BOY SCOUTS OF AMERICA
CHESTER COUNTY COUNCIL

LENNI LENAPE DISTRICT
SCOUTMASTER FUNDAMENTALS

WOODS TOOLS

GOOD THINGS TO HAVE ALONG WITH GOOD KNOW HOW

FALL 1995

- KNIVES
  - Bigger is NOT necessarily better with knives
  - Good outdoor pocket knife
    - One or two folding blades
    - Attachment for opening cans
    - Attachment for driving screws
    - Hole punch blade
  - Basic knife safety rules
    - Keep blades CLOSED unless in use.
    - When cutting, cutting direction should be away from body parts.
    - Keep knife sharp & clean. Sharp knife is easier to control when cutting.
    - Close blades before passing to another person.
    - NEVER carry knife with blade in open position.
    - NEVER throw knife - in fact, don't play around with knife at any time... it's a tool, not a toy.
  - Knife maintenance
    - Don't pry with knife tip. Could break the blade.
    - Don't put knife in fire. Could cause burn when removed. May also ruin temper of blade causing blade to fail in use.
    - Clean by opening all blades, use Q-tip to clean inside, remove dirt, lint & debris.
    - If used to cut or spread food, consider washing with dishes.
    - Lightly oil knife after each cleaning.
    - Keep from losing in woods by using lanyard or brightly colored attachment.
- CAMP SAWS
  - Two common types - bow saw & folding saw (Sven saw)
  - Basic saw safety rules
    - Keep bow saw blade covered when not in use. Guard can be made of section of garden hose, slit along length and placed over blade. Hold guard in place with cord
    - Keep folding saw folded when not in use
    - Store any saw inside tent or under dining fly when not being used. Keep dry.
    - Use gloves when using saw. Protects hands from cuts and blisters. Allows better grip on wood and saw.
  - Using the saw

- Brace wood being cut firmly, prevents rolling or movement.
- Use smooth, long strokes... letting weight of saw increase depth of cut. Blade on bow saw can be broken if saw is twisted or forced excessively.
- Generally a good idea to have a spare blade along.
- Sharpen saw with small triangle file or ignition file, stroking upward following shape of tooth.
- Over time, any saw blade's teeth will lose their set (angle to insure sawdust is removed during cut & prevent binding). When blade begins binding consistently, replace it.

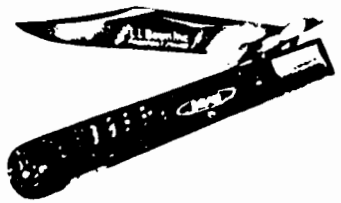
- AXES
  - Not as widely used today as in past, often camp saw and pocket knife suffice.
  - Ax safety
    - Keep ax blade sheathed when not in use. Remove sheath only when ax is to be used. Remove sheath only within ax yard.
    - Keep ax blade sharp... cuts instead of rebounding or skipping.
    - If head loosens, can be temporarily tightened by soaking head in water so wood in handle expands. Permanent tightening requires use of wedge.
    - ALWAYS wear long pants and sturdy leather shoes when using ax.
    - Use AX YARD if long term (one or more nights) camp to be established.
      - Mark borders of ax yard with bright colored rope or safety tape.
      - One person at a time in the ax yard.
      - Other people should be at least 10 feet away from person doing the chopping.
      - Clean up debris of chopping and cutting (wood chips, twigs, bark, etc.)
    - Make sure room exists for ax use. Check immediate area by holding ax by head and checking clearance from your body for 360 degrees with ax held out at full horizontal extension from your body and then swing overhead to make sure there is no contact with brush or limbs.

- Carry ax with one hand at your side with the blade facing away from the body. If falling, toss ax away. NEVER carry ax on your shoulder.
- Passing ax to another person
    - Hold handle near the knob with head down.
    - Bit faces out at right angles from you and person to whom being passed.
    - When other person has grip on handle, should say "Thank You!"
    - Don't release the ax until you hear the "Thank You!".
- Tips for using ax
    - Limbing (cutting limbs off downed log)
        - Stand on side of log opposite of limb to be cut.
        - Cut into underside of limb close to its base.
        - Keep log between you and cuts, in case of miss or skip.
    - Bucking (cutting through a log)
        - Feet shoulder width apart
        - One hand near the ax head, other near end of handle at start of swing.
        - Lift ax head above shoulder and as you swing downward let hand at head slide down handle until both hands are holding the ax at the end of the handle.
        - Slide one hand back to head, lift ax and repeat.
        - Use strokes so cut is a V-shaped notch twice as wide as the log is thick.
        - Learn to swing ax from both directions, cutting both sides of the 'V' with easy rhythm.
    - Splitting
        - Use chopping block - large log section, sawed and stood on end for flat surface. Place wood to be split on block.
        - Use stroke similar to that used for bucking but bring ax down vertically into wood to be split.
        - If stroke does not split the wood, remove the ax and try again. DON'T try to life ax and wood together and then bring it back down on the chopping block.
    - Sharpening
        - Use 8" - 10" mill bastard file

- Use knuckle guard, handle & gloves when sharpening.
- Brace ax against sturdy log
- Dull ax blade will reflect light, file until not reflecting.
- Use file so cutting teeth can be felt cutting metal.
- Do one side of blade and then reverse
- Filing blade can leave burr along new cutting edge, remove with whetstone, sharpening ax blade as if it were knife.

