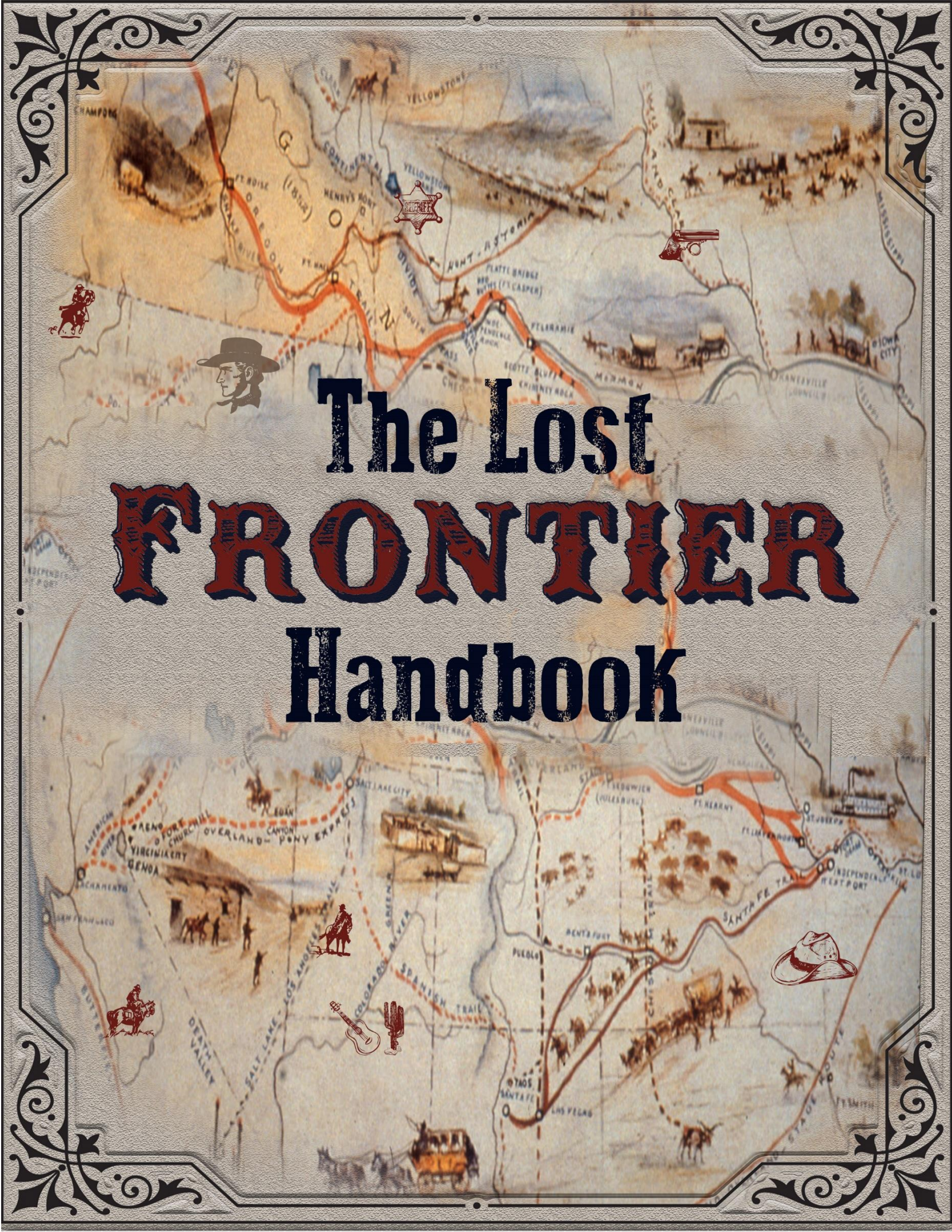

The Lost FRONTIER Handbook

The Frontier Handbook

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First Edition

The Lost Frontier Handbook

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Preserving Foods Naturally

We all need food; that's a basic fact of life. While you may be able to survive without food for a while, you'll eventually use up your body's energy reserves and need to eat more. This has caused a large portion of human activity throughout history to be dedicated to meeting that basic need. Growing food has become one of the world's major industries. More than that, it's not only growing food that has become important, but processing, preserving, distributing and selling that food as well.

All food comes from nature, in one way or another. Even in our modern world of GMOs (genetically modified organisms) and cross-breeding of species, food is still a natural substance. Everything we eat comes from plant life or animal life, even those things which have chemicals thrown in.

But the same natural processes which cause food to grow also cause it to spoil. We humans are not the only things that want to eat the food that we produce. Insects, rodents and bacteria need that food to survive as well; and when they get into our food, they tend to render it unsuitable for human consumption.

This has led to the need for developing various means for preserving the foods that we eat. Any method we use for preserving food is intended to keep those insects, rodents and bacteria from eating the food, but more than anything, they are intended to keep bacteria from eating it. Most "spoilage" and decomposition of food is accomplished by bacteria eating that food.

As far back in recorded history as you look, you'll find mention of food being preserved in a variety of means. Ancient tombs around the world have been opened, to find dried grains and other food preserved along with the bodies of kings and priests. This food had been left for them to eat on their journey through the afterlife. Interestingly enough, in many cases, the food has survived the centuries, in better shape than the bodies it was buried with.

Today, food preservation has changed dramatically. While we still use the old methods of food preservation, most of the foods you can buy in the supermarket are preserved with chemicals. These chemicals kill the bacteria which would otherwise eat the food, supposedly rendering the food safe for use. But those chemicals aren't much better for human bodies than they are for bacteria. The only reason we don't see them causing more damage, is that our bodies are much bigger than those of bacteria. So, the impact of those chemicals is much less.

Yet there is a trend in society to move away from artificial preservatives and move more towards natural means of preserving food. More and more people are becoming distrustful of those chemicals, preferring to consume foods with ingredients that they can pronounce. While the junk food industry is in no danger of losing all their sales, their customer base is slowly dwindling.

Part of this is due to the mistrust of GMOs, which have never been fully tested. We find that people on both ends of the political spectrum distrust those foods and are unhappy with the idea of being used as lab rats in an experiment to find out if they are safe.

At the same time, more and more people are seeking to preserve food at home, either due to a return to growing their own foods for health reasons or as a part of preparing for a disaster. Should a TEOTWAWKI (the end of the world as we know it) event strike the country, such as a loss of the electrical grid, the ability to preserve food may be an essential skill for surviving in a post-disaster world.

Yet few people today have the knowledge to preserve food in the home. This knowledge, which was commonplace in the time of our grandparents, has become a rarity today. We have become so accustomed to consuming what others produce, that overall, we have forgotten how to be producers ourselves.

This book is about returning to those old ways. We will discuss the various means which you can use to preserve food in your own home. Armed with this information, you could create a fully-stocked pantry, ready for any disaster, even if that's just making it through the winter.

THE ROOTS OF FOOD PRESERVATION

Since the foods we eat grow naturally, we have to accept that they have a natural growing cycle. This means that there will always be seedtime and harvest, regardless of where we live or what sort of food we want to eat. Even animals have a seedtime and harvest, although that is usually totally outside of our control.

In hot climates, you can harvest food from nature year-round. Southern Mexico, for example, is a very fruitful area, with most people having a variety of fruit trees on their property. Some of those, like bananas, give fruit year-round, while others only give fruit in their season. But between the two of those, you can find something to eat, pretty much any time of the year.

But things are much different in the colder climates of Europe and the Northern United States. There, you may only have a short growing season of three to four months. During that time, you must plant, harvest, hunt, gather and preserve enough food to get you through the cold winter months. If you don't, chances are that you will starve to death before spring comes around again.

This makes food preservation critical in the colder climates, explaining why many of our natural food preservation techniques originate there. But we cannot ignore that the people of Egypt and the Mayans of Mesoamerica, both of which were in hot climates, dried grains for use and storage.

While the Mayans may not have needed to preserve food to get through the cold winter, they did have to deal with the hurricane season. Hurricanes, with their high winds, will strip trees of their fruit and flatten crops that have not been harvested. Likewise, the Nile River, which the Egyptians counted on to water their crops, had a dry season when they couldn't grow food. So even in these supposedly ideal growing climates, there was a need to preserve food.

THE ENEMIES OF OUR FOOD

As anyone who has pets knows, we are not the only ones who consume the things we consider food. Animals of all kinds want to eat the same things that we do, regardless of their size. Gardeners fight this all the time, with birds, insects and even possums getting into their gardens to eat their fresh growing produce. However, most food spoilage is not due to pets or even rodents, rather it is due to bacteria and insects.

But bacteria, insects and rodents aren't the only enemies of any food that we try to store. Heat, light and oxygen can damage it too. Enough heat can cause food to cook while it is stored. Oxygen causes certain

foods to oxidize, especially when it is combined with heat. That oxidation can change the nutritional value of the food, but it usually just changes its appearance.

The whole idea of preserving food is to keep these enemies of our food from damaging the food we are storing away for a rainy (or cold) day. Many methods have been developed over the centuries, which allow the storage of just about any type of food for prolonged periods of time, just as long as the food is properly prepared or "preserved" for storage. Except for fresh fruit, vegetables, meats and dairy, just about everything you find in your local grocery store has been preserved in one way or another.

WHY PRESERVE YOUR OWN FOOD

There are many reasons why you might want to preserve your own food. The aforementioned problem of GMOs is merely one. But there are much better reasons for preserving food at home; such as freshness.

Most of the foods we buy at the grocery store are harvested early, to help prevent the possibility of them going bad before they are preserved. Between that, transportation and the queuing of the food at the factory, you aren't getting the freshest possible food.

On the other hand, if you preserve your own food, you can literally go from the garden to the can. You can smoke meats as soon as the animal is slaughtered. You can ensure that the food you are preserving is at its peak ripeness and preserved before it can begin to deteriorate.

Not only that, but you can choose the specific varieties of food that you preserve. Commercial farms grow varieties of produce that provide them with the maximum yield, all ripening at the same time.

While that may be necessary for a commercial farm to be productive and profitable, it is not the best for ensuring flavor and nutrition. Other varieties, usually the heirloom varieties of those fruits and vegetables, generally have better flavor and nutrition.

It's clear that preserving your own food will help ensure that you are feeding your family the best possible meals. The flavor, freshness and nutrition you can pack into your own preserved foods will always be better than what you can get in commercial foods. But there's a still more important reason to preserve your own food; that's survival.

None of us know what tomorrow may hold. Out technology driven society depends heavily on electronics and the electricity that drives those electronics. This is our greatest vulnerability. If an enemy were to take out our electrical grid, either through the use of a high-altitude EMP (electromagnetic pulse), cyber-warfare of active terrorist attacks, it would bring our country to its knees.

All three of these are very real possibilities. We have enemies today who are working hard at developing the ability to do them. North Korea has announced their intention to attack us with an EMP; China and Russia are constantly "tickling" the control systems to our electrical grid, and have already shown they can gain access to our power plants. Not only that, a power substation in San Juan,

California was taken out by a man with a rifle, which is believed to have been a test to see if it could be done by terrorists.

Should any of these attacks materialize, our country would come to a screeching standstill. According to the report of the EMP Commission, an EMP or similar loss of the grid would result in the deaths of as much as 90% of our population within the first year. Most of those people would die of starvation. Without the ability to feed yourself and your family, you could become one of those fatalities.

So, learning how to preserve food is an important survival skill. As long as you are dependent on the food distribution network to feed you, you are at risk. Being able to grow your own food and then preserve what you grow, could very well make the difference between life and death for your family.

SALT & SUGAR - NATURE'S PRESERVATIVES

Modern food-processing plants use a wide variety of chemical preservatives to kill bacteria and prevent food going bad. But there is no need for all those chemicals, whose names we can't pronounce. Nature herself has provided us with preservatives which we can use to keep food from spoiling; salt and sugar.

Both salt and sugar work by essentially the same method, although they are not normally used for the same foods. Sugar is usually only used as a preservative for fruit, while salt is used for pretty much everything else. So, you are much more likely to encounter salt being used as a preservative, than sugar.

All life needs some salt, especially animal life. But the amount of salt needed to preserve life is minimal. You and I have salt in our bodies. The amount of salt is critical, as too little salt makes it difficult for our bodies to hold in enough water and too much salt makes it so

that we retain excessive water. An excess of salt can also cause a variety of health problems.

But we aren't concerned about how much salt is in the body; we're concerned about using salt for a preservative. In that regard, we need to understand osmosis.

Osmosis is the scientific term for a natural process in which water (or another solvent) passes through a semi-permeable membrane, to equalize the concentration of the solution on both sides of that membrane. So, water will move from a low-concentration area, across the semi-permeable membrane, to a high-concentration area, until the concentration is the same on both sides.

For the purpose of food preservation, the concentration we are referring to come from either salt or sugar. If there is more salt on one side of a membrane, than there is on the other side, water will move through the membrane to equalize the levels. Since cell walls are semi-permeable membranes, this works with all vegetables, fruit and meats. It also works with bacteria.

You can see the results of this by doing a simple experiment. Take a piece of raw meat and put it on a plate, drying the surface with a paper towel. Then sprinkle a liberal coating of salt onto the meat, allowing it to sit. Within a few minutes, the salt will be wet, having drawn water out of the meat.

Bacteria are single-cell organisms. As such, they are also surrounded by semi-permeable membranes. The space between the various parts of the cells, just like the cells in our bodies, is filled with water. So, when salt comes into contact with bacteria, it draws water out of the bacteria, just like it draws it out of meat or any other food. When it draws enough water out of the bacteria, the bacteria dies.

While the main idea behind osmosis is that the water passes across the membrane, salt will pass across the membrane in the opposite direction, increasing the salt level in the cells of the food. This is an

important part of the preservation process, as that protects the food from further infestations of bacteria. As long as the level of salt in the food is high enough to draw water out of any bacteria that comes into contact with the food, it will kill the bacteria.

This is why so many preserved foods are salty. While modern food processing plants use chemical preservatives, they also use salt. It is the salt, more than the chemicals, which protect the food from bacterial. The chemicals mostly preserve the appearance of the food.

Drying Food to Preserve It

Drying food is probably the oldest known means of preserving it, going back millennia. Most grains are dried before use, often on the stalk. This probably gave our early ancestors the idea of drying other grains, such as corn, which are not dried on the stalk. Dried grains could be stored and often were, to provide a food source during drought.

One of the earliest recorded cases of this is found in the Bible. During the 19th Century BC, Pharaoh had a pair of dreams, which warned of coming drought. These dreams were interpreted by a Hebrew slave, Joseph, who was a prisoner at the time. This caused Pharaoh to promote Joseph, making him Prime Minister of Egypt so that he could prepare

the nation for the coming drought. Joseph accomplished this by placing a levy on the grain that was grown and storing up that grain to get them through the coming hard times.

Grains are still dried today, although unless you are planning on growing grain in your backyard, you are unlikely to end up drying your own. This is handled at the commercial level, where most of those grains are also ground into flour.

