and extracts of the leaf are used as a gargle for tonsillitis and to treat a person for worms. Cold leaf infusions are used as an eyewash to treat painful eye conditions and powdered leaves are applied to wounds as a styptic (helps to control minor bleeding).

Sourplum jam (right)

Emergency signaling



Being able to attract attention to your plight could quite likely determine whether or not you survive a life threatening situation so let's think of some ways that you can go about signaling for help.

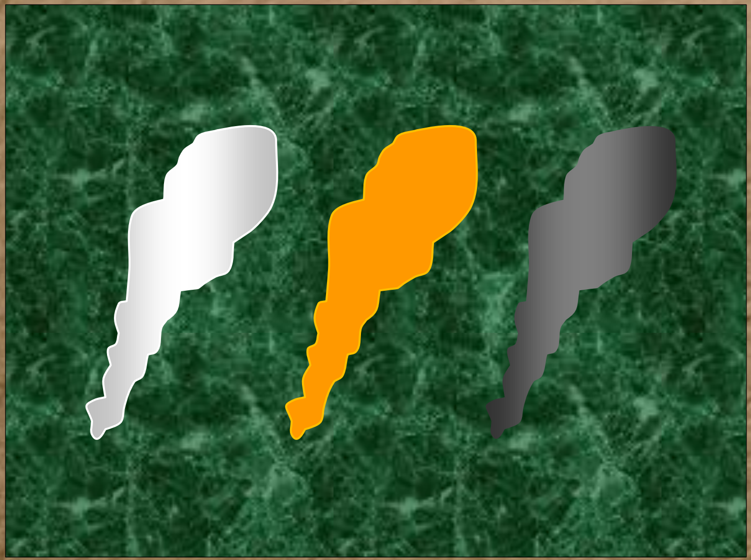
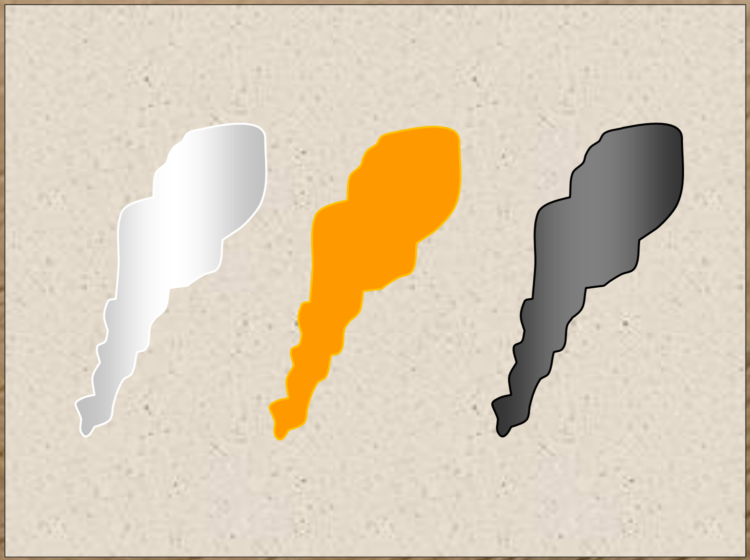
The two most obvious ways you are going to attract attention to yourself is through sight or sound.

Visual signals.

The way you are going to use visual cues is by creating something which is out of the ordinary and which will stand out from the background. Lets look at some examples.