- SHOVELS
  - Used for removing grassy turf from fire lay
  - If metal, can be used to move coals during cooking (best to wear gloves).
  - No digging ditches around tents, starts erosion.

Chapter 8



Woods Tools: On Warming Yourself Twice

Henry David Thoreau, referring to the stumps he had pulled from his garden, wrote: "they warmed me twice—once while I was splitting them, and again when they were on the fire." Obviously an idyllic life in the woods involves hard work, especially the cutting of firewood; even with modern tools, your firewood will warm you twice. But choosing the right high-quality tool, and using it correctly, will minimize your initial overheating.

Cutting wood for a trailside campfire differs considerably from working up a sizable woodpile at a backcountry cabin or rural home. At home, you'll need tools that approximate those used by loggers—a chain saw, a full-size axe, a splitting maul and wedges, possibly a peavey, perhaps a sawbuck. But along a hiking trail or a canoe route or even at a nonwilderness campsite, you can get along nicely with nothing more than a light axe and a folding saw. If you're backpacking, ski touring or planning to use a stove, you might even dispense with the axe. Fit the tool to the trip.

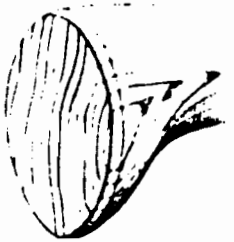
The one thing you should always carry is a knife. It's the key implement for backwoods travel, not for cutting firewood, of course, but for dozens of other necessary chores.

AXES IN GENERAL

The best axes and hatchets are fitted with handles or "helves" of tough and resilient second-growth hickory. Axe handles take a beating. The resilience of hickory absorbs the shock of each blow, a shock that would otherwise be transmitted to your hands, arms and shoulders. Avoid axes rigged with steel handles. They will jar your eyeteeth loose.

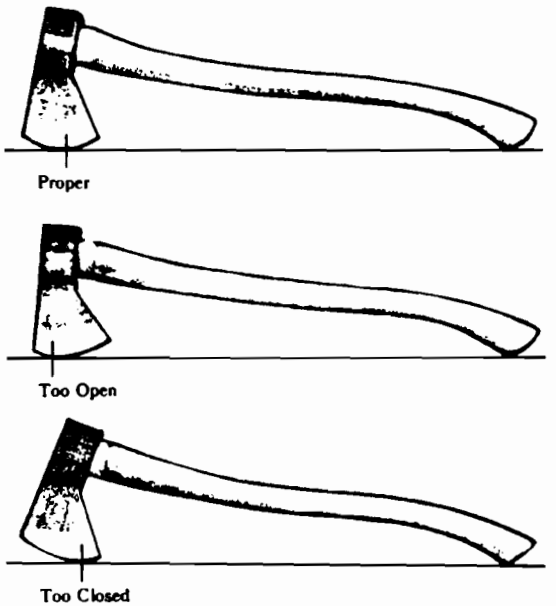
Beware of a wooden handle that is painted. It's probably of inferior wood, the paint covering the defects. What's more, a painted surface will raise a crop of

blisters unless you wear gloves. Check the grain of the handle at the knob end. This should run vertically or nearly so to reduce the chance of splitting.



Proper Endgrain in an Axe Handle

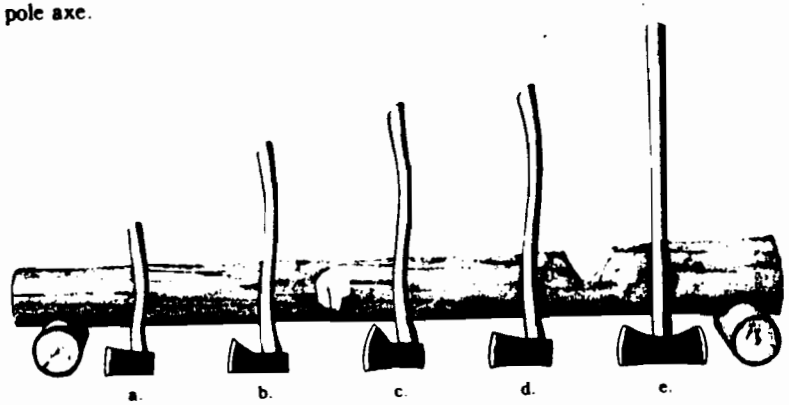
The "hang" of an axe is critical. Place it in profile on a flat surface—a store counter, for example—with only the bit (the cutting edge) and the knob touching. The bit should rest approximately at its midpoint or slightly back of this. Next, sight along the cutting edge toward the handle. Your line of sight should bisect the handle exactly. If not, the handle is warped or improperly seated in the axe head.