However, many other foods are dried today, both commercially and at home. Most foods can be dried, including meats, vegetables and fruits. The process of drying the foods provides a natural defense against bacteria. If the foods are then properly stored to protect them from insects and rodents, they will keep for an extended time.

How does drying food preserve it? Bacteria need a moist environment to survive. As we discussed when I was talking about salt, the loss of enough water will cause bacteria to die. Just as osmosis will cause water to cross a membrane to equalize chemical or mineral levels across the membrane, it will also cross a membrane when the moisture levels are different. This makes dried food is a very inhospitable environment for bacteria to live in.

DEHYDRATING VS. FREEZE DRYING

Most dried foods throughout history have been dehydrated. This is a process where sunlight or heat are used to draw the moisture out of the food. Of the two, sunlight has historically been more common, although modern dehydration techniques use heat.

Freeze drying is a newer process, which has been developed for use with foods that don't dehydrate well. Some fruits, like berries, don't turn out well when dehydrated, but are shriveled and hard. While they can be rehydrated, they really can't be eaten as they are. Freeze drying provides an option in those cases, providing dried foods that

appear more appetizing (because they look more like the moist version) and are edible without rehydration.

Freeze drying can also be used for some foods that one would not expect to be able to be dried, like ice cream. The invention of freeze-drying coffee revolutionized the coffee industry, providing a means of making instant coffee that tasted almost as good as fresh brewed.

While it is possible to freeze dry foods at home, the equipment is considerably more expensive than dehydrating. The three-step process for freeze drying is also more complicated. It consists of freezing the food, then placing it in a vacuum chamber. Low heat is applied, along with the vacuum.

This causes the water crystals to evaporate directly in a process known as sublimation. After this, the food undergoes secondary drying, in which remaining water is removed under higher temperature.

In a survival situation, freeze drying probably wouldn't be effective, because it requires much more electricity than dehydrating does. Since dehydrating food can be accomplished with nothing more than solar power, it would be much more effective in a survival situation.

DRYING FRUITS & VEGETABLES

Home dehydration can be accomplished with a commercially manufactured dehydrator, of which there are many models on the market. While it is theoretically possible to dehydrate in a normal kitchen oven, the temperature control doesn't go low enough for proper dehydration. So, in order to use it, you need to be manually controlling the temperature by turning the oven on and off or by opening and closing the oven door.

Typically, the lower cost dehydrators have a heating element in the bottom, with a series of trays that can be stacked one above the other. This provides uneven drying times, as the trays which are closer to the heating element receive more heat. Most people who use these end up juggling the trays, restacking them throughout the process to try and make everything dry evenly.

Better dehydrators use a side-mounted heating element with a fan. This forces the heat throughout the cabinet, much like a convection oven. In doing this, the heat is much more evenly distributed, ensuring that the food dries at a more even rate. These dehydrators are also larger, allowing you to dehydrate more food at one time.

It is also possible to dehydrate using the power of the sun. Commercially available solar dehydrators consist of a net cage, with shelves to put the food on. While this does technically allow the sun access to the food being dehydrated, it is normal evaporation, more than the power of the sun which is dehydrating the food.

Homemade solar dehydrators are more effective. These consist of a glass-fronted case, which is pointed at the sun. Shelves inside the dehydrator hold the food. Some are simple boxes, similar to a solar oven, while others are more complex, providing an area to heat incoming air, which then passes via normal convection through the box with the food shelves in it.

Both types are effective, although the one with separate warming chambers for the air and the food are more effective, allowing you to dehydrate more food at one time.

In order to dehydrate fruits and vegetables, most need to be cut first. While there is no actual set limit on thickness for foods to be dehydrated, the thicker they are, the longer it takes to dehydrate them. If they are thick enough, then it is virtually impossible to get the center of the food to dehydrate. For this reason, ¼” is a

reasonable limit. It is also necessary to clean the fruit or vegetable, removing skins and seeds, if necessary.

The following temperatures are ideal for dehydrating various foods:

Food	Temperature
Herbs	95°F/35°C
Vegetables	125°F/52°C
Fruits	135°F/57°C
Meats/Poultry/Fish	155°F/68°C

The higher the moisture content in the food, the longer it will take to dehydrate it. So, fruits generally take longer to dehydrate than meats do, and meats take longer than vegetables do. You can tell when they are sufficiently dehydrated by feel. Properly dehydrated meats and vegetables will be hard, while properly dehydrated fruits will still be a little bit springy.

Some fruits have a high acid content, which helps to preserve them as well. But these fruits can also be too bitter to eat, once dehydrated. To compensate for this, the pieces of fruit are rolled in granulated sugar, before dehydrating. This is why commercially prepared dried pineapple always seems to have sugar on the outside. This sugar is there for taste, although it also helps as part of the preservation process.

Dried fruits and meats can be eaten as is; but dried vegetables are not. They are normally used only in soups. The process of cooking the soup allows the vegetables an opportunity to rehydrate. While they rarely ever reach the exact same pre-hydration level, once cooked they taste pretty much the same.

Dried fruits and vegetables are extremely useful in a survival situation, due to their long shelf-life. They are also lighter in weight

and less bulky than fresh or canned fruits and vegetables, making them ideal for carrying in a backpack or bug out bag.

DRIED MEAT OR JERKY

It is widely known that the American Indians dried meat as a normal means of preserving it which is the root of jerky, a popular snack food. But they were not the only ones to do this. It turns out that many ancient cultures followed a similar practice, especially throughout Latin America.

Meat, poultry and fish can all be made into jerky effectively. Fish is slightly more difficult, because the flesh of fish doesn't have the structural integrity of red meat or poultry. So it has a bit of a tendency to fall apart, while drying. But that doesn't affect its taste or ability to be used effectively once dehydrated.

It is best to use extremely lean meat for making jerky. Tender cuts are not necessary, but gristle and fat should be trimmed off. If small amounts remain, it doesn't spoil the jerky, although the fat may turn rancid over time. The meat should be cut into pieces that are no more than ¼" thick, although they can be any size that you like.

When cutting meat for making jerky, it is best to cut across the grain, rather than with the grain. This provides a jerky which is easier to eat, as it will separate easily between the grain. To do this, you will need to buy roasts. Jerk which is made from meat that is cut with the grain is harder to bite and chew. However, it is exactly the same in other regards.

While dehydrating meats does protect them from bacteria, it does not protect them from mold. So, it is necessary to marinade the meat in a brine (salt solution) before dehydrating it. Typically, additional flavorings are added into the marinade, either in the form of ground spices or sauces. There are a wide variety of recipes available to satisfy the palate of just about anyone. When marinating the meat, it is important to ensure that all surfaces of each piece of meat are coated with the marinate.

A meat rub, containing salt, can also be used in place of the marinate. Once again, all surfaces of all pieces of the meat need to have the rub applied for maximum protection of the meat. Allow the meat to sit in the marinate or rub overnight before dehydrating it.

Today, meats are dehydrated in an electric dehydrator, but the American Indians made their jerky by drying it in the sun. Rather than using a dehydrator, they laid strips of meat over a framework of thin poles, allowing it to dry in the sun. This could take more than one day, meaning that the meat would have to be removed at night and then put back on the framework in the morning.

Homemade jerky which is well-marinated with a high salt content will keep, even without refrigeration, for an extended period of time. I can't really tell you how long, because I always end up eating it before it reaches the point of going bad. But I have had homemade jerky keep for several months, without refrigeration. Commercially made jerky, which also includes chemical preservatives, will keep for much longer.

SALT FISH

One of the many things the northern parts of Europe are known for is their maritime tradition, especially fishing. While the Vikings are probably history's best known mariners of this area of the world, the fishing fleets of the region far outnumbered Viking warships. However, salt fish is not limited to just these countries, as it has spread to many other parts of the world; even countries in hot climates.

With the harsh winter seasons that they experienced that far north, it was necessary to have a way of preserving the fish they caught, so that they could eat them through the long winter months. Thus, the idea of salt fish was born. Similar to jerky, salt fish is a dried fish, which is prepared in salt, before drying.

It is possible to make salt fish with whole fish, fillets, butterflied or cut into steaks. Generally speaking, the larger breeds of fish are filleted or made into steaks, while smaller breeds are salted whole (but cleaned) or butterflied. The skin on the fish slows the process, so it is actually faster to make salt fish from fillets. However, without the skin and bones to hold the flesh in place, fillets of some species are more likely to fall apart.

Making salt fish is a two-step process, beginning with salting and ending with drying. To salt the fish, the fish are first cleaned and prepared. A waterproof crock or bin is used, along with a lot of salt. Larger-grained salt is better, such as rock salt or the salt used in ice-cream makers.

A liberal layer of salt is first placed in the bottom of the container, covering it completely. This is then covered with a layer of fish, without overlapping any part of one fish over another. If the skin is on the fish, it is laid skin side down. This is then covered with another layer of salt, and then more fish. Alternate layers of salt and fish are

added until the container is filled, topping it all off with a final layer of salt.

The salt will draw the water out of the fish, creating a brine. Opinions vary as to how long the fish should be left in the brine, but traditionally it was left as long as 21 days. The fish are then removed from the brine and rinsed in fresh water. While not required, some people press the fish to help remove excess brine.

With the fish fully salted, it is either laid in flat baskets or hung from wood racks, much as the American Indians hung jerky off of wood racks to dry. The fish is then left in the sun to dry. A combination of sunlight and a warm breeze are needed for drying the fish. Ideally, this is done in warm weather, rather than hot weather. If the weather is too hot and the sun too strong, it could cook the fish, rather than drying it. On the other hand, if it is not warm enough, bacteria could grow in the fish, before it is dry.

Salt fish is not usually eaten raw, like jerky. Rather, it is cooked in a variety of different, traditional recipes.

PRESERVING BY CANNING

It's hard to say whether canning or drying is a more common method of preserving food. If you go into any grocery store in the country, you'll find a canned food aisle. But you won't find a corresponding dry food aisle. Even so, there is a lot of dried food in that grocery store; we just don't normally think of it in those terms. Oatmeal, rise and other grains are all dried; even popcorn is. By extension, we could say that breakfast cereal, cookies and potato chips are also dried foods, although they are cooked, dried foods.

Canning is an almost perfect method of food preservation, at least for wet foods. It not only provides protection from bacteria, but from insects and rodents as well. Drying, as we discussed in the last

chapter, doesn't automatically provide protection from insects and rodents; you have to provide some sort of packaging which does that. But the can or jar used in canning does that as well.

What makes canning so effective is that it creates a hermetically sealed environment, where no live enemies of our food exist. While it is still possible for the food to be damaged by heat or for the seal to be compromised and the food damaged, as long as the container stays intact, there is little risk to the food stored inside.

As part of the canning process, all food that is canned is pasteurized. This process requires raising the food's temperature to a minimum of 158°F (70°C) and holding it there for a minimum of 20 minutes to ensure that the food is heated all the way to its core. This temperature is hot enough to kill any bacterial that is in the food, sterilizing it. So, there is no way that the food can spoil (decompose) as long as the seal on the can or jar is not breached.

It may seem a little confusing, but most home canning is done in jars, rather than cans. That's because the word "canning" which refers to

a specific process of preserving food existed and was in use before the invention of the can. The can was named as it is, because it was invented for use in canning.

But for home canning, you're probably going to want to use jars, rather than cans. The main reason for this is cost. The cans themselves are cheaper than jars, assuming that you don't reuse the jars. But canning in cans requires having the right equipment to seal the cans. While there are manually-operated consumer versions of this equipment on the market, even those are fairly expensive. When you factor in the fact that you can reuse jars over and over again, only having to replace the seals, they are a much more cost-effective investment over the long-term.

Before going on, let me clear up a misconception. If you buy canned foods in the grocery store, it will have an expiration date on it. Actually, this is nothing more than a guarantee date. The cannery that produced that food is guaranteeing that it will be safe for consumption, up until that date. After that, they don't guarantee it.

But that doesn't mean that the food goes bad after that point; in most cases it doesn't. There are still cans of food floating around, which were canned decades ago… and they are still good. As long as the can hasn't rusted or the seal broken, the food is still protected.

Recently, some canned food that was 100 years old was opened, in order to see how the food had fared being canned for so long. While the texture and color of the food had changed, it was still edible. The only thing that might be at doubt for canned food this old, is whether any of the nutrients in the food would oxidize, making the food less nutritious.

There is an exception to canned food lasting virtually forever though. That is for non-pickled foods that are canned in plastic jars, rather than glass ones. There is something different that is done in this process, which makes it so that the food does not last as long. There

aren't many foods that fall into this category, but there are some; specifically, applesauce and fruit juices. Applesauce in particular will begin to oxidize after about six months. So, while it is still safe to eat, it will not look the same.

THE CANNING PROCESS

The freshest and best quality food should always be used for canning. If you use food that is nearing the end of its "fresh" shelf-life, it will affect the quality of the canned food you produce. While it will still be edible, the flavor and consistency of the food will be affected.

Any wet food can be canned; so, vegetables, fruits and meats all qualify. It needs to be wet foods, because the excess space in the can or jar will be filled with water. This is to prevent oxidation of the food. Perhaps you've seen home-canned fruit, where some of the pieces were poking above the water and were discolored. This is the oxidation I'm referring to.

The food needs to be cleaned, cut and prepared before canning. In some cases, especially with meat, this would include cooking the meat, before canning. Fruits and vegetables are usually blanched, rather than being cooked. In other cases, foods will be mixed together or have spices added to them, before canning. There are thousands of canning recipes available online, which provide you with an abundant variety of ideas of what you can do.

Many of these recipes are old, having been passed down for generations. The US Department of Agriculture (USDA) undertook a major project long ago to determine minimum canning times and temperatures, as well as the need for adding salt or sugar to canned items. This data, which is available on the USDA website, is the basis used for all of these recipes. Food canned according to these guidelines cannot go bad, while in the can.

The canning jars themselves, with their lids, as well as the pot they are hated in must be sterilized before canning. This is done by filling the jars with water and putting them in a water bath in the pot. Then the temperature of the water is raise to at least 158°F (70°C) to kill any bacteria.

The prepared food is put in the sterilized jars and the remainder of the space in the jars is filled with water. A small amount of room, called “headspace”, must be left in the tops of the jars, to allow the food and water to expand. This varies depending on the type of food you are canning.

Food	Headspace
Jams, Jellies, Spreads and Butters	¼”
Pickles, Tomatoes and Fruit	½”
Non-pickled Vegetables	1”
Meats/Poultry/Fish	1” – 1 ½”

With the jars filled, the lids are placed on the jar and the rings loosely attached. These rings are there just to hold the lids in place through the canning process. They need to be loose enough to allow air to escape the jars during heating.

Heating time and temperature is a critical part of the canning process. Recipes you use for canning must provide this information. If you are unsure of the information provided in the recipe, check with the USDA website at:

http://nchfp.uga.edu/publications/publications_usda.html for accurate information about times and temperatures.

Once the jars have been in the water bath at the right temperature and for the right amount of time, the pot can be removed from the heat and the jars removed from the pot. Allow them to cool on a cooling rack, before doing anything with them. Once cool, verify that the jars sealed properly by testing to see if the center of the lid is concave. If it moves downwards when you push on it, it is convex and did not seal. The jar will have to be heated again in the water bath to seal it.