Smoke

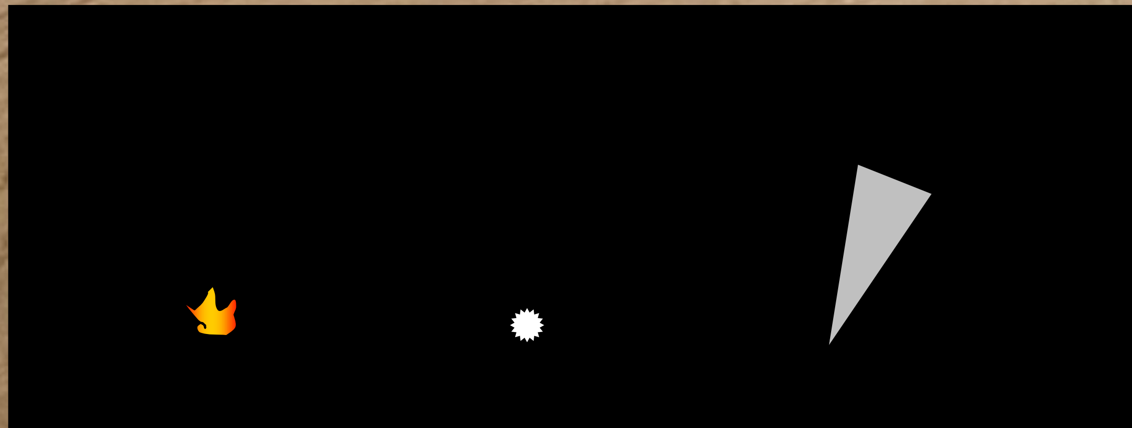
Smoke can help to attract attention. Substances which produce dense white or black smoke will work well. Burning rubber (a car or aircraft landing wheel tyre) will belch out dark black smoke whereas throwing green leaves on a fire will result in dense clouds of white smoke. Coloured smoke from smoke grenades are particularly effective. Always try and use a colour of smoke that will stand out from the background. Put yourself in the position of a spotter looking out of a search aircraft and try and imagine which colour smoke will be most visible.

Signaling with smoke. Note how some colours stand out better against the background whereas others are difficult to see.

Light

A light source such as a torch, fire, or flare is very effective to attract attention in low light conditions or in the dark. If you have a torch it can also be used to flash the internationally recognized S.O.S (Save Our Souls) signal.



Signaling at night using fire, torch or flare.

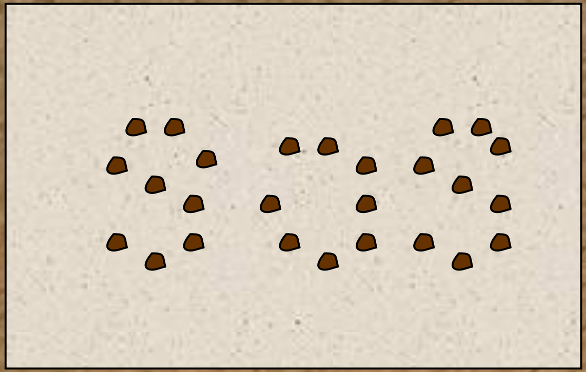
Panels or objects foreign to the background.

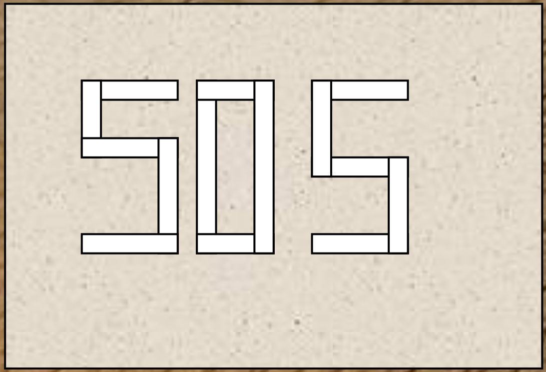
Smoke signals might be mistaken as a natural bushfire so one must look at alternatives. Figures on the next page shows some alternatives as well as the international ground / air emergency code using panels.

Heliograph.

Punch a hole in the center of the lid of a shiny tin. To attract attention from the sky work as follows. Sight the aircraft through the hole, the lid being held about 10cm from the face. A spot of light will be thrown through the hole onto the face, hand or shirt which will be visible in the polished rear of the mirror. Adjust the angle of the mirror until the spot disappears through the hole while you are sighting on the plane. You can flash an S.O.S. signal.