Proper Axe Hang

This may seem a petty matter; after all, an axe is hardly a precision instrument. However, a poorly hung axe or one with a warped handle has a habit of missing its mark. That's not only inefficient; it's downright dangerous.

There are several types of axes: the hatchet, the Hudson Bay axe, the pole, the double-bit, the cedar—plus a host of others now rarely used. The double-bit is the professional's tool, one edge usually honed for chopping, the other for splitting; it's not recommended for recreational use. The cedar axe has an extra wide bit, best adapted to cutting softwood such as cedar. Most of us in the woods for recreation are concerned basically with the first three: the hatchet, the Hudson Bay and the pole axe.



Types of Axes a. *Hatchet* b. *Hudson Bay* c. *Cedar* d. *Pole* e. *Double-Bit*

The Hatchet

Many woodsmen scorn the hatchet, with some justification. Because it's lightweight—usually about two pounds—it has to be wielded forcefully for an effective bite. The short handle, frequently under sixteen inches, prompts the user to swing it with one hand, thus lessening control. Should the bit glance, the one-hand grip often can't prevent it from seeking out a kneecap or an ankle. And the short handle compounds this danger by requiring that you stand (or even worse, kneel) close to your target. You'll work harder cutting or splitting wood with a hatchet than you will with a full-size axe.

The Hudson Bay Axe

A better choice than the hatchet is the Hudson Bay axe. Its head weighs one-and-three-quarter pounds, give or take a few ounces, and its handle is twenty to twenty-two inches long. A Hudson Bay axe generally weighs little more than a hatchet. Yet the longer handle gives your swing a wider arc. With this added momentum, the blade cuts more deeply with each stroke. The longer handle calls for a two-hand grip for better control. Best of all, you can stand safely away from your target. For light work at a fixed camp or during a canoe trip, the Hudson Bay is a fine choice.

The Pole Axe

This model derives its name from its flat-top hammer head or "pole." It is not restricted to cutting poles or saplings, and is, in fact, a heavy-duty tool. For the same reasons that a Hudson Bay axe is superior to a hatchet, the pole axe is the best of the three for heavy work. The pole axe is ideal for cutting hardwood, since its relatively narrow bit bites well into tough fibers. Weights run two-and-a-half, three and three-and-a-half pounds. The two-and-a-half pounder is widely accepted for recreational camping and on extended canoe trips, while the three-and-a-half pound style is better suited to working up a woodpile for cabin or home heating. Most pole axes have handles of about twenty-eight inches.

The extra weight of a full-size pole axe is anathema if your weight restrictions are severe. For backpacking or ski touring, a big axe is out of the question. However, on trips where you can tolerate the extra heft, it's well worthwhile. A pole axe will make the chips fly and, for splitting, it will cleave all but the most stubborn bolt of hardwood.

Whether you choose the hatchet, the Hudson Bay or the pole axe, you'll ease your chores if you let the tool do the work. Don't drive the axe head into the wood so hard that it sends shock waves up your arms to your shoulders. If you work so hard that you grunt, you're overdoing it. Simply raise the axe in a moderate rhythmic swing and allow the weight of the head and its downward momentum to take over. You merely guide it. Not only is this more efficient, it's also safer.

Brush Hooks

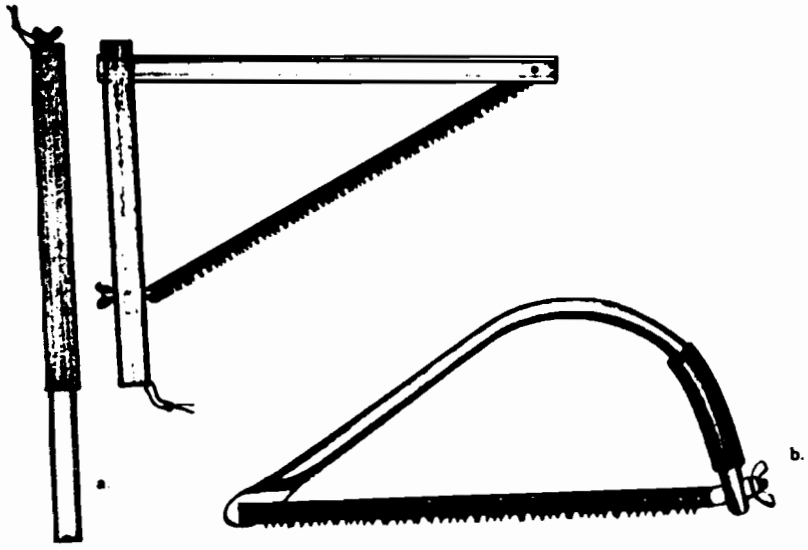
Sometimes referred to as a "bush" or "clearing" axe, the brush hook is a combination of machete and axe that has been around for many years. It has a sword-type handle, designed so that the blade can be swung like a hatchet or used with an upward pull to cut brush. It's not a wood-gathering tool, though it can serve as one in a pinch. The brush hook is at its best for trail clearing, and is a good tool for canoe tripping into areas where portages may have become overgrown. It's also effective for clearing brush around a cabin or rural home. An axe can be used for these chores, of course, but there's the ever-present risk of driving the bit into the ground, and nicking it on stones. The brush hook's cutting edge does not extend the full length of the blade so that driving it into the ground probably won't injure the edge. Also, on the opposite side, a sicklelike hook calls for an upward pull, eliminating all danger of contact with rocks.