PRESSURE CANNING

Pressure canning involves using a special pressure cooker, unsurprisingly known as a "pressure canner" to increase the atmospheric pressure and therefore the boiling point of water. This allows canning at a higher temperature, which is necessary for some types of foods, especially meats. This higher temperature is necessary to ensure that all bacteria are killed.

Most references will tell you that you need to use pressure canning for all non-acidic foods. However, I have seen a wide range of recipes for canning non-acidic fruits and vegetables, which did not require a pressure canner. My wife and I canned a considerable amount of home-made applesauce and apple butter, before we ever had a pressure canner.

Nevertheless, I am not suggesting that you can without a pressure canner, unless you have specific information that it is safe to can the type of food you are canning without one. We have since acquired a pressure canner and use it for most of our canning.

DRY CANNING

In the last few years, some people have been experimenting with pressure canning as a means of preserving dry foods. Rather than canning in a pot, the jars and their contents are heated in the oven, set to a low temperature (most home ovens only go down to 200 degrees).

Theoretically, dry canning should work as well for these foods, which are mostly grains and pasta, as normal canning does for wet foods. You can't use it for dry fruit, only for foods that are truly dry, like the aforementioned grains. Bacteria can't survive in this food, as there is not enough moisture in it; so, there is very little moisture content to be concerned about. However, there is the possibility of insects, insect larva or insect eggs. So heating is still necessary, not so much to kill the bacteria, but to kill insect larva and eggs.

One of the advantages being claimed for dry canning is that you can prepare pre-mixed dry meals, such as soups, with all the ingredients mixed tighter, except water. This would mean grain or pasta, dried vegetables, bouillon and even dried meat and spices. They can then be preserved, providing you with ready meals when the time comes. These become great survival rations.

To dry can in the oven, preheat the oven to 200°F (70°C) with a cookie sheet inside. You will probably need to remove the top rack. While it is heating, fill the jars with the food you are going to dry can and place the lids on the jars. Once the oven is heated, open it and place the jars on the cookie sheet. Leave the jars in the hot oven for 12 hours.

Like with normal canning, you're going to want to check the integrity of the seal, once the jars have had a chance to cool. Jars that did not seal properly can be reheated.

It should be noted that while this method seems like it would work well, it has not been used as long as normal canning has, so there is no proof that dry canning will work over the long-term. If you choose to use dry canning, you are doing so at your own risk. For this reason, it would be wise to use other methods for some of your food as well, so that all your eggs aren't in one basket.

PICKLING

Although pickling and canning are actually quite different, they are normally categorized together, simply because most pickled foods are also canned. While canning is not essential for preserving these foods, it does provide an effective storage method for them, protecting them from insects.

What makes pickling unique is that it depends on changing the pH of the foods, in order to create an environment which is inhospitable to bacteria. Vinegar is normally used for this, although some recipes call for a salt brine, rather than using vinegar. In either case, the pickling process makes ensures that bacteria cannot survive in the food. The process of pickling also modifies the foods that are being pickled, affecting their flavor and even their texture.

We are all familiar with "pickles" which can be placed on hamburgers or eaten plain. But there are many other condiments which are pickled as well, even though we don't realize it. Ketchup, mustard, most meat sauces and salad dressing are all pickled products. There are even meat products which are pickled, such as corned beef, which was originally known as "pickled beef" and pickled herring.

Pickling is a time-consuming process; not for the person doing the pickling, but for the food. Foods which are being pickled must be left in the pickling solution for a considerable amount of time; sometimes

for days. In many cases, the pickled foods are canned in the pickling solution, allowing the process to continue.

Should you decide you want to attempt pickling, it is essential that you follow a recipe. Since it is the pickling process that preserves the food and not the canning process, it would be dangerous to reduce or eliminate an essential ingredient, such as vinegar or salt.

PACKAGING DRY FOODS FOR LONG-TERM STORAGE

While canning is excellent for long-term storage of wet food products, the jury is still out as to whether or not dry canning of foods is effective. However, there is an effective way of packing dry foods for long-term storage; one which has been proved to be effective for as long as 20 years.

This method is actually intended for use with bulk food products, but it can easily be adapted for storing smaller quantities of food, by simply changing the size of the bags that are used. That would allow several bags to be put together in the same container, rather than using one large bag to seal the food.

What makes this method so effective is the use of oxygen absorbers. As we've already discussed, bacteria need a wet environment to survive; so, they don't tend to spoil dry food products. What does spoil those foods is insects; which can mean the adult insects, insect larva or the eggs of insects which hatch after the food is sealed away. By eliminating the oxygen in the environment, insects can't survive, ensuring that they don't eat the food.

In addition to this, the sealed food packages are stored in five-gallon plastic buckets, which are impervious to insects. So, there is no risk of insects eating their way into the packages. Those buckets also

make good protection against rodents, the other enemy of our dry food products.

I have a five-gallon bucket lid in my workshop, which used to sit on top of a five-gallon bucket I stored dog food in. We occasionally have a problem with rats, and this lid is testimony of how well those buckets protect against them. While there is ample evidence of at least one rat gnawing on the lid, to the point of breaking off a chunk of the lip, it did not get into the bucket. By the way, I know that the rat tried on more than one night, because of how the gnawed area grew.

In order to package foods in this manner, you will need:

- Food-grade five-gallon buckets (the food grade ones are white)
- Six-gallon aluminized Mylar bags
- Food to be stored
- 1,000 cc Oxygen absorbers
- Vacuum cleaner with hose
- Hair straightener
- Permanent marker
- Rubber mallet

Oxygen absorbers and aluminized Mylar bags can be purchased from a number of online sources; most of which carry both of these items. While these sources will tell you that you need different size oxygen absorbers for different types of dry foods, I have found that using the 1,000 cc ones (basically the largest size you can get) ensures that you always have enough. A little overkill doesn't hurt.

These oxygen absorbers are highly sensitive and act quickly. So, they need to be used rapidly. I would recommend having at least one assistant with you when you package food this way, giving them responsibility for the oxygen absorbers, opening the package, putting them in the buckets and then resealing the package quickly.

Food-grade five-gallon buckets are available from the larger home-improvement warehouses. You can also get used ones for free from your local bakery or some restaurants. But you'll have to clean these used ones out, before you can use them.

To store the food:

- Open the bags and place them in the buckets
- Fill the buckets with dry food, one type of food per bag, to about 1" from the top of the bucket
- Using the marker, label the outside of the bucket with the contents
- Seal all but 2 ½" of the top edge of the bag with the hair straightener. You will notice that you have a lot of excess bag; that's all right. You can cut off your seal and use that excess to reseal the bag, if you ever need to take out some of the contents
- Working quickly, place an oxygen absorber in the bag, through the opening. Stick the end of the vacuum cleaner hose in the hole and suck out the air, being careful not to suck out any of the contents. Remove the hose and seal the bag the rest of the way
- Fold the flap of the bad down onto the food and put the lid on the bucket
- Use the rubber mallet to ensure that the bucket lid seats fully

You can store the filled buckets anywhere, even in a hole in the ground. This makes them ideal for use in setting up a food cache. Avoid placing them anywhere where there will be a lot of heat, as the heat could affect the food, even inside the bucket.

If you are trying to store smaller quantities of several types of food, you can buy one-gallon aluminized Mylar bags and do the same thing. You will need smaller oxygen absorbers (300cc for one gallon) to go with them. These packages can then be layered into the bucket,

pushing them down to avoid any wasted space. Be sure to mark the contents of all the packages on the outside of the bucket.

SMOKING & CURING MEATS

Off all the categories of food, meats are the hardest to preserve. This is due to the higher bacteria content found in meats, compared to that which is found in produce. While drying meat is effective, the very act of drying it changes the meat to such a point, that it can't be eaten in the same manner that just cooking it would allow. Even rehydrating the meat merely makes it usable in soups. While nutritious, it may not be satisfying.

Meats can be canned quite effectively, but just like with anything else that is canned, the process of preserving the meat changes its texture and flavor. Many people find canned meats unappetizing to the point of avoiding it. While canned meats are still useful for emergencies, they are not highly favored.

Long before canning was invented (in 1810), meats, fish and poultry were smoked. As best as anyone can tell, this process actually began in prehistoric times. Early man apparently thought that the smoke from cooking over a fire helped preserve the meat, as smoke drove away flies. However, they were unaware of the actual mechanism of how smoking preserves meat.

Nevertheless, smoking has been part of food preservation for centuries. I've been to some of the living history museums here in the United States and seen how they customarily smoked meats. Some homes even had kitchen fireplaces large enough to walk into, with hooks embedded in the masonry, above head height, to hang hams and quarters of meat on for smoking.

There are actually several different aspects to how smoking preserves meat. First of all, salt is used in the smoking process, soaking the

meat in a brine before putting it over the fire. In and of itself, this creates an inhospitable environment to the bacteria. Smoking also partially dries the meat, which of course, dries the bacteria as well, killing those that aren't killed by the heat of cooking the meat. Finally, the process of smoking produces a thick skin of collagen (a protein) on the meat, called a "pellicle", which is impermeable to bacteria.

The weakness of smoking, as a means of food preservation, is that once you cut through the outer skin of the meat, you expose meat to the air, which can be infected by bacteria. This is why those colonial homes had such large chimneys. Once the smoked meat was cut, it was hung in the chimney once again, allowing the fresh surface to smoke and protecting the meat. But if you don't have this, once you start eating the meat, you either have to use it all fairly quickly or have a way to preserve it until it is used.

To be specific, the smoking I'm referring to is called "hot smoking", which differs from cold smoking and smoke roasting:

- **Cold smoking** – A low temperature smoking process (68 – 86°F) used to impart smoke flavoring into food products. Cold smoking doesn't dry out meat, like hot smoking does. But it doesn't have any ability to preserve the meat.
- **Hot smoking** – A two-stage process, which starts with cold smoking, then moves on to a higher temperature (200 – 225°F) to fully cook the meat and kill microorganisms. It is during this high temperature phase that the pellicle is formed.
- **Smoke roasting** – Barbecuing meat in a "smoker". This is a method of cooking, more than smoking; but if the lid of the grille is closed, it does infuse some of the smoke flavor into the meat. It is not intended for preserving meat, but to prepare it for eating.

Any smoking method tends to dry out the meat, especially hot smoking. That's mostly due to the long time that the meat is exposed to the heat. But hot smoking makes up for this very well, because of the length of time. Because the meat is cooked slowly over a low temperature, it tends to tenderize it quite well. This makes smoking an excellent process for some of the lesser cuts of meat, which tend to be tougher.

SMOKING THE MEAT

Actual smoking requires either a smoker or a smoke house. Basically, they are the same, except for size. In either case, the meat isn't cooked by the heat of the fire, but rather by the heat of the air and smoke rising off that fire. In many smokers, the meat is not directly over the fire, but rather the smoke rising from the fire is directed to the area where the meat is located.

For a smoker to work, it needs a few things:

- **Heat** – This is usually a wood fire, as it is the smoke from the wood which imparts the flavor to the meat. Different types of hardwoods provide for different smoke flavors. Some industrial smokers use gas, but in that case wood chips are burnt to produce the smoke.
- **Water** – A pan of water is placed over the fire, so that the heat from the fire causes it to turn into steam, providing a moist environment. This helps to reduce the drying of the meat. While smoking, the water supply must be replenished regularly.
- **Thermometer** – It is important to monitor the temperature inside the smoker. Different meats need different temperatures.
- **Air Draft Control** – The temperature inside the smoker is controlled by controlling the amount of air which is drawn into

the smoker at the fire and expelled at the top. There are generally two shuttered vents, which can be adjusted to control this air flow.

Before the meats are smoked, they are soaked in a brine (salt solution) overnight, allowing the salt to soak into the outer layer of the meat. The only exception to this is cured meats, which already have a high salt content.

As I already mentioned, smoking is a slow-cooking process. To hot smoke meats normally takes all day. The temperature has to be monitored throughout this time, adjusting the vents and adding fuel as necessary to maintain the temperature inside the smoker. Rather than cooking for a particular amount of time, it is typical to cook the meat until it reaches a specific internal temperature. The correct temperatures can be found on the USDA website at www.foodsafety.gov.

CURING MEATS

All hot smoked meats are cured to some extent, by the process of soaking it in brine, before cooking. This is known as “wet curing”. You can also “dry cure” meats by using a meat rub, rather than brine. Rubs consist of a combination of salt, herbs and spices, intended to impart a particular flavor into the meat, while curing it.

But cured meats can refer to something else entirely; most of what we know as deli meats are actually cured meats. This tradition goes back to the Middle Ages in Europe, where it was used for both preserving meats and making less choice cuts of meat usable.

Curing meats consists of cutting up meat and fat and mixing it with salt and spices. The salt used is not ordinary table salt, but rather “curing salt”. This differs from normal table salt in that it has nitrates

and nitrites mixed in. It is these nitrates and nitrites which break down the tough meat, turning it into a delicacy.

There has been some controversy over the use of nitrates and nitrites in food products. This stems from the danger of consuming too much of these substances. However, if you use curing salt, rather than adding your own nitrates and nitrites, it will have the right amount and your family will not be at risk.

The chopped and seasoned meats are normally put in a sausage casing and allowed to sit. Cold curing is done in the refrigerator, using the cold environment to protect the meat while it is curing. But much cured meat is smoked; which is usually done within a few days of making it. Smoked and cured meats are a delicacy in many parts of Europe, as well as here in the United States.

COLD AS A PRESERVATIVE

When most people think of preserving food in our modern industrialized society, they think of using cold. Actually, they don't even think of it in those terms, they just think they need to keep the food from spoiling. But isn't that the same thing? So off to the refrigerator they go.

Both refrigeration and freezing are means of preserving food; but they (especially refrigeration) are actually some of the poorest methods of food preservation going. Compared to the other methods we've discussed, refrigeration can only keep food from spoiling for a short period of time. Freezing extends this time, but does so at the cost of constant energy input. It is also risky, in the sense that it will stop working if electrical power is lost.

Unlike other methods of food preservation, refrigeration doesn't kill bacteria or turn the food into an inhospitable environment for it to survive. Rather, it acts on the bacteria itself by slowing its

metabolism. Although bacteria can't be "cold blooded" because it doesn't have any blood, the same concept applies. The internal temperature of the bacteria is the same as its environment. So, the lower the temperature, the slower the metabolism; the slower the metabolism, the less the bacteria eats.

Freezing lowers the temperature of the bacteria to the point where its metabolism comes to a complete standstill. But it doesn't kill the bacteria either. Once the food's temperature rises above freezing, the bacteria become active again and start consuming the food.

Freezing has another risk as well, especially in modern "frost free" freezers. In order to keep the freezer from developing frost, the moisture is sucked out of it regularly, something like that which is done in freeze-drying food. If food is not properly wrapped to protect it, the moisture will be drawn out of it, causing freezer burn and rendering at least part of the food unusable.