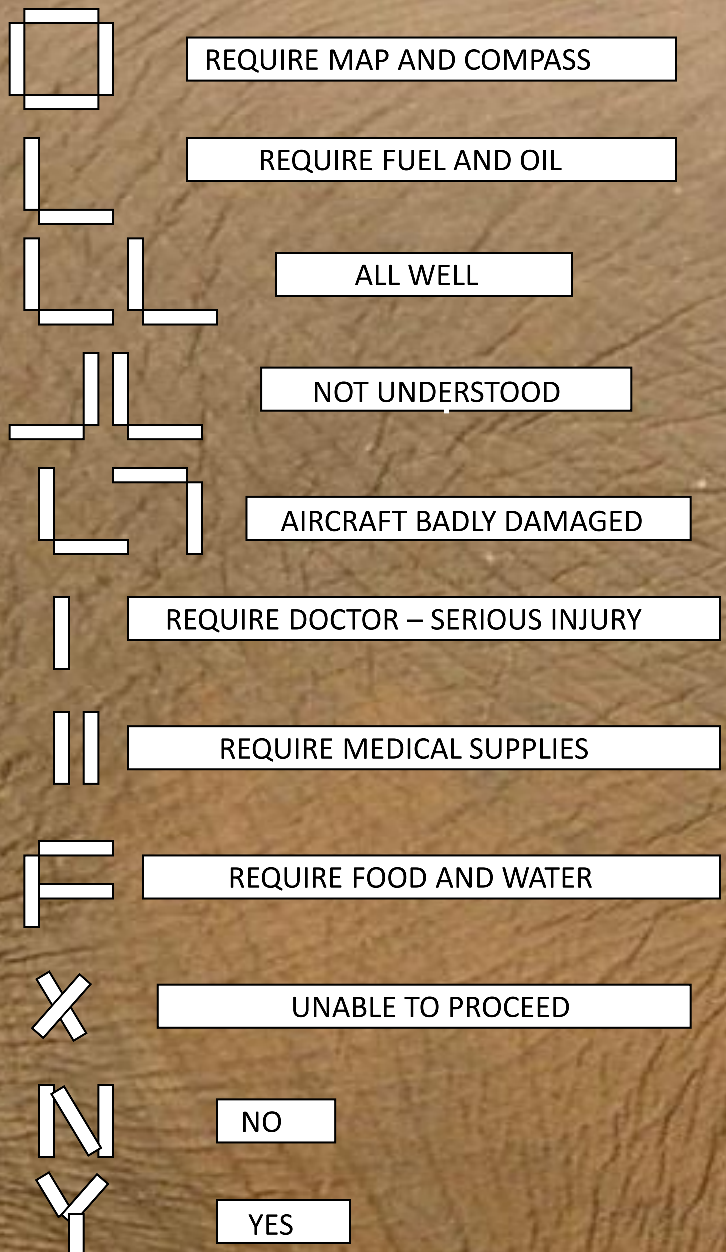
Lines scratched in the sand to convey a signal for help. Use large letter if possible to make them visible from the air – at least 10m in length.





Using rocks, logs, toilet paper or material laid out on the ground to signal for help.

Waving arms and objects.
Wave your arms and any unusual or out of place object – preferably in an eye catching colour.



International ground air emergency code (left).

Write a message.

At sea or stranded on an island write a message and send it in a bottle. In a tense hostage or kidnapping situation try and pass a written note to someone – air hostess, bank teller, passer by anyone.

Sound signals.

Radio

If there is a radio in a downed plane or stranded vehicle try and establish contact to call attention to your plight.

Cell phone, satellite phone or landline.
Most people carry cell phones with them nowadays. See if you are within cell phone range and call an emergency number, family or friends for assistance.

Whistle
Sharp, loud blasts on a whistle can be of great help in leading rescuers to you. You can also signal an S.O.S. on your whistle.

Shouting for help
This is obvious but should not be overlooked.

Banging on noisy objects.
Beating on empty tins or drums, using the lids of dustbins like cymbals, hitting with sticks on corrugated tin roofs.

The End

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