CAMPING SAWS

Lightweight saws that fold (as opposed to the heavy-duty saws necessary for major wood cutting) are ideal on the trail, along canoe routes or for occasional use at a summer cabin. These small saws require no brawn and, with the exception that you can't split wood with them, accomplish just about any other woodcutting chore. Moreover, they are safer than an axe or a hatchet; many campers forego the latter in favor of a saw.

In the past, the problem with camping saws was that when packed their exposed teeth chewed through knapsacks and tents. Homemade sheaths were devised, made of a piece of garden hose split lengthwise, or of wood. Both types invariably broke apart or split.

The folding camp saw has eliminated the need for a sheath. The blade fits into one section of the triangular aluminum frame, which, in turn, folds into a fully self-enclosed unit barely twenty-four inches long. Aluminum is not usually a good frame material since its flexibility tends to cause the blade to wobble when in use. However, the folding camp saw's frame is girderlike, providing more than ample rigidity. It's important to keep the blade taut, and the folding camp saw does this by means of a thumb screw. The blade is much like that used by pulpwood cutters before the advent of the chainsaw, having four cutting teeth interspersed with a raker tooth, known as "four-teeth-and-a-raker." This cutting edge combination



Camp Saws a. *Folding Saw* b. *Bow Saw*

makes the sawdust fly. For every four teeth biting through fibers, there's a raker to withdraw the sawdust. The folding camp saw is the lightest and most compact of camp saws and, although it's not designed for heavy work, it will efficiently cut bolts or logs up to three or four inches thick.

There are also oval-framed bow saws with the same type of blades, usually twenty-four inches or so long—though they run up to forty-two inches for heavy work. These have a cantilever-action locking device that, combined with the steel frame's rigidity, keeps the blade taut. They do not fold and some sort of a sheath should be devised. Oval-framed bow saws are not as compact as the folding camp model, but they will handle larger logs more effectively.

Saw teeth tend to become dull in time, which makes for hard work and poor production. They can be sharpened but it's a job for an expert saw filer. The cutting teeth must not only be sharpened but "set"—alternatingly bent to one side then to the other to produce a saw kerf slightly wider than the thickness of the blade. However, the cost of filing and setting a saw is likely to be greater than replacing it. Many campers buy a new blade at the start of each season.

Protect your blade against rusting or pitting, which slows cutting. Some of today's blades are coated with an industrial-type Teflon®, but this wears off in time. If you store your saw for any extended period, particularly in a place where it may be exposed to moisture, coat the blade lightly with oil.

KNIVES

In *Hunting—Fishing and Camping*, L.L. made few references to knives, but he did suggest that a deer be dressed out "with a jackknife"; and when he built a fire, he added "pine whittlings" to his tinder. During his many years in the woods, L.L. also used his knife to dress out salmon, ducks and trout, as well as deer. He peeled potatoes by the campfire and he cut many a length of rope for guy lines. Knife use is generally so prosaic that few of us give it a second thought. One thing is certain—you'll need a knife every day. Take one along.

Many of us buy knives on the strength of looks alone. Although a knife is a simple tool, there's more to one than meets the eye. Take the matter of steel, for example.

Carbon steel is an alloy—iron to which iron carbide (carbon) has been added, rendering the metal malleable yet sufficiently hard. When new, carbon steel may have a bright, shiny finish but it will soon turn a dull gray. This is in no way detrimental to the knife. Also, the metal will stain, but again, this does no harm. Carbon steel is often favored because it is easy to sharpen and holds an edge well. Probably the best grade is "1095 carbon," which contains .95 percent carbon (almost one percent).