Nevertheless, refrigeration, or the use of cold to slow the metabolism of bacteria, is the only way of keeping fresh food fresh, while still preserving it. You are just limited as to the amount of time you can keep this food fresh, as it will eventually spoil. But it will take much longer for the food to spoil, than if it were left at room temperature.

The modern electric refrigerator is a fairly new invention, having hit the market only about a century ago. Even so, the use of cold for food storage is not new. In the Middle Ages, people who had the capability used to keep milk, cheese and other perishables in caves or wells to keep them cool. This idea later developed into the root cellar, which also uses cool temperatures to reduce spoilage of food. In cold climates, freezing (especially of meat) was accomplished during the wintertime by building a food locker that was exposed to the outside temperature, while protecting it from wild animals.

While modern refrigeration is extremely convenient and widely used, it requires electricity. This places a limitation on refrigeration, in that

it can't be used if the power goes out. In a post-disaster situation, where power is often lost, people tend to lose the contents of their refrigerators and freezers. If such a situation were caused by a true TEOTWAWKI event, such as the loss of the electric grid, the resultant loss of food would be devastating.

REFRIGERATION WITHOUT ELECTRICITY

There are ways of keeping food cool, without the use of electricity. These predominantly cool by evaporation. The process of evaporation is a natural cooling process, that's why people perspire. As the sweat or water changes from liquid to gas (water vapor) it has to absorb a lot of heat. In the case of perspiration, it absorbs that heat from the person's body. In the case of an evaporative cooler, it absorbs that heat from what is in the cooler.

These sorts of coolers work more efficiently in areas where there is low humidity. The lower the humidity and the greater the ambient heat, the more water will evaporate, cooling the food. Even so, they will still provide some help in higher humidity areas.

The Zeer Pot is an ancient evaporative cooler, still in use in some parts of Africa to keep food fresh. It consists of two unglazed but fired ceramic pots, nested one inside the other. The space between the two pots is filled with sand and the food is put inside the inner pot. It is essential that the pots be made of unglazed ceramic, or it will not work.

To use the Zeer Pot, water is poured into the sand between the pots, saturating it. This water then wicks into the ceramic, saturating it as well. The water will start evaporating from the surface of the outer pot, cooling it and the contents.

For the Zeer Pot to continue working, water needs to be added to replenish what evaporates. Its efficiency can be increased slightly by

placing a wet cloth over the top, so that the contents are not exposed to the hot ambient air. Used in this manner, Zeer Pots have kept vegetables fresh for four times as long as they would remain fresh if left sitting on the table.

This concept is effective enough that a company in India is manufacturing small home refrigerators in the same manner. The rectangular refrigerator is a double-walled ceramic box. The space between the walls is filled with water, rather than sand and food is placed inside the box, with a closable door to protect it. The unit not only keeps the food cool, but works as a water cooler too, as there is a spigot to get cold water out of it.

In an emergency, you can make a temporary evaporative refrigerator by hanging heavy fabric over a free-standing metal or plastic shelving unit. Be sure to totally enclose the shelves, leaving no gaps in the fabric. For a door, overlap two layers of fabric. Wet the fabric and leave sitting in an area with good airflow. Replenish the water as needed.

Like the Zeer Pot, the water on the outside of the fabric will begin to evaporate immediately, drawing heat out of the shelving unit and its contents. It will be necessary to wet the fabric several times per day to keep the system working.

ROOT CELLARS

I mentioned earlier that ancient people kept food cool by keeping it underground. That works because it is always cooler underground than it is on the surface, unless there is volcanic action, which can include hot springs. Since heat rises and cold drops, air underground will always remain cooler than that on the surface. Typically, a root cellar will stay at 55°F or below, regardless of the ambient

temperature. If it is built below the frost line, it will never drop below freezing.

If you happen to have a cave on your property, all you have to do is create some means of securing food in it and you'll have a root cellar. If you don't, you could dig your own. Basically, that's what a primitive root cellar is, a man-made cave for storing food in. If you wanted a better one, you could cover the walls with cement block, brick or pressure-treated timbers.

There is a company in Europe which is manufacturing modern fiberglass root cellars and selling them as natural refrigerators. The root cellar is a six-foot diameter ball, with shelves built in and has an attached and enclosed staircase leading down into it. The company claims that the installed unit will keep food at 55°F.

If your home has a basement, you can build an enclosed room and turn it into a root cellar. In order to naturally cool the room, add a vent near the ceiling, for warm air to escape. Then add a vent pipe from outside, close to the ground, which comes out close to the floor in the root cellar. This arrangement will allow cool air at night to work its way into the root cellar, while keeping the warmer air from the daytime from coming in.

A simpler root cellar can be made by burying a used, non-working refrigerator in the ground, laying on its back, with the door at ground level. The same thing can be done with any sort of container, but the advantage of a used refrigerator is that it is insect and rodent proof. The insulation in the door will help keep the contents cool too.

Root cellars derive their name from being used for storing root vegetables, such as carrots, potatoes and onions. While not really refrigeration, as we know it today, the cooler temperature that a root cellar provides will keep these vegetables usable for months.

THE ICE HOUSE

Before electric refrigerators, people used iceboxes. These were insulated wood cabinets, with doors and shelves for storing food. One compartment was left open from food and used to put a 25 or 50 pound block of ice. Ice men delivered ice on a regular schedule, so that people could keep their food cool.

The ice used for these iceboxes wasn't manufactured as it is today, but rather harvested from nature. The same men who delivered the ice during the warmer months, spent the winter months cutting blocks of ice from rivers and lakes, which was stored in an insulated warehouse, referred to as the "ice house. Additional insulation, usually in the form or sawdust or straw, was piled on the ice to slow its melting.

Even without the insulation, the massive amount of ice itself helped to keep it from melting. With several tons of ice packed together, even if the outer layer of ice was subject to melting, the rest of it would stay solid.

If you've ever seen the movie "Frozen" you've seen this process. The opening scene shows ice men on the lake, cutting blocks of ice and loading it on a wagon, for storage in the ice house. This was not made up for the movie, but rather a very real part of life for well over 100 years. Ice houses and their associated iceboxes were in use from the middle of the 19th century, until the 1030s, when they were replaced by electric refrigerators.

While collecting ice for keeping food cool is backbreaking work, it is effective. In the event of a TEOTWAWKI event, where we no longer had electricity to keep our food cold, I imagine an ice house and icebox would be the way to go. Producing enough electricity to run your refrigerator off of solar panels would require a lot of solar panels.

Although most ice houses looked no different than any other wood warehouse, the best ice houses were underground. The lower temperature underground helped keep the ice from melting prematurely, extending the amount of time that ice could last.

IN CONCLUSION

While few Americans today pay much attention to preserving their own food, this was commonplace for much of human history. We only have to go back a couple of generations, to find our own ancestors canning, drying, smoking and otherwise preserving food. The ability to do these things was considered an essential part of keeping a home.

Should a major disaster happen, such as the destruction of the electrical grid, the ability to preserve our own food would be essential to survival. Those who did not have this ability would most likely die, once available food sources were exhausted. The only people who would stand a chance at surviving are those who would have the ability to grow, harvest and preserve their own food.

All of the methods we've discussed in this work are things that we can do today, in our own homes. The materials and tools are readily available, for those who care to look. Coupling these methods, with the ability to grow your own food, would make anyone much more self-sufficient.

But even without the danger created by a major disaster, the ability to preserve your own food provides you and your family with better, fresher, tastier and more nutritious food than you can buy commercially. While commercial food packaging has come a long way in the last 50 years, the necessities of harvesting early, so as to ensure that food is ripe and not over-ripe when packaged, means that it is never at its peak flavor. Home preserved foods can be.

Best SHTF Guns from The Old West

No good Western movie is complete unless it showcases an array of classic firearms, and there are good reasons for that. If you ever want to understand why Americans have a different relationship with firearms than the rest of the world, you have to understand the Old West. It was guns that made the creation of the USA possible. Unarmed, our pioneer forefathers could never have tamed the wild lands they found as they moved inland from the original colonies. As they moved west, they had to confront hostile tribes, dangerous animals and even outlaws; along the way they also had to hunt to survive. Without guns they'd never have made it.

Rightly, the guns that won the West have become American icons. Many of them are still being made, and they're popular collector's items. More than that, some of them have advocates that say they're still practical weapons today. How true is that?

The answer seems like it should be obvious. After all, these are old guns. Historians put the end of the Old West era at 1920, but the period most of us associate with it – and that gave us the most iconic guns – covers a couple of decades each side of the Civil War. That takes us back well over 100 years, and firearms have advanced a lot in that time. Can an antique gun *really* still be useful in a world of AR15s, Glocks and precision bolt-action rifles?

Yes, it definitely can. Part of that is that *any* gun is useful, if it's in working order and you have ammunition for it. The only gun that

can't help you is one you don't have. More important than that, though, is that a lot of the guns of the Old West were just good guns. The pioneers were tough people in a tough environment, and they chose dependable weapons that wouldn't let them down. Their guns were simple, rugged and easy to maintain in harsh conditions. Many of them were designed by people who knew the West, so they were ideal for that environment.

A lot of the things that made those guns so vital in the Old West mean they're still good guns today. They might not have all the modern tactical features we're used to, but they won't let you down when you need them. In this book we'll look at nine of the guns that served our ancestors well, and still get the job done today.

SHOTGUNS

Let's start with one thing Hollywood has got very wrong about the Old West: Revolvers. In the movies just about everyone has a revolver strapped to their hip, and quite often a pair of them. This wasn't the reality. Guns were expensive back then; as a percentage of the average income they were a *lot* more expensive than they are now. Most people could only afford one gun, and they wanted the one they got to be as versatile as possible.

It's hard to think of anything more versatile than a shotgun. No other firearm can fire such a wide variety of loads. The average 12-gauge can be fed with ammunition ranging from rock salt, for deterring intruders,

to a single massive projectile for bringing down heavy game. In between there's a whole range of shot sizes that will let you take anything from small birds to deer.

For the average family in the Old West a gun wasn't a combat weapon. It was a tool, essential for putting food on the table and protecting crops and livestock from animals. Of course, it helped if it made an effective weapon as well, because the West had its dangers. A shotgun is a perfect jack of all trades; it isn't excellent at *everything* you might want a gun to do, but it covers most of it pretty well.

Shotguns were everywhere in the Old West – and, unlike revolvers and lever-action rifles, they were around at the beginning of the period. Early shotguns were percussion-fired muzzle loaders; apart from being shorter and lighter they weren't much different from smoothbore muskets. Some were even made from cut-down military surplus muskets. Both single- and double-barrel models were available. Breech-loading shotguns appeared towards the middle of the 19th century, in England, and soon made it to the USA. They still had external hammers, but now these struck angled firing pins that hit the cap on each cartridge. Finally, the boxlock, with concealed self-cocking hammers, was invented – again in England – in 1875, and since then almost all single and double shotguns have used it. The boxlock is fast, simple and sturdy, and it quickly became popular in the West.

Modern pump shotguns hold more ammunition than a traditional double, but they're less reliable, heavier and more expensive. If you want a cheap but dependable gun that can handle almost any situation, a double shotgun is still the best option. It's light, easy to use, there isn't a lot to go wrong, and it will reliably fire the full range of shotgun ammunition.

Unfortunately, the gunmakers who made the shotguns used in the Old West have either disappeared long ago or switched to making

pump guns or high-end doubles that cost as much as a new car. That isn't a lot of use if you want the maximum amount of gun for the smallest amount of money.

The solution is to get a modern gun that's equivalent to the ones used in the Old West, and there's a very obvious choice. The Russian Baikal brand, made by Kalashnikov Concern, are solid, dependable guns that won't win any prizes for beauty, but they work well – and they're cheap. Thanks to sanctions against Russia these guns aren't being imported anymore, but there are plenty used and new ones still on the market.

For most people, the Baikal MP 43 is a great choice. It's a 12-gauge side by side double, with a chrome-lined bore and 3-inch Magnum chambers that let it use any shotgun ammunition. It comes in several barrel lengths from 18 to 30 inches, too. Short barrels are lighter and handier at close quarters; long barrels give a tighter shot pattern and longer range. Although it's a very traditional gun it has modern removable choke tubes to make it even more versatile.

The MP 43 is a boxlock design, but if you want to get as close as possible to the shotguns of the Old West there's also the related MP 43K. Often called a "coach gun", this is basically identical to the MP 43 apart from the action. Instead of the boxlock there's an old-style lock with twin external hammers. This action is more complex than the boxlock and the hammers are exposed to being knocked, but it does give you the option of loading the gun then decocking it by lowering the hammers.

REMINGTON NEW MODEL ARMY "MODEL 1858"

Made famous as the sidearm of Angel Eyes (Lee Van Cleef) in *The Good, The Bad and The Ugly*, this elegant-looking revolver was a standard handgun of the Union Army during the Civil War. Close to

a quarter of a million of them were made, and tens of thousands of them found their way out West.

For most people a handgun wasn't as useful as a shotgun, but they did have their strong points. If you could afford two guns it made sense to get a compact one that could be carried at all times. It was even better if that gun had a high ammunition capacity – and, in a world used to one-shot muzzle loaders, six shots was a lot of firepower. The new revolvers were also tough and reliable, and while they weren't much use for hunting, they were excellent for self-defense.

The standard US Army revolver in the early 1860s was the Colt Army Model 1860, a .44 caliber percussion gun with a six-shot cylinder. Unfortunately, Colt were never able to meet the demand for this pistol, so the Army started buying Remington 1858s as a secondary issue. Then, in 1864, a huge fire completely destroyed Colt's factory and the Remington was ordered in large numbers.

The Remington was slightly bulkier and heavier than the Colt, and the government didn't like it because it cost 50 cents more (the equivalent of $15 now). The soldiers who were issued the 1858 liked it, though. The Colt's frame had no top strap, and its strength relied on the lower frame and a massive cylinder pin; the Remington's cylinder fitted into a cutout in the solid frame, making it a much stronger design.

Like most revolvers at the time the Remington is what's now called single action – you have to cock the hammer between shots. This makes it a bit slower than what we call "double action", where pulling the trigger recocks, then drops, the hammer. In fact, this is technically an Adams action, and double action originally meant a gun that could be fired this way *or* manually recocked between shots. The advantage of hand-cocking is that you get a much lighter trigger pull, which makes the pistol more accurate.

For modern shooters the Remington has one major drawback – it's a cap and ball design. You can get six shots off in a hurry, but reloading the cylinder takes a couple of minutes. The complicated process involved pouring a powder charge into each chamber, dropping a ball on top, then rotating the cylinder one chamber at a time and using the hinged lever under the barrel to ram the ball down on the charge. Finally, a cap had to be placed on each chamber's nipple.

This was becoming an issue even in the 1860s, and in 1868 Remington fixed it by making a drop-in replacement cylinder in .46 rimfire. This could be quickly removed and reloaded, or by milling a cut-out in the rear of the frame could be loaded while it was still in the gun.

Remington stopped making the New Model Army in 1875, moving on to more modern designs, but there are plenty modern reproductions available. Most of these are made in Italy, and the best come from Euroarms and Uberti – both of these are practically identical to the original, but use modern steel in the frames to make them even stronger. Again, they're percussion guns, but replacement cylinders are available and let you fire low-pressure (non-Magnum) .44 cartridges. The Uberti is also available in the .45 Colt New Army Conversion model, with hinged loading gate and ejector.

The question is, why would you choose a 160-year-old design over a modern handgun? Let's just start with it being an excellent gun. It's strong, reliable and very accurate. These are long pistols, so they're not ideal for concealed carry, but that same length gives them a long sight radius. Even with a 6-inch barrel the 1858 is a very precise weapon, and the 8-inch model is even more accurate.

If you're firing .44 Special with a conversion cylinder the Remington is an effective, powerful weapon, and the .45 Colt is a legendary round. Cap and ball isn't bad either. In fact you can load a variety of

bullet shapes in the percussion cylinder, but a ball is fine at short range.

There's a big advantage to the cap and ball design, too. As long as you have a supply of caps, which don't take up much space, you can make your own ammunition very easily. Black powder consists of sulfur and saltpeter (which you can find) and charcoal (which you can make). As long as you have a bullet mold any kind of lead can be melted down and turned into bullets. With some basic skills and tools, your Remington will keep reliably banging away long after modern guns have run out of ammunition for good.

SPRINGFIELD MODEL 1861

The most used US Army rifle of the Civil War was a weapon that Revolutionary War soldiers would have recognized instantly as a more advanced version of the muskets they used. The Springfield Model 1861 Rifle Musket was a muzzle-loading black powder rifle that fired a .58-caliber Minié ball. Long, heavy and slow to load, it was also a sturdy and powerful weapon that was capable of impressive accuracy at normal combat ranges. After the war ended it served on with the US Army until the 1870s, but hundreds of thousands were sold as surplus. Many of these found their way to the western frontier.

A rifle made sense for the early settlers. In open country it was the only firearm with the range for hunting. The same long range was useful for keeping enemies at arm's length. Rifle muskets don't have the highest rate of fire, but with some practice most people could get off three or even four shots a minute. They were accurate out to around 400 yards, too, which is good performance for a muzzle loader with open sights. Best of all they were simple weapons; there weren't many moving parts to go wrong, and if anything did break it was easy to repair or replace.

By the 1870s cartridge rifles were starting to appear and the rifle musket was showing its age. The US Army converted most of its Springfields – the slightly updated Model 1863 – to Model 1873 trapdoor breech loaders, but out West most people were happy to leave them as muskets. The rate of fire was lower, but that was more important for soldiers than for trappers, hunters and farmers. The heavy .58 Minié ball was also more effective on large game than the .45 round the Model 1873 launched through its re-sleeved barrel.

Finally, brass-cased cartridges were expensive and it wasn't always easy to find the caliber you needed. The only weapon-specific ammunition component for the old weapons was the projectile; percussion caps and powder worked with any gun, and as long as you could buy the right size of ball – or if you had a bullet mold, which were supplied with most civilian guns anyway – you were in business.

The Springfield is a pretty typical rifle musket. It's a long weapon – very long, in fact; 56 inches overall, including a 40-inch barrel. Despite its size it isn't all that heavy, at a bit under ten pounds. It's extremely simple to operate. All you have to do is pour a measured charge of powder down the muzzle, then ram the projectile down on top of it. Next, raise the hammer to half cock, put a cap on the nipple, fully cock the hammer, aim and fire. If you don't plan to fire immediately it's possible to lower the hammer over the cap to hold it in place, but any impact on the hammer could detonate the cap and fire the rifle. If you want to carry the rifle loaded it's best not to fit the cap until you're about to fire.

Apart from the hammer and trigger, the Springfield has no controls. The lock is simple and most of the internal parts can be manufactured by anyone with hand tools and basic metalworking skills. The foresight is fixed, and the rearsight has two folding leaves calibrated to 300 and 500 yards, plus a fixed battle sight calibrated for 100 yards.

So we have a single-shot rifle that's over four and a half feet long and takes about twenty seconds to reload. Is it any use? Yes, it is. If you need a rifle for hunting, this will bring down anything in North America. Best of all, though, it's almost indestructible – and, like a cap and ball revolver, you can make your own ammunition if it comes to it. As long as you have caps, black powder and projectiles can be made from scavenged-up materials. Although it was designed to fire Minié balls it will work fine with a round ball too; to maintain accuracy, wrap the ball in a greased patch of linen or thin leather before ramming it. You can even use a wad and shot to turn the Springfield into a very long shotgun.

Original Model 1861 Springfields are expensive now, but there are some very good reproductions on the market. Again they're mostly made in Italy; the Pedersoli is a good example. It's huge, slow and old-fashioned, but it's also fun to shoot and, most importantly, it's a simple gun that will last forever.

WINCHESTER MODEL 1873

Rifle muskets like the Springfield were powerful and accurate, but many frontiersmen wanted a smaller, lighter weapon with higher ammunition capacity, and they were willing to trade range and hitting power for it. Unfortunately, the weapons technology of the time was a lot more basic than today, and while gunmakers had been trying to make a rapid-fire weapon for centuries none of them were really successful.

The USA had an early taste of the power of rapid-firing rifles during the War of Independence, when the British deployed the Experimental Rifle Corps at the Battle of Saratoga in 1777. This unit was armed with the Ferguson rifle, an unusual breech-loading flintlock that could fire up to ten shots a minute and was deadly

accurate at over 300 yards – terrifying firepower at a time when the standard infantry musket fired three shots a minute and struggled to hit a barn beyond 50 yards. Fortunately for the revolution the Experimental Rifle Corps only numbered about a hundred men, and it was disbanded after its commander (and the rifle's designer), Major Patrick Ferguson, was wounded at Brandywine. Ferguson himself once had George Washington in the sights of his deadly rifle, but didn't pull the trigger as he thought it was ungentlemanly to shoot a man in the back.

All but a handful of Ferguson rifles left America with the retreating British, but American gunsmiths wanted to replicate its firepower. Early efforts included long-barreled revolvers fitted with rifle stocks, but these were never very effective. It was only when the Sharps rifle appeared that the Ferguson could be matched, but the Sharps was still a single-shot breech loader. Gun designers wanted to do better.

The first really successful repeater was the 15-shot Henry rifle of 1860, used by Union cavalry during the Civil War – "That damned Yankee rifle that they load on Sunday then shoot all week". After the war the basic design was improved by Winchester and quickly became popular on the frontier. The original Winchester was the .44 rimfire Model 1866, known as the Yellow Boy for its brass receiver. Then, in 1873, Winchester released a new centerfire cartridge, the .44-40 – and a new version of the rifle to fire it.

Centerfire rounds can be more powerful, because the weak spot of the rolled rim is eliminated, so to handle the increased power Winchester replaced the brass frame with a steel one. They also beefed up the rest of the gun and made a few refinements to the action, then released it as the Model 1873.

Everyone who'd been looking for a smaller, faster-shooting rifle suddenly had what they wanted. The Winchester didn't have the power of the old rifle muskets, but it was still effective out to about

200 yards, and that was good enough for self-defense and most hunting.

There was another big advantage to the Model 1873. The .44-40 was basically a pistol cartridge, and it wasn't long before handguns chambered for it started appearing. Colt released their famous Peacemaker in the new caliber as the Frontier Six-Shooter, and Smith & Wesson did the same with the New Model 3. That meant you could use the same ammunition in your rifle and handgun, which made life a lot easier.

In many ways the Model 1873 was the AR15 of its day. Lighter and more compact than traditional rifles, it offered a high magazine capacity of fifteen rounds and a good rate of fire – a Winchester could put more rounds down range than four or five men with rifle muskets. It came in a variety of barrel lengths, including 20-inch, 24-inch and several custom sizes down to 12-inch; the 20-inch was handy enough to be used from horseback. Meanwhile the .44-40 round was capable of bringing down a deer, and had more than enough punch for self-defense.

Winchester stopped making the rifle in 1923, after building about 720,000 of them. A few decades later Uberti started making high-quality replicas, and their popularity pushed Winchester to put it back into production.

There are two options if you want to own one of these guns. Winchester make the rifle in a single version, chambered for .357 Magnum and fitted with a ten-round magazine and 20-inch barrel. Uberti have a wider selection, with barrels from 24¼-inch down to a 16-inch "Trapper" model. They also offer it in .357, .45 Colt and the original .44-40. This means it's still easy to have a rifle and handgun that use the same effective cartridge.

Is it worth getting a Model 1873? Yes, definitely. It's a solid, reliable gun that's easy to shoot, accurate inside normal combat ranges, and

very effective at taking a variety of game. It can't match the firepower of a semi-auto rifle, but it's still more than a match for any handgun. Overall, it's a dependable firearm that played a huge role in the building of the West, and it will serve you well in the aftermath of a SHTF scenario.

SHARPS MODEL 1874

We're used to general-purpose rifles that can effortlessly switch from close quarter battle to putting down reasonably accurate fire at five or six hundred yards. Firearms technology in the Old West couldn't produce that sort of weapon, which is why such different types as the Springfield and Winchester existed. Rifle muskets had decent range and high power, while lever-action repeaters could be fired a lot faster but chambered pistol cartridges. On the other hand, neither of them could achieve real accuracy at long ranges. Luckily there was another weapon that could easily achieve that – the Sharps rifle.

There's an old myth that the word "sharpshooter" originated from the accuracy of the Sharps rifle, but that's not true – it comes from an old German word, *Scharfschütze*, and the British had translated it into English before Christian Sharps was even born. The Sharps *was* a very accurate rifle by the standards of its time, though, and it's pretty respectable even today.

Sharps designed his first rifle in 1848; three years later he sold an improved design to R&L Co, who perfected it for mass production as the Model 1851. It was an unusual rifle for the time. The lever-operated action used a falling breech block, an immensely strong design that's now used in heavy artillery. It was fed with paper cartridges containing the bullet and powder charge. Opening the breech cocked the hammer and lowered the block, exposing the chamber so a cartridge could be loaded; when the breech was closed

the sharp edge of the block sheared off the back of the cartridge, exposing the powder. At the same time the action advanced a paper roll of percussion caps, feeding a new one onto the nipple (standard copper caps could also be used).

Christian Sharps designed immense strength into his rifle for a reason; it was an extremely powerful weapon, firing a 475-grain, .52-caliber bullet at over 1,200 feet per second, which was high for the time; the Springfield managed around 950fps with a 500-grain bullet, and while many soldiers had complaints about the Springfield "It's not powerful enough" wasn't one of them – those huge, soft lead bullets were prodigious manstoppers. But, as powerful as the Springfield was, the Sharps topped its muzzle energy by over 60%.

The other outstanding feature of the Sharps was its accuracy. It was much shorter than a rifle musket – a 26¾-inch heavy octagonal barrel, and 47 inches overall – but, being a breech loader and fitted with excellent sights for the time, inherently a lot more accurate. In fact an expert marksman could put groups into a large dinner plate at 1,000 yards, and Sharps enthusiasts still shoot silhouette competitions out to 805 yards. A good Sharps is still competitive with a modern bolt action with open sights.

It's also still a hard-hitting rifle. A muzzle energy of just over 1,500 foot pounds is about the same as a .223 carbine, but the big heavy bullet is devastatingly effective. After all it's a soft lead slug more than twice the weight of a .45ACP military ball round, and it's moving a lot faster. A Sharps will easily drop anything it hits – it was a favorite with professional buffalo hunters.

During the Civil War it was also a favorite with sharpshooters – the equivalent of snipers at the time. Sharpshooters had the job of picking off enemy officers and artillerymen, so that by the time the line infantry came into rifle musket range the enemy were already weakened and disorganized. The Sharps was ideal for this.

By the late 1860s the Sharps was becoming obsolete; its paper cartridges were less convenient, and more vulnerable to weather and rough handling, than the brass ones that were quickly taking over. That turned out not to be a problem, though. The falling block design as easy to adapt for the new ammunition – all that really had to be done was remove the cap feed system, replace the nipple with a slanted firing pin and rechamber the rifle to take a centerfire caliber. The update gave the rifle a new lease of life that kept it in production for another two decades.

The US Army started converting its Sharps rifles to .45-70 in 1873, and the next year a new civilian version as released. The Model 1874 came in a variety of calibers, including some of the most powerful black powder chamberings ever made – fearsome rounds like the .50-70 Government, which could deliver over 3,000 foot pounds to the target. That's a lot of power even today, and it made the Sharps more popular than ever as a big game rifle.

How well does the Sharps hold up today? Very well! It has all the power you need for hunting, plus a respectable rate of fire – with a bit of practice you can get off ten rounds a minute with a Model 1874. It's simple and robust. The action is very compact, making for a relatively short rifle relative to barrel length, and the working parts are very well sealed – the only place dirt can really get into is the chamber, and that's easy to clean. In short this is a rifle that will keep working very reliably even in extreme conditions, and it's rugged enough to last forever.

Original Sharps rifles are valuable antiques today, but there's no shortage of good reproductions available. As usual, Uberti of Italy are one source. Who knows why Italy makes so many reproduction Western guns, but they do and the quality is usually excellent. As far as the Model 1874 goes they have six versions, all in .47-70. These range from a Cavalry Carbine with a 22-inch barrel, through the 32-inch Buffalo Hunter to the 34-inch Deluxe.

There are a couple of excellent American options, too. C Sharp Arms, based in Montana, make reproductions of a range of classic Sharps models in a wide variety of historical calibers. These range from .30-40 Krag up to the mammoth .50-140 Sharps heavy game round. For SHTF use their Hartfod Sporting Rifle in .45-70 with a 26-inch barrel is a great choice. Alternatively, Shiloh Rifle Manufacturing also make high-quality Sharps rifles in a similar range of calibers.

Remington Model 1875 Single Action Army

We've already looked at the Remington Model 1858. This was a very successful revolver, especially when conversion cylinders for centerfire cartridges became available. The success of the conversions highlighted a problem, though – the standard cap-and-ball gun was becoming obsolete. When rivals like Colt started releasing pistols designed from the ground up to fire brass-cased ammo, Remington realized it was time to modernize.

Luckily for Remington, this wasn't a difficult process. The Model 1858 was a solid and well-proven design, and it didn't take a lot of work to produce a cartridge-fed version. The designers took the action and frame of the older gun, fitted it with a hinged loading gate and bored-through cylinder, added an ejector, and the Model 1875 was born.

The 1875 was identical to its predecessor in most ways. It retained the extremely strong frame design, with a solid piece of metal enclosing the cylinder top and bottom. This made it a lot more robust than open-top frames like most of the early Colts. The main changes were the loading gate and ejector. Many converted 1858s had these features added, but they were often quite crude. For example, the loading gate on a conversion was usually just a cutout on the right side of the frame that let you slide a cartridge into the chamber without removing the cylinder from the gun. The problem was that

this left open space behind the chamber on the right; recoil could slide the round in that chamber backwards, and it would jam the cylinder when you tried to re-cock. A proper hinged gate closed the space and eliminated that risk.