Stainless steel is also an alloy—iron to which nickel, chromium or other metals have been added. While stainless steel has been used in knives for many years, it was often considered difficult to sharpen. Some claimed it was also more brittle

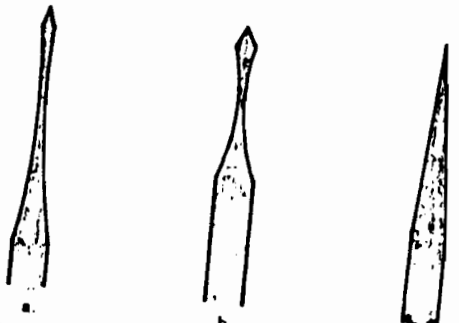
than carbon steel. However, the newest stainless-steel knives are no more difficult to sharpen than carbon steel ones, nor are they any more brittle. There are numerous grades of stainless steel, the most common being the 440 series, which includes several subdivisions such as 440A, 440B, 440C. However, significant differences in manufacturers' processes for tempering and heat treating make it difficult to generalize about the characteristics of any specific type. Moreover, a consumer may find it difficult to identify the exact grade of steel used in a particular knife.

Probably the most accurate indication of knife quality—how easily it will sharpen and how well it will hold an edge—is the steel's hardness, or Rockwell rating. If too soft, steel will readily take an edge but soon dulls; too hard, and it resists a sharpening stone and may even be so brittle as to break easily. Before being made into a blade, steel is tested in a Rockwell machine by placing the metal under a diamond-pointed drill-like device which is then lowered under ten kilograms of pressure. The indentation is then noted and the process repeated with one-hundred-and-fifty kilograms of pressure. Based on a metallurgist's "C" scale, the difference between the two readings results in a rating of hardness. A reading of 56 to 59 is considered acceptable for knives, give or take a point or so. Knives with ratings below 56 don't hold an edge well. Anything above 59 is very difficult to sharpen.

Controversy has been longstanding among outdoorsmen, some of whom insist on carbon steel because it's easy to sharpen; and others who prefer stainless steel and its stain- and rust-resistant qualities. It comes down to a matter of personal preference. Carbon advocates don't mind "touching up" the edges of their knives occasionally and are not concerned about the dull gray finish carbon blades take on. (It can be sanded clear if desired.) Stainless steel users don't mind the slight extra work required to sharpen their blades, since the need is less frequent.

Part of the knife-making process, of course, is grinding the edge. A full hollow-ground blade in profile resembles a very thin needle with little backing, resulting in a blade generally too delicate for outdoor purposes. A semihollow-ground blade has some of the backing removed but enough remains to stabilize the cutting edge against undue pressure. Flat-ground blades taper directly from the thickest point of the blade to the cutting edge. Flat-ground blades are a good all-around choice. Generally stronger and somewhat heavier than either the hollow or semihollow type, they withstand rugged use. More difficult to sharpen, since the angle of the original grind must be maintained, they are not well suited to precise, delicate work.

The materials that go into knife handles are varied indeed. One of the least expensive is rosewood, which is tough, fine-grained and able to resist damage from repeated washings and exposure to detergents—providing the wood has been suitably finished. In more expensive knives, oak, ebony and staghorn are also used. Natural materials, despite their beauty, are generally not quite as durable as synthetics. Wood may crack or split; staghorn is expensive and easily damaged.



Blade Grinds a. *Semi-Hollow* b. *Hollow* c. *Flat*

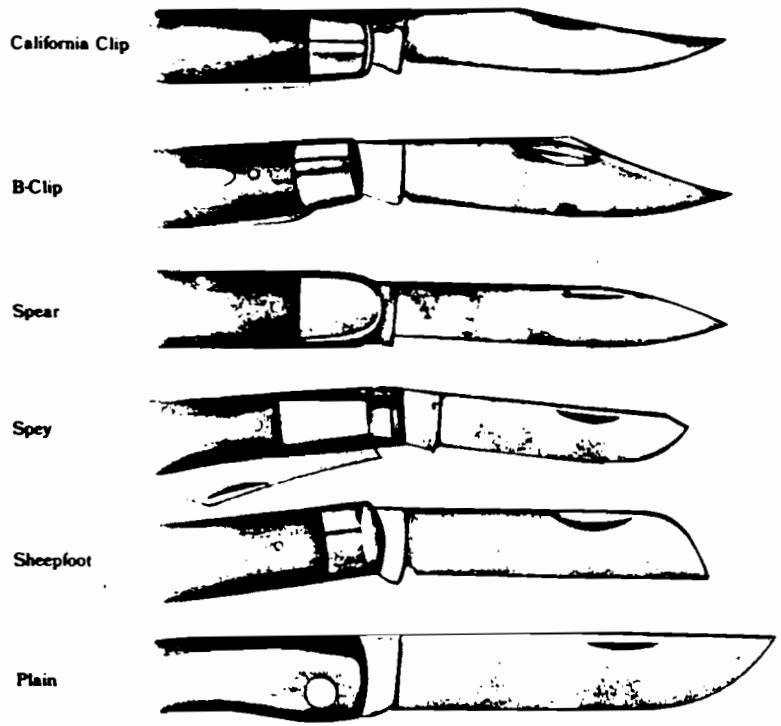
Among the synthetics that are widely used are Delrin® plastic and Micarta®—an epoxy-linen laminate. Both are durable and can be fashioned into attractive-looking knives. They can also be "textured" to provide a better grip when wet.