Because the 1858 was a cap and ball design it didn't need an ejector; the chamber emptied when it was fired, and all you had to do was pull the fired caps off the nipples before reloading. With brass cartridges it was different; you needed some way to push the spent cases out the loading gate. A stick would do it, but a better solution was a spring-loaded plunger that operated an ejector rod. All you had to do was work the plunger, rotate the cylinder to the next chamber and work the plunger again – each time, a case would be ejected. Gunsmiths who converted 1858s often added an ejector, but Remington did a professional job of it. The rammer lever was fixed in position to act as a base, and a tube containing an ejector plunger and spring fitted to the right side of it.

Sadly, for Remington they didn't quite make it on the timing. By the time the revolver was ready to go on sale Colt's Single Action Army had already been on the market for two years, and it had snapped up most of the big contracts. The biggest one of all was the US Army, which Remington had been hoping for a share of, but in the end the government only bought 650 pistols to arm the Indian Police. Mexico bought another thousand. Egypt ordered 10,000, but only a few were delivered – Remington had also supplied the Egyptian government with rolling block rifles, but the bill hadn't been paid and the company decided not to take any more risks with them.

The Model 1875 might not have won lucrative government orders, but it did fairly well on the civilian market. It stayed on production for 14 years and Remington made close to 30,000 of them. During its life it was made in three calibers - .44 Remington, .44-40 and, finally, .45 Long Colt. All of these were solid, hard—hitting rounds, making the 1875 ideal for self-defense against either men or animals. A lot of

pioneers carried one of these sturdy and accurate pistols as they built a new life in the West.

Carrying one today still makes a lot of sense. It can't deliver as much firepower as a modern semi-automatic, or even a modern revolver – it can't use speedloaders because of the solid frame design. To compensate for that there's a lot less to go wrong with it, and the long barrel makes it very accurate gun. You probably wouldn't want to carry one in combat, but if you're confident you can solve most problems with six well-aimed shots, and you want a gun that can stand any amount of hard use and keep working reliably, this is a solid choice.

Like most Old West guns, the original manufacturer stopped making this one long ago. Also like most Old West guns, the Italian gun industry is making high-quality reproductions. Uberti make an almost perfect copy, which is exactly like the original apart from using modern steel. Marketed as the 1875 Army Outlaw, the Uberti gun is available with the standard 7½-inch barrel, as well as a handier 5½-inch version. You can choose two of the original chamberings, too - .44-40 or .45 Long Colt, as well as .45 ACP. The stronger steel used in the Uberti also allows higher pressure loads, so there's a .357 Magnum version too. The option of these more widely used calibers helps make the Model 1875 a versatile and practical post-SHTF handgun.

Remington Model 95 Derringer

Western-style revolvers look great, shoot well and last just about forever, but nobody's ever going to call them compact. Let's face it; if you're looking for a concealed carry pistol something like a Remington Model 1875 isn't ideal. Even with the "short" 5½-inch barrel it's almost eleven inches long, so it's not exactly a pocket pistol. So, what did our Western ancestors do when they needed a discreet firearm for self-defense? Simple: They carried a derringer.

The first popular, compact pistol made in the USA was designed by Henry Deringer in 1852. Deringer came from a family of gunsmiths – his father, Henry Senior, made many of the famous Kentucky Long Rifles used in the Revolutionary War – and Deringer himself opened a gunsmith's shop in 1806. He started off making flintlock rifle muskets for the US Army, then moved into high-quality sporting rifles and dueling pistols. In about 1825 he started experimenting with pocket pistols, and finally in 1852 he released the famous Philadelphia Deringer.

Although it was popular, this wasn't really much pistol. It was a single-shot, .41-caliber percussion muzzle loader, with a rifled barrel between 1.5 and six inches long. It took a fairly small powder charge, and was never going to win any prizes for range or power. What it *did* do was give people the option of carrying a very concealable gun that was effective enough at close range. Thousands were sold for self-defense and it also, notoriously, became a favorite of assassins. A Philadelphia Deringer was the gun used to assassinate President Lincoln in 1865.

Just a few years after Deringer released the little gun it was overtaken by technology, as brass-cased cartridges began to replace percussion weapons. It didn't take long before other gunmakers realized that, with the new ammunition, they could make a pistol that was even smaller than Deringer's and some extremely compact handguns started to appear. One of the best, and definitely the most recognizable, was Remington's Model 95.

At least, that's what Remington called it. However, "derringer" – the second R crept in quite quickly – soon became a generic term for a very small pistol, and the Model 95 is often called the double derringer. It was made from 1866 to 1935, and in the end Remington made over 130,000 of them. Tens of thousands were carried, and used, in the Old West.

Apart from its small size, Deringer's original gun was a pretty conventional percussion pistol. It didn't have any radical design features, just existing ones engineered down into a very compact form. The double derringer was different. It was a break-open design with two over and under barrels in .41 Short Rimfire caliber. Unusually, the barrels hinged upwards when a lever on the side of the frame was operated. A sliding extractor on the other side pushed spent cases out of the chambers.

There was no trigger guard; the trigger was concealed inside a spur on the frame, and moved forward into firing position when the external hammer was cocked. The firing pin was hinged; an unusual cross-shaped sear rocked it up or down each time the hammer was cocked, so on alternate shots it would strike a different chamber.

When it came right down to it the Remington Model 95 wasn't a lot of gun. The .41 rimfire was notoriously underpowered; sometimes a heavy overcoat would stop the bullet. It *was* a gun, though, and at the close ranges it was used it generally had enough punch to do the job. It was also very easy to conceal – it would fit in any pocket. Many of the buyers were women, because it could easily be carried in a purse, inside a muff or even tucked in a stocking top.

Remington haven't made the Model 95 for more than 80 years, but there are many modern reproductions of it and they're just as compact as the original. The really good news is that they're chambered in a huge array of modern calibers, most of them far more effective than the .41 rimfire. In fact, .22LR derringers are popular, and even that is probably more effective than the .41, but there's no shortage of tiny double pistols in .38 Special, 9mm and.357 Magnum. There are even a couple in .45 Long Colt. Bond Arms and Cobra are two companies who make powerful but ultra-compact derringers, some almost identical to the old Remington and others with refinements like safety catches and trigger guards.

Is it worth getting one? That depends on what you're looking for – but if you want the most concealable gun possible, the answer is a definite yes. You won't find any revolver or semi-automatic that comes close to being that small and flat, and derringers also have a respectable barrel length for their size; with 3-inch barrels you can still get a pistol less than five inches long.

Derringers are short-range guns; their small grips mean they're not that controllable and they usually have simple fixed, low-profile sights. They're surprisingly fast to reload, though, and even with what's in the chambers, two rounds of .357 that nobody expected you to have can make a big difference. If you take concealed carry seriously, one of these tiny equalizers should be on your shopping list.

SPENCER 1860

We've already looked at the iconic Winchester Model 1873, the most famous repeating rifle of the Old West era – and maybe ever. It wasn't the only repeating rifle of the time, though, or even the first. The Winchester was a development of the Henry, but even that wasn't the first. In fact, the first repeater to achieve widespread use was the much less famous Spencer 1860.

The Spencer was designed by Christopher Spencer around the same time as the Henry appeared, and competed with it for US government contracts. The Spencer won, and more than 200,000 of them were made between 1860 and 1869; many of them were issued to US Army units, especially cavalrymen, and they saw a lot of use during the Civil War. It was so highly thought of that the Confederacy, which captured many Spencers, re-issued them to their own troops despite the difficulty of getting ammunition for them.

Like the Henry and Winchester, the Spencer was a lever-action design. Unlike them, the tubular magazine wasn't under the barrel; it was in the rifle's butt. Operating the level tilted the rear of the breech block down, ejecting the spent case and bringing the chamber into line with the magazine to feed a fresh round.

Most experts agree that the Spencer had two disadvantages compared to the Henry and Winchester. The first was the action. Working the Winchester's lever pulled back an operating rod that recocked the hammer; nothing else had to be done between shots. With the Spencer you have to pull the hammer to half-cock, work the lever then fully cock the hammer. That meant a lower rate of fire; while the Winchester could manage around 28 rounds per minute (although not very accurately) the Spencer was doing well to manage much more than 20. In practice, with properly aimed shots, it wasn't a significant difference, but the Henry did have a slight edge.

The other drawback was the magazine capacity. The Henry and Winchester generally held fifteen rounds; the Spencer was limited to seven. There were two reasons for that. The Henry's magazine ran the length of the barrel, which was 24 inches long; the Spencer's was in the much shorter butt. The other reason was that the Spencer fired a much larger cartridge.

Like the .44 Henry the Spencer fired a rimfire round, the .56-56 Spencer. The disadvantage of rimfires was that the rim itself was inherently weak, and using too powerful a load tended to badly damage the case and jam it in the breech. On the other hand they also tended to be more reliable than the early centerfire primers. People were more comfortable using them in tubular magazines, too. Early primers could be sensitive, and having cartridges stacked nose-to-primer in a tube that recoiled every time you pulled the trigger made shooters nervous.

Not all rimfires are equal, though, and the Spencer was a much more serious round than the .44 Henry. The Henry fired a 200-grain bullet at about 1,125fps, giving a muzzle energy of around 570 ft lb. The Spencer's 350-grain projectile hit 1,200fps, delivering 1,125 ft lb. It was also pretty accurate out to about 500 yards, while the Henry struggled at much over 200. Overall the Spencer was a much better rifle for hunting, and while it couldn't put down as much firepower in combat as the Henry or Winchester it did let you start winning the firefight at a much longer range.

There's no doubt that the Spencer had more of an impact on the Civil War than any other repeater, mainly because there were just more of them on the battlefield. While they were quite rare in the Army of the Potomac, in the US armies deployed further west whole regiments were armed with them. Those regiments often had a devastating effect; they could shoot as far and hit as hard as men armed with rifle muskets, while almost matching the lighter Henry's rate of fire. The Spencer's biggest victory was probably at the Battle of Nashville, when 9,000 Union mounted infantry armed with the rifles outflanked General Hood's army. Their attack was so powerful that Hood was forced to reinforce that flank, fatally weakening his main defensive positions – and in the end the left flank disintegrated anyway, quickly followed by the collapse and virtual destruction of Hood's Army of Tennessee as an effective force.

As a post-SHTF rifle the Spencer has the same advantages as most Old West guns. It's simple and incredibly robust; well-maintained, it will last pretty much forever. It's also powerful enough to hunt most game, and while it doesn't have the firepower of a semi-automatic it does outrange a short-barrel rifle. If your opponent has a pistol or shotgun, a Spencer has them totally outgunned.

Original Spencers are much too valuable to use as everyday guns, but Chiappa of Italy (where else?) make a high-quality reproduction in .56-50 centerfire or .45 Long Colt. It's available as a rifle with a

30-inch barrel, or a carbine with a 20 or 22-inch barrel. Paired with a good revolver in .45 Colt, it makes for a very capable loadout that will serve you well in a tough spot.

COLT SINGLE ACTION ARMY

And finally, we get to the gun that, more than any other, has come to symbolize the Old West. We've looked at a couple of excellent revolvers, and some long guns that had a much bigger influence on the period than Hollywood gives them credit for, but if you had to pick *one* gun to represent the history of America's pioneers it's almost certain to be this one – the Colt Single Action Army, better known as the Peacemaker or just the Colt .45.

Despite being the iconic gun of the West, the Colt appeared quite late in the period. Colt had developed the first really practical revolvers as early as 1851, and thousands of cap-and-ball Colt pistols made their way out to the frontier, but the appearance of metal cartridges made them all obsolete. Unfortunately for Colt, the bored-through cylinder required for a cartridge revolver had been patented by Rollin White in 1855; the next year he sold the patent to arch-rival Smith & Wesson in exchange for a royalty of 25 cents for each revolver they sold.

Ironically Rollin White (who also developed the knife-edge breech block for the first Sharps rifles) was a former Colt employee, and his prototypes were made from scrap cylinders he'd scavenged from the workshop. But the law was the law, and if Colt started making bored-through cylinders while the patent was valid, they would have to pay Smith & Wesson every time they sold one. Instead of swallowing their pride, Colt decided to wait out the patent. It expired in 1869, and they immediately started work on a cartridge-loaded revolver.

What Colt finally came up with wasn't just one of the most recognizable revolvers of all time; it was also a highly effective gun. They started by designing a new cartridge for it, the legendary .45 Long Colt. Fractionally larger in diameter than the .44 rounds that most big-bore revolvers had used, it was also significantly more powerful.

Next, they came up with a pistol to match. At this point Colt decided to abandon the open-topped frame that most of their previous designs had used. There was nothing much wrong with earlier Colts, but by now it was obvious that the full-frame design favored by Remington was inherently stronger. For the Peacemaker, designed to fire one of the most powerful cartridges used in a pistol so far, a full frame was the only sensible choice. A hinged gate on the right of the frame opened to expose the back of the chamber at the 2 o'clock position. With the hammer at half-cock the cylinder unlocked from the mechanism, so it could be freely turned for faster loading.

The front of the frame held the barrel, with a spring-loaded ejector rod underneath and slightly offset to the right. That lined up with the right-hand chamber, so with the loading gate open an empty case could be pushed out. The original standard barrel was 7½ inches long, and became known as the Cavalry model; 4¾ and 5½-inch models were also available.

At the back the strong and reliable lock had one unusual feature. In most revolvers the cylinder pawl was linked to the trigger; pulling the trigger raised the pawl, which engaged the cylinder and rotated it to bring the next chamber under the hammer. In the Peacemaker the pawl was linked to the *hammer*. It's not clear why Colt did that, but it wasn't long before people figured out they could do something unusual with it.

If you start with an uncocked Peacemaker, you can get off six shots very rapidly by pulling the trigger (it won't fire, because it isn't

cocked) then "fanning" the hammer with the edge of the other hand. Some cowboy action shooters can draw and empty the gun in just over a second using this technique – faster than a semi-auto can fire - but for most people three shots a second is pretty good. Many believe that fanning the hammer is extremely inaccurate, but there are plenty videos on YouTube that prove different. With some practice it's possible to shoot tight groups, or rapidly engage multiple targets.

The Peacemaker's first big test was the US Army's pistol trial in 1872. The Army was looking for a new handgun to replace its 1860 cap-and-ball Colts, and they'd already bought a thousand .44 S&W Number 3 Schofields to evaluate. Colt made a thousand guns in the same .44 American chambering and entered them in the trial. It quickly became obvious that the Colt was superior, and the original .45 model was adopted as the standard US military pistol – a role it filled for the next 20 years.

With the Army order in the bag Colt quickly began selling the Peacemaker to civilians, in a range of calibers. As well as the .45 it could be chambered for the .44-40 (ideal for anyone who carried a Winchester rifle), .38-40, .38 Colt and many others. Huge numbers of them in both military and civilian hands helped tame the West, and it remained popular well into the 20th century. In fact, Colt only stopped making it when the USA entered World War II, so they could concentrate on military orders. Even then, batches of Peacemakers in .38/200 British were sent to the UK to supplement production of Webley and Enfield revolvers.

After the War Colt had no plans to restart Peacemaker production, but public demand soon changed their mind. In 1956 they started making them again, and continued until 1974 when they dropped the gun again. This time it only took two years for them to give in and resume production; these "third generation" guns have some minor changes, but still look almost identical – and they're still being made.

So, unlike most of the other guns we've looked at, there's no problem with getting your hands on an original Single Action Army. Colt sell it in all three original barrel lengths and a choice of .45 Colt or .357 Magnum, although other calibers are available through the Colt Custom Shop. As well as the Colt, Ruger's Vaquero is a near-clone of the Peacemaker but adds more barrel options and offers .44-40 as well as .357 and .45. Finally, there are Italian clones that mimic the Peacemaker almost perfectly; the Uberti Cattleman is a good example, and you can get it in .44 Magnum if .45 Long Colt isn't powerful enough for you.

All the guns we've talked about are still practical weapons that can have a place in a SHTF arsenal, but most of them have faded into history to some extent. The Peacemaker is different. It shares the title "The gun that won the West" with the Winchester Model 1873, and it's probably more popular today than it's ever been; hundreds of thousands of Americans shoot with them regularly. Part of that is because of its rich history, but it's also a reliable and effective revolver in its own right. It might lack the technology of a modern weapon, but it's rugged, powerful and about as American as a gun can get. It helped build this country once, and if the manure really does hit the ventilator, a lot of Colt Peacemakers will play their part in building it again.

Ginger beer

Making Soda the Old-Fashioned Way

Look at the news today and fizzy drinks are making a lot of headlines as the latest fashionable health concern. Excessive consumption of these sugary concoctions is being blamed for obesity and the rise of Type 2 diabetes. This is causing a big debate among scientists and nutritionists, with some laying all the blame on Big Soda and others arguing that it's not so simple.

In fact fizzy drinks aren't exactly a new thing. Soda water was invented in the late 18th century, the Schweppes Company opened in Geneva in 1783 and Coca-Cola has been around since 1886, but even these big names are newcomers. People have been able to buy bottles of carbonated drinks for a little bit more than 200 years, but before that they still drank them – they just made them at home. And far from being an unhealthy option they were seen as the safer option – often literally a life saver.

THE DEADLIEST DRINK?

Today we're all used to clean, safe drinking water whenever we want it – just turn on the faucet. This is something so basic we take it for granted but in fact it's an almost unbelievable luxury. Billions of people in the world don't have this luxury – contaminated drinking water kills over two million people a year – and even in the west it's a quite recent innovation.

Cholera from dirty water was killing people in London, the world's most advanced city, in 1854 and until well into the 20th century many people in rural parts of the USA didn't have a supply of water they could rely on as being safe to drink. Until the mid-19th century nobody knew that it was bacteria that made water unsafe to drink,

but as long ago as the early Middle Ages they had found a safer option. They drank beer instead.

People might not have known what caused disease until the discovery of bacteria but they *did* know that, whatever it was, alcohol killed it. From the end of the Roman Empire through to the early 19th century few people of any social class would drink water if beer was available. Strong beer was brewed for socializing and special occasions, then the barley mash was soaked again and used to brew "small beer" as an everyday drink. Children started drinking small beer as soon as they stopped drinking milk. English diarist Samuel Pepys often wrote of drinking beer with breakfast.

DRUNKEN SAILORS

Sailors were famous consumers of alcohol of all kinds and beer was a daily part of their diet. A voyage on a sailing ship could last a very long time; from England it took five weeks to cross the Atlantic, three months to India, four to Australia or China. A cask of water might start the journey clear and fresh but after a few weeks it would be streaked with green slime – and infested with bacteria and parasites. Water was also carried but the sailors mostly used it for cooking. When they wanted a drink they opted for beer. Kegs of beer stayed fresh much longer than water; the full name of the popular IPA style

is India Pale Ale, and it was specially brewed to survive the long voyage from England to India without spoiling.

The Royal Navy only stopped issuing its sailors a daily rum ration in 1970, when the admirals finally realized that alcohol and guided missiles were a bad idea, and that tradition has its origins in the drinking habits of the Age of Sail. In the 18th century each man's daily beer allowance was a British gallon – over nine and a half US pints. It was small beer, but that's still a formidable amount of alcohol. Later, when the Navy began operating in the Mediterranean and Caribbean, they found that the beer quickly went bad in the heat. The daily gallon was replaced with a half pint of rum; mixed with water it killed the bacteria and made it safe to drink.

BEER GETS BORING

Beer was safer than water, and it also contained nutrients – when the 19th century temperance movement persuaded many poor people to switch to water, the result was an epidemic of malnutrition as the newly sober were deprived of the vitamins contained in their vast beer intake. Not everyone wanted to drink beer every day though, so alternatives were often tried. Sometime in the 18th century someone realized that the fermentation process that made beer could be modified to make other drinks.

Fermented drinks have a long history. The Sumerians had a goddess of beer 4,000 years ago, and wine has been made for 7,500 years. Europeans would try to ferment almost anything and mead, made from honey, was popular with the pre-Roman Celts. All these drinks had significant alcohol content though, and there was a demand for something less intoxicating. What finally emerged were the ancestors of today's soft drinks.

When we think of lemonade we think of a cool, refreshing mix of lemon juice, sugar and water. In the UK and Commonwealth it's different; it's a carbonated drink, similar to Sprite but without the lime, and it's a descendant of the original soft drinks. If you take the basic lemonade ingredients then add yeast, ferment and bottle them what you get is a fizzy, lemon-flavored drink that's less alcoholic than small beer.

That's traditional lemonade – and before long the same techniques were being used to make a range of other fizzy drinks. For a long time the most popular one in the UK was ginger beer, and immigrants brought the recipe to the USA. Its popularity has faded over the years in America but it still hangs on as the main ingredient of the Moscow Mule cocktail.

SPICING IT UP

Ginger originates in China but it's been exported to Europe since Roman times, and has always been a popular flavoring. One reason it caught on was that it could be dried and powdered, which made it easy to ship and relatively cheap to buy. Around the middle of the 18th century someone, probably in Yorkshire, England, thought of adding ginger to their next batch of home-brewed lemonade, and ginger beer was born.

Traditional ginger beer can be quite alcoholic – strengths of up to 7% aren't unknown – but it's usually below 2%. It's also a very refreshing drink, especially in hot weather, and must have made a welcome change from beer. As an added bonus it's very simple to make, and soon many English homes had a big jar of it quietly bubbling away in a corner of the kitchen waiting to be bottled.

In the 18th and 19th centuries home brewing was more than just common; outside the cities it was ubiquitous. Most people in rural

areas made their own small beer, and often stronger brews too. Local taverns brewed their supplies in the cellar but there wasn't a lot of commercial production. Until the Industrial Revolution produced accurate thermometers and hydrometers beer was tricky to make in large quantities. Ginger beer was much simpler though.

AN EASIER BREW

To make ginger beer all you had to do was boil a gallon of water and dissolve a bag of sugar in it, let it cool and stir in lemon juice, ground ginger and yeast. After fermenting for four or five days it can be bottled, and the last stage of fermentation will carbonate it naturally. Traditional ginger beer is extremely bubbly – fizzier than even champagne – so it was traditionally put into heavy glass or stoneware bottles with the corks firmly wired down.

When you're fermenting anything it's always a good idea to cover it with a cloth to keep bacteria or fungi out. Even the cleanest home has some microorganisms floating in the air, and if they land in your ginger beer mix they can multiply rapidly and ruin it. Two centuries ago people didn't know about bacteria though, so they didn't always follow this advice. They might cover their fermenting jar with some gauze to keep flies out but bacteria and spores could get in easily. A lot of spoiled batches got poured out – but then someone had a stroke of luck.

Bacteria usually spoil a brew by either killing the yeast or consuming the sugar it needs to ferment, but not always. Some bacteria can form a symbiotic relationship with the yeast, altering the fermentation process – basically the two work together to do something slightly different from what the yeast would do on its own. In this case a symbiotic bacteria ended up in someone's ginger beer and reacted with yeast (perhaps "wild" yeast from a piece of fresh ginger root rather than the brewer's yeast that was usually added) and formed a symbiotic organism. Whoever the lucky brewer was, when they were

ready to bottle their latest batch they would have noticed something strange in the bottom of the jar.

AN UNUSUAL ORGANISM

Brewer's yeast usually leaves a light brown sediment at the bottom, but this unknown person would have noticed small, soft gray-while granules mixed in with the dead yeast. Obviously they decided to bottle and drink it anyway because they also noticed that this batch tasted better than all the others they'd made – it had a much crisper, more refreshing flavor. It also had a lot more bubbles and less alcohol.

The secret to this superior taste was those little jelly-like granules. They're a mix of yeast and a bacteria, *Brevibacterium vermiforme*, and together they're known as "ginger beer plant". It can be used in place of brewer's yeast and it gives much better results. It has some other advantages too. The granules – actually a substance made by the bacteria half of the colony – hold the yeast and microbes together so they can be easily collected once the batch has been brewed. A quick rinse to wash away any remaining bits of ginger and they're ready to be dropped into the next batch, so there's no need to use more yeast for every fresh brew.

Ginger beer plant also grows slowly. After making three or four jars of ginger beer there will be about twice as much of it as you started with. That means you can divide it up, keep half for your next batch, put the rest in a little jar and give it to someone. It's similar to the way sourdough fans share out bits of their starter, and it spread rapidly.

By the early 19th century a large percentage of homes in England had their own stock of ginger beer plant – and when English emigrants set off to start a new life in America they often took a jar of the organism with them. The process of growing, then sharing, ginger beer plant started again in the USA and in the early 20th century it

was one of the most popular (almost) non-alcoholic drinks, before finally losing out to the factory-made sodas that are more familiar today.

Doing It Yourself

It's still easy to make your own ginger beer at home. Packs of dried ginger beer plant can be found online, and once you have that the recipe is simple. Add half a pound of sugar and the juice of a lemon to two quarts of water, and heat it until the sugar dissolves. Pour it into a large jar and let it cool to room temperature, add half a teaspoon of tartaric acid and a teaspoon of dried ginger and give it a good stir. Finally drop in a tablespoon of ginger beer plant. Cover the jar with a paper towel and leave it somewhere that's around 65°F. Taste it every day; when it's just a bit sweeter than you want (this should take four to six days) bottle it and leave it for another five days. Then put the bottles in the refrigerator to stop it fermenting, and that's it – it's ready to drink. Don't forget to pour through a strainer when you're bottling, to catch the ginger beer plant for the next batch.

The great thing about ginger beer plant is it doesn't just make ginger beer. Starting with the basic mix of sugar and water you can flavor it with almost anything. Make delicious carbonated iced tea, or old-style lemonade. Add some chopped mint leaves to the mix before fermenting for a refreshing summery drink. You can also ferment just about any fruit juice (except pineapple, which doesn't get on with ginger beer plant) – apple juice is a popular option. Just make sure it's raw fruit juice and doesn't contain any preservatives.

Traditional-style fizzy drinks are fun to make and let you experiment with your favorite flavors. They're also healthier than modern commercial ones; they're made with real sugar, not high fructose corn syrup. That usually means they taste better too. It's definitely worth giving it a try. Most ginger beer now is made by adding ginger

flavor to soda water, and it just doesn't taste the same as the old-style fermented version. Proper brewed ginger beer can be found but it's expensive and not that easy to get a hold of, which is a shame – as a thirst quencher on a hot summer day it's hard to beat. With a few simple ingredients you can make an endless supply of it in your kitchen at home, just like your grandparents used to.

How to Make a Water Filter Using Activated Charcoal

In almost any situation, safe drinking water is the number one priority. Without that, it doesn't matter how much food you have stockpiled and how prepared you are to defend your property. If you don't have water you're going to be dead in a week. The problem is that the infrastructure most of us get our water from is terrifyingly vulnerable to a SHTF scenario.

If your water comes from the municipal supply it comes via a treatment plant, and that plant is going to stop working as soon as its staff quit. If society breaks down the water coming out your faucets might look the same, but the chances are it's going to be untreated.

If you have an artesian well you might be lucky, but then you might not. A lot of potential disasters can contaminate the groundwater the well draws from.

A nuclear or chemical attack, or a bad industrial accident, will spread contamination; rain will flush that down into the aquifers. In an SHTF situation you can't rely on any water that hasn't been filtered.

In fact it's worse than that. A lot of chemical contaminants will dissolve in water, so a sand or textile filter won't get them out. What's needed is a filter that doesn't just trap particles, but captures molecules of dangerous substances. The solution is activated charcoal.

Activated charcoal can absorb hundreds of times its own weight of contamination, and the finer it's ground the more it can absorb.

If you can filter your water through activated charcoal almost all chemicals will be removed from it – even the radioactive particles in fallout.

Your active charcoal filter should be one of the final stages in a multi-layer filtration process. You can just run water straight from source

into a charcoal filter if you like, and it'll produce safe water, but you'll go through charcoal a lot faster than you have to.

The filter will quickly get choked up with sediment and debris. It's much better to use gravel and sand to do the basic filtration, clearing out debris and large particles, then run the semi-treated water through the charcoal filter to remove toxic chemicals. Finally, because some bacteria and viruses can make it through, use UV sterilization to kill them. This is simple – just put the filtered water in clear plastic containers and leave it in the sun for a day.

You can buy activated carbon filters, and it's always a good idea to keep a stock of them, but what if the crisis goes on long enough that you run out? Or what if there's very heavy contamination and you need to change them a lot more often? That's when you need to be able to make your own.

The first thing you need is a container that will hold the filter. This needs to be food grade (so it won't add any more contamination to

the water) and large enough that the water's own weight will force it through the filter.

The obvious, and cheap, solution is a plastic drink bottle. Water bottles are fine; soda bottles are better because they tend to be stiffer and more robust - they're built to take pressure.

What you're aiming to do is create a deep enough layer of charcoal for the water to pass through. The quantity of charcoal is important – if there isn't enough its ability to soak up contamination will quickly be used up – but the depth matters too. A ton of activated charcoal in a thin layer will be less effective than a pound of it in a deep column.

Activated charcoal filters don't just trap pieces of contamination the way a cloth or sand filter does; they actually use chemical reactions to remove toxic substances at a molecular level.

That means it's important to keep the water in contact with the charcoal long enough for the reactions to take place, and the easiest way to do that is by creating a deep layer.

If you're using something like a Coke bottle for your filter, there's a simple way to create a deeper layer – just turn the bottle upside down. The narrow neck will give more depth for the same amount of charcoal. At the other end you can either cut away the whole base to make it easy to pour water in, or modify it to suit your water storage system.

If you run water through a sand filter then into a barrel with a tap, you can make a filter that fits onto the tap. If water goes from your sand filter into a pipe you can put the charcoal filter on the end of the pipe.

Once you have a suitable bottle you need to add the actual filter. The key here is to make sure the charcoal is properly contained. If it isn't,

particles of it will be washed out of the filter and into your clean water.