In the recreational outdoors there is little need for heavy, thick blades. Skillful knife handling calls for deft and delicate finger work, impossible with a large blade and a hefty handle. Choose a short, slender blade; anything over five inches is awkward to use. Nor does the blade need to exceed three-quarters of an inch in width.

The shape of the blade is a matter of function and personal taste. One of the most popular shapes for both folding and sheath knives is the clip, including two of its variations, the California clip and the B clip. Both are slender with a sharp point—ideal for close, delicate work. A trapper will usually choose such a blade; a big-game hunter, on the other hand, requires a heftier blade.

The drop-point or spear blade is somewhat sturdier than the clip, being wider and thicker. Hunters like it because of its ruggedness, but its uses are by no means limited to dressing game. The sheep-foot blade is favored by sailors and gardeners. With a relatively straight edge, plus a point, it's also handy for almost any camp chore. The Spey blade resembles a surgeon's scalpel and is generally short, likely to be used by farmers and stockmen. This is probably the least practical blade for general purposes, although it's handy when included in a folding knife with one or two other types of blades.

Filet Knife



Common Blade Types

The plain blade—for lack of a better name—is less common than the clip or spear, yet its fairly thick backing makes it particularly sturdy. Designed for heavy work, it is a little clumsy for skinning and whittling. For preparing fish, the long, slender—and quite flexible—filet blade is unbeatable. Unlike most other blades, the filet type is always made of stainless steel and, for outdoor use, is manufactured as a sheath knife.

Folding Knives

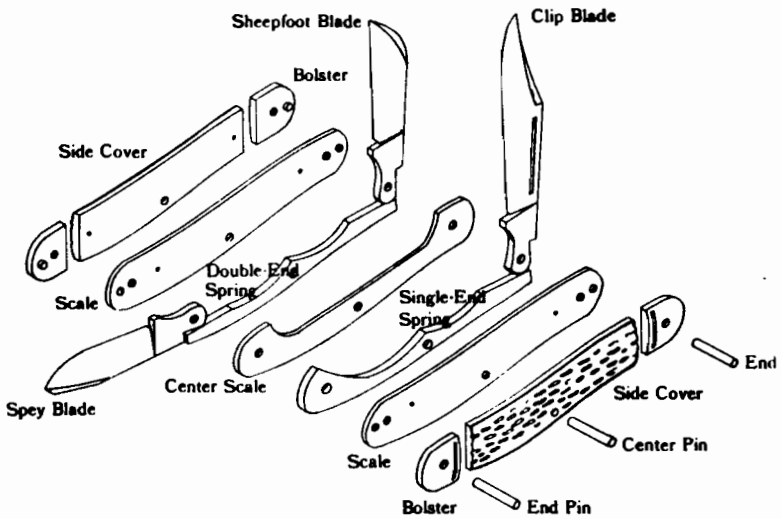
Although a sheath knife may seem more "woodsy," the folding or pocket knife has grown tremendously popular. And for good reason. It offers a combination of up to three blades and these are always protected when not in use. You can tuck a folding knife into your pants pocket or wear it in a sheath at the belt. Its blades can handle just about any chore that can be expected of a knife, even the most delicate probing and cutting.

Buying a folding knife calls for some knowledge of its construction. Folding knives generally consist of a spring (single- or double-end, depending on the number of blades) that forms the backbone of the knife, the blade(s) and two side scales that sandwich the spring/blade section. The entire assembly is held together with a number of rivetlike pins, the end pins usually doubling as blade pivots. Decorative side covers may be added to cover the scales, and bolsters may cap the ends of the knife for extra durability and balance. A safety feature in many of the better folding knives designed for outdoorsmen is a lock-blade—that is, one that will lock itself automatically when open so that it cannot snap shut accidentally. The larger models of these lock-back knives, known as "folding hunters," are as strong and safe as sheath knives.

Check the scales and the bolsters. If you find the slightest looseness, discard the knife. The material in the scales of better knives should be brass, nickel or stainless steel; Micarta® is also used on lightweight knives. Less expensive knives usually have carbon or plated-steel scales. As for the bolsters, the best are made of brass; though nickel, silver and stainless steel are fairly common. Less expensive knives may have bolsters of thin metal, which will easily rust or dent.

Open and close the blade(s) several times. There should be no wobble. Test the spring, too. The blade should snap firmly shut and should lock securely in place when opened. Look at the back of the knife. The spring and scales should fit together cleanly, and have a tight, smoothly polished finish.

If the knife is equipped with a lanyard loop, be sure this is secure and not likely



Parts of a Folding Knife

to work loose with time. If you prefer to use a lanyard there's still better provision on some knives—a brass grommet running entirely through the knife at one end. But be sure that a knife secured with a lanyard is what you really want. The lanyard may prove to be a nuisance, especially if it is short and limits your reach. Most experienced knife users choose to carry a folding knife in a belt sheath or in a pocket, preferably one secured with a buttoned flap. If you're working on or around boats, however, a lanyard may prevent your losing the knife overboard.

Swiss Army Knives

Among the folding models is the versatile Swiss Army knife, a veritable miniature tool kit. The knife, which comes in many styles, may include one or more blades (serviceable but not superior), a nail file, scissors, screwdriver (regular and/or Phillips), tweezers, bottle and can openers, disgorger (for fishermen), reamer (for pipe smokers), corkscrew, magnifying glass and even a minute wood or metal saw.

How practical is such a knife? The list of minor repairs possible with a Swiss Army knife goes on ad infinitum. A fisherman can repair a reel, a cross-country skier his bindings; a hunter can adjust his gunsights; a camper can tinker with his stove. While the knife has great appeal to the gadget-minded, it is more than a gadget.

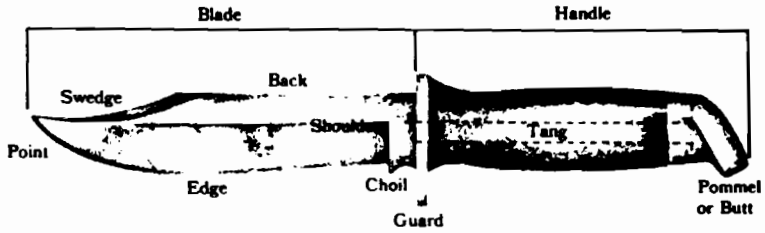
Sheath Knives

All folding knives have one minor drawback. You need two hands with which to open them. On a bitter winter day when your fingers are numbed by the cold, you may prefer a sheath knife. It's ready to use the moment you withdraw it. Whether there is actually any need for such speed is questionable, but nonetheless, the handiness of the sheath knife is an asset. It will do anything that's possible with a folding model. Generally, too, sheath knives are more durable and easier to clean. Their main disadvantage is that you are limited to a single blade.

Most sheath knives are equipped with a finger guard, or hilt, a metal protrusion just above the blade that prevents your fingers from slipping to the blade's edge. Some sheath knives lack this guard and you can cut a finger if you're careless. However, skilled whittlers may look on the guard as a nuisance. Here again, personal taste rules.

The blades and handles of sheath knives can be evaluated in much the same way as those of folding knives. However, there are some special features to look for. The grind should be smooth and clean, of course. Note the manner in which the blade is attached to the handle. The blade's shaft—or tang—should extend the full length of the handle's interior and be firmly secured to the pommel or butt of the handle. The guard, or hilt, should be free of any play.

Choose the sheath carefully, too. Some sheaths house only the blade, the handle



Parts of a Sheath Knife

held in place by a leather loop and a snap. Should the snap pop open you could lose the knife. One good alternative is the full-length Scandinavian-type sheath that houses the handle as well. Whatever you select, make sure the knife fits firmly into the sheath, much like a handgun fits into its holster.

SHARPENING YOUR WOODS TOOLS

The Axe

A dull axe is dangerous. It's more likely to glance. Nor does it bite as deeply as a sharp edge. It's a fallacy, too, that a dull axe is more efficient for splitting. A sharp bit parts the grain better initially and, as the head drives into the bolt, it more readily cuts through knots and sections of cross-grain.

The simplest tool for sharpening an axe is a flat file. Lock the head in a bench vise or prop it against a small bolt of wood, edge up, locking it into position by placing your foot on the handle. Holding the file at about a fifteen-degree angle to the bit, apply pressure and stroke the file into the bit, following its contours. Make only forward strokes to avoid a "rolled edge." No wetting is necessary.

For a truly fine edge, touch it up with a dual-grit hand stone, one side coarse, the other fine. Keeping the stone wet (woodsmen spit on theirs), apply light pressure in a circular motion, first with the coarse side, then the fine. Touch up the edge of the axe after each use to maintain a deep-biting bit.

By far the easiest way to sharpen an axe is with a grindstone. If you're lucky enough to have access to one, turn the stone so that it runs into the bit (toward the eye) and move the axe from side to side across the face of the stone. Maintain the original bevel as much as possible, flopping the axe occasionally to grind both sides evenly. Some axemen grind this bevel down flat for deeper penetration but this may weaken the backing, resulting in a break or chip. It's important that the grindstone be kept wet during the process to avoid overheating. Under no circumstances use a high-speed grinding wheel. This will overheat the metal and draw the temper, ruining the axe.

In time your axe head may loosen, perhaps even fly off. A quick cure is to soak the head in water overnight to swell the wood fibers. This is a short-lived remedy. Once dried again, the handle will be looser than ever. A permanent cure calls for driving an additional wedge into the handle within the eye of the axe. Hardware stores and many outfitters carry such wedges.

Even experts break or split a handle now and then. If the wood is not shattered, winding the handle with tape will fix it temporarily. However, a split handle cannot be trusted for long. It's best to replace it.

Cut the handle off close to the head. Since the front of the eye is larger than the back you may be able to drive the remnant of the handle out. If it proves balky, bury the bit in moist earth, leaving the eye above the ground. Build a small fire over the axe head and allow it to burn a few minutes. (Burying the bit keeps it cool.) This will char the wood and cause the eye to expand slightly. Driving out the wood remnants should then be easy. Instead of a fire, you can use a small propane blowtorch. Handle the axe head gingerly. It will be hot.

Inserting the new handle is a whittle-and-fit process. With a rasp or knife, trim the handle until it fits into the rear of the eye, tapping it in until it sticks and curly shavings begin to form. Withdraw the handle and apply the rasp or knife to these "high spots." You'll probably need several tries. Check the hang of the handle as you progress, trimming to compensate if it appears out of alignment. Inserted fully, the handle will protrude an inch or two beyond the front eye. Saw it off flush and insert a small wedge.

An axe is too important—and dangerous—a tool to be left about casually. Don't leave it out at night, especially in the rain. Moisture will raise the grain of the handle and roughen it—if a porcupine doesn't dine on it first! Bring your axe inside at night, and keep a sheath on the head at all times when you're not using it.

The Knife

Keeping a knife sharp is no great chore, so there is no need for short-cuts. A power grinder is fast but it will ruin the edge in a few seconds by overheating it. A grindstone doesn't pose this danger but it's too coarse for a fine edge. A file is not much better. Only a suitable knife stone will do the job right.

If you're meticulous about your tools, consider acquiring a pair of Washita stones. These are made from novaculite, a fine, granular silica rock, which is mined near Hot Springs, Arkansas. The novaculite stone comes in four grades. Washita Grade 1 is relatively coarse to produce a quick-cutting edge. A better choice for the initial honing is the Soft Arkansas grade, followed by a finish polishing with a Hard Arkansas stone. Honing kits, designed especially for knives, usually include two grades. The fourth grade is the Black Hard Arkansas stone, generally too hard for knife honing and better adapted to straight-edge razors and surgical instruments. While synthetic stones should be kept wet (water will do), Washita stones require that the surface be oiled. Kits generally include suitable oil.

Less expensive are the synthetic stones, one side medium-coarse for an abused blade, the other a fine grit with which to apply a polished edge. On the trail you're probably better off with a synthetic stone, the pocket type with dual-grit surfaces; a kit can take up too much space. However, at your cabin or at home, the Washita stones will improve any edge attained at trailside.

Different stones call for slightly different methods of sharpening. With a pocket stone, wet it first and then apply the blade at about a fifteen-degree angle, moving the blade in a circular motion. Flop it occasionally. If the knife's edge is slightly ragged or nicked, start with the coarse grit. Once the edge becomes fairly sharp, use the fine-grit side. A Washita stone calls for two or three drops of oil. Draw the knife's edge toward you across the surface of the stone, from the hilt to the point, as if you are trying to cut a thin slice from the stone. Flop the blade and repeat, this time pushing the blade away from you. If you have a two-stone kit, start with the coarser one, working up to the fine grit.

FIXED-CAMP TOOLS

When you're traveling afoot or by canoe, woods tools are necessarily restricted to those that are lightweight and easily carried. Generally, you'll need only enough firewood for cooking and possibly for an evening campfire. You can usually glean a wood supply within a few hundred feet of camp and light tools are adequate to cut it.

At a fixed camp, it's another matter. You don't want to spend excessive time gathering quick-burning wood that needs constant replenishing. Some serious woodcutting may be in order. At a summer cabin (possibly occupied for November's deer hunt) or for heating your home, working up a woodpile takes on the aspects of professional logging if it's done efficiently and in sufficient quantity to supply your needs. To work up the best grades of firewood, ones that will cast great heat for hours at a time, you'll need tools not unlike those of woodsmen. This sort of wood garnering involves handling logs, not mere armloads of dry branches, and there's no way to avoid hard work. However, you can ease the chore considerably by using the proper tools.

Saws

Loggers no longer use them, but there are steel-framed bow saws up to forty-two inches long, capable of cutting a foot-thick log with their "four-teeth-and-a-raker" blades. These are difficult to use. Unless the frame is held absolutely vertical as you draw it back and forth the blade will "run"—that is, it will curve to the side, cutting a saucerlike kerf that will soon lead to binding, locking the blade firmly in the wood. As hand-powered saws go, this is a highly efficient tool but it requires considerable skill, increasingly so as the logs grow larger in diameter. On small logs and poles, up to five or six inches, these saws are adequate.