This won't do you any harm, but the filter will slowly lose effectiveness - plus anything you cook with the water will be kind of gritty.

Because you'll be using the smallest particles of charcoal you can, whatever you use to contain it with will need to be a filter itself.

There are two ways to do this:

THE FIRST METHOD

Make a bag from tightly knit fabric and loosely fill it with charcoal.

Then securely close it, either by stitching the top closed or with a tightly knotted cord. Then just put the bag into the bottle through the hole you cut in the base and ram it down tightly into the neck end.

This is quick and easy, but it's not a perfect solution. It should filter the water pretty well, but there's a good chance some of it will be

wicked down through the fabric without ever coming in contact with the charcoal. That means it's possible some contamination could make it through, which obviously isn't good news.

Ideally you want the charcoal to be in contact with the walls of the bottle all the way round. That way there's no way any water can get past it – every drop will have to filter its way through.

THE SECOND METHOD

The first stage is to plug the neck of the bottle so water can get through, but charcoal can't. This is simple – just stuff a cotton ball into the neck, then secure it.

A small piece of cloth held over the mouth of the bottle with a zip tie will do nicely.

Now you have to add the activated charcoal.

Just pour it in the base of the bottle until there's at least three inches of it on top of the cotton, then tap the neck of the bottle on a hard surface to settle it down.

The final stage is to secure the top of the charcoal. Otherwise, when water is poured into the filter the charcoal will be stirred up and mixed with it; the water won't be properly filtered, because it doesn't have to slowly trickle down through the full depth of charcoal.

Again, use a piece of cloth for this. Cut out a circle about an inch wider than the bottle and lay it on top of the charcoal.

Now get a half-inch-wide strip of springy plastic – you can cut this from another bottle – and curl it into a circle.

Place that on top of the cloth and let it uncurl, so it traps the cloth between itself and the sides of the bottle.

Before loading the charcoal into your filter, weigh it. This will give you a good idea how long the filter will last.

An ounce of charcoal should be good for about 100 gallons of water that's already been through a sand filter – so if you used half a pound of charcoal, the filter will purify 800 gallons before it needs to be rebuilt or replaced.

It's worth making at least two filters, and rebuilding used ones as soon as you swap them out, so you'll always have a fresh one ready to do. It's even better to make more than that and have a couple of spares handy.

Of course, you can make as many as you want. You know how to make and activate your own charcoal, so the key ingredient is easily

available and cheap. There's no reason for you ever to run out of safe water!

How to Render Lard and How to Preserve Meat in It Like the Pioneers

In the 19th century, lard was used in American households similarly to butter. It was a cooking and baking staple, a fuel, but also a way to preserve meat.

In 1854 J. Stonesifer of Boonesborogh patented a lamp that specifically used lard as fuel. A screw-driven piston forced lard up into the chamber around the wick, where it burned to form an efficient source of portable light. A tin loop handle with a hole in it was used for hanging.[1]

Lard's popularity decreased during the Industrial Revolution as vegetable oil become more affordable and common.

In the 20th century it was used as a substitute for butter during World War II. By the end of the century, it was considered to be less healthy than vegetable oil, but recent studies suggest otherwise.

Rendered lard can also be used to make soap. It was also applied as a poultice to burns, cuts, and inflamed areas.

It can be used as a balm moisturizing and protecting the skin from chapping and cracking. You can also mix it with beeswax and use it to refurbish and maintain wood and leather.

The best use for lard is for preserving meat. Meat will last up to a year if it's conserved in lard.

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[1] Klebe D., 19th Century Lard Lamp - Early Lighting

How to Render Lard

The first step is preparing the fat. I used the back fat, but leaf fat can also be used. This fat was fresh, so I left it to cure with salt for two days.

Chop the fat into small pieces as equally as you can, about ½" square.

Put them in a pot on medium heat.

Stir every minute or so for the first ten minutes with a wooden spoon and afterwards every five minutes.

It's good to add a little bit of water too so that the fat won't stick to the pan. When it really starts boiling, reduce the heat.

When the lardons turn golden, remove the pot from the heat and wait for five more minutes before clearing away the lardons. They will continue to cook during that time.

If you remove the pot as soon as they are done, the lard will burn and won't be white. It would still taste great however, and you can still use it. I used around four and a half pounds of fat, and I kept it on the heat for about 35–40 minutes. Remove the delicious, crispy lardons with a slotted spoon or with a strainer.

Next filter the lard through a fine-meshed sieve. Place the lard in glass jars or enamel metal containers or pots.

To prevent the jars from breaking, you can either heat them up a little bit before pouring the lard or wait a couple of minutes for the lard to get a little bit cooler. Don't wait too long, however, as it will turn solid, but you can always heat it up again. The metal containers have to be enamel or the lard will go rancid.

Screw the cap of the jar on tightly after the lard is solid.

The lard will last up to a year, or up to two years if the fat is smoked beforehand. The containers have to be placed in a cool, dry, dark place.

PRESERVING MEAT FOR A YEAR WITH LARD

If you want to preserve meat, cut it into pieces and put it into jars. Then pour hot lard over it, making sure you cover the meat and have at least about an inch of clear lard. Wait for the lard to solidify, and then screw on the caps.

You can use it to conserve raw meat, but it will last only about a month. If you want to conserve it up to a year, you have to smoke the meat beforehand for a couple of days. Then you can fry it and place it in the containers, covering it with lard. You can also do the same with homemade sausages.

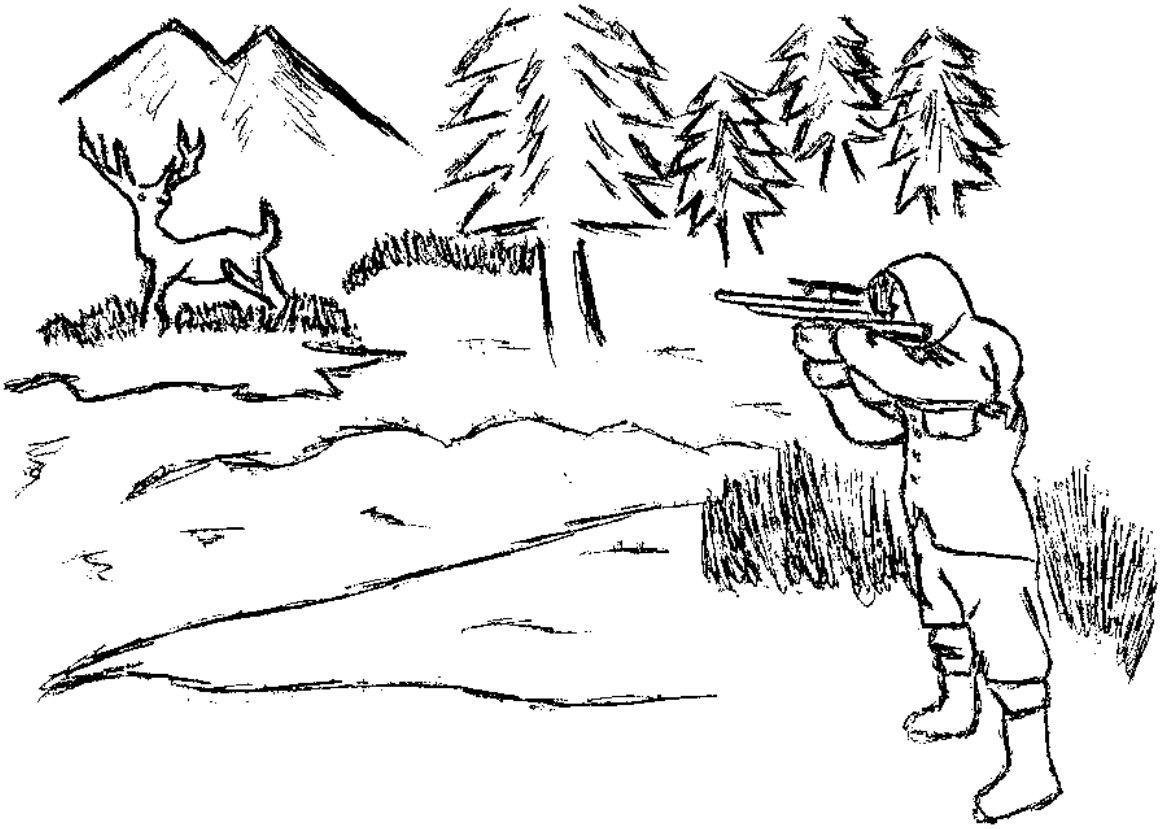
The best way to cook this meat is just to put it in a pan with a spoonful of lard until it's hot. The pieces of meat will be very tender and juicy. Be very careful with this preservation method as the meat usually doesn't last more than a couple of months. The jars or metal containers have to be stored in a cool, dry place.

Deer Hunting Basics and Steps to Hide Tanning

Deer hunting is as old as civilization and provided our ancestors with a source of lean protein as well as material for clothing and shelter. The last 100 years has seen a shift away from hunting deer out of necessity into one of sport and keeping our hunting skills sharp, a tribute to those ancient humans.

It's a stretch even to attempt to cover how to hunt deer in such a small amount of space, but I am going to lay out the basics of deer hunting for those looking to begin a lifelong pursuit.

As I will discuss, the practice of utilizing everything a deer has to offer has seen a renaissance in the hunting world, a trend I hope continues. Everyone knows what to do with the meat, but an often-underutilized part of the deer is the hide. In this chapter, I will also take a look at the steps to correctly tan a whole deer hide.



DEER HUNTING BASICS

We're going to go into this with the assumption that you understand the basic gear involved with deer hunting. You know, the gun or bow and camo.

What I want to outline in this first section are the basics of locating deer, understanding their behavior, and how you go about finding and setting up for a harvest.

What Deer Need

Having a basic understanding of what deer need to survive allows you to make your initial scouting much more efficient.

So, what do deer need to survive?

Water is of course, essential for all living creatures on Earth, deer included. Deer normally do not have large home ranges and generally will stay around a five mile or less radius.

If you can find a water source such as a pond or creek, there is going to be a deer population in the area.

One of the first steps to scouting an area and determining where deer traffic is found is to determine food sources in the area.

If there are crops in the area, you can bet that there will be deer feeding in those areas consistently early in the season and up to rut.

Deer also feed heavily on browse, such as woody plants, as well as mast (nuts and fruits).

All of these foods are going to attract deer and during the early and late season, should be your focus point and branching out from there to find deer.

Deer also need a form of shelter. This often in the form of heavier brush or thickets where they can escape from predators.

These areas are also places deer like to bed down. You will often find deer holding, especially in the colder winter months, on the southeast side of embankments or land rises which protect them from brutal winds.

If you can nail down these three requirements from scouting and maps, you can be confident that you will be in an area that is patrolled by deer.

WHEN DEER MOVE

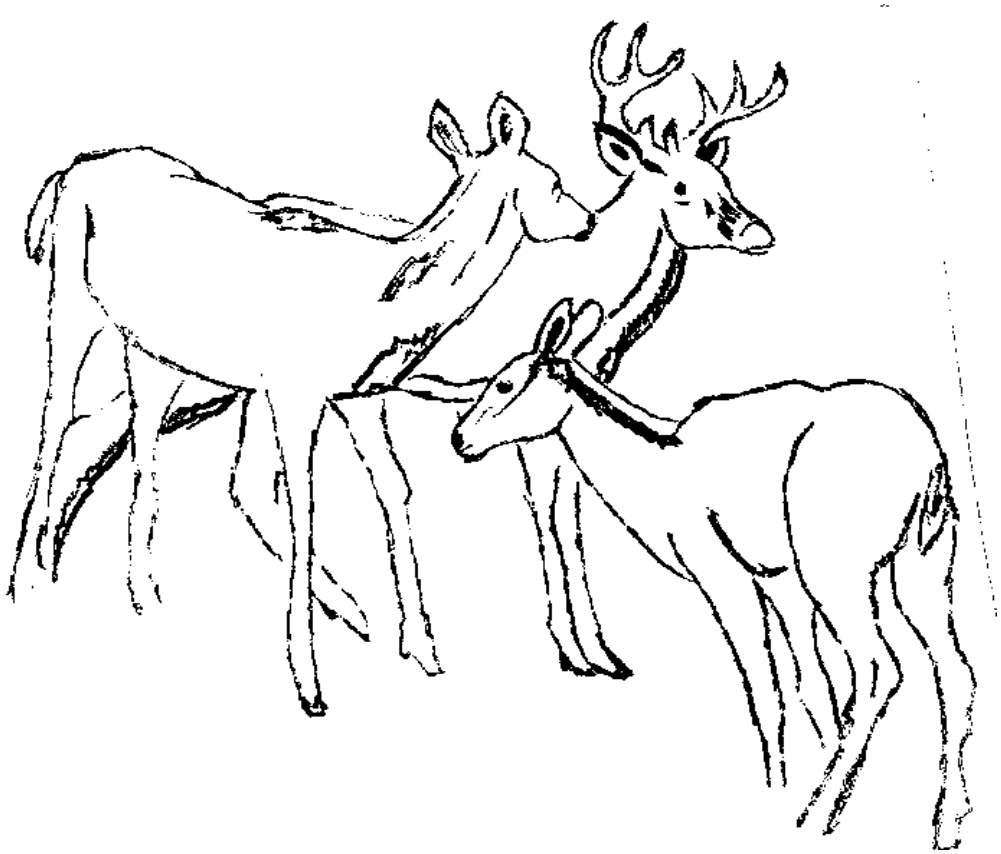
Understanding when deer are the most active allow you to be in the woods during these times. For just about any time during the year, especially during the season, deer are usually going to be more active at night making the best times to hunt them early in the morning, when they are moving back to bed, and late in the afternoon when they are moving to begin eating.

This is not always the case as there have been thousands of deer taken in the middle of the day. Regarding activity though, early daylight hours and the last two hours of shooting light have the highest deer activities.

Things can change during the peak of the deer mating season, the rut, where deer are moving just about at all hours of the day.

The most important aspect is not only understanding when deer are moving but their routes. Deer are creature of habit and will often hold to the same travel lanes if not disturbed.

Scouting before the season and looking for tracks and scat in areas where there is a noticeable path through the woods or vegetation will give you a decent idea of these travel lanes and can be extrapolated to feeding and bedding areas.



Deer Behavior in Different Seasons

Though this is a generalization, for this chapter I can split the normal deer season into three distinct time periods based on how deer are behaving.

Early Season:

During the early season deer are focused on feeding, and they are feeding hard. With scouting and observing deer movements, you can pin down times and locations of deer movement.

Though it's much easier said than done, the early season is the easiest period for predicting when and where the deer are going to be at.

Rut:

I could write a book, and there are several out there, on deer behavior during the rut. Rut often occurs around the first real cold snap and usually ranges around mid-November in most areas.

During this time, bucks are searching hard for does and breeding takes the place of feeding. It's much more difficult to predict deer movements during this time. If you have located rubs and know areas where deer are localizing, you can use estrous scents and even rattling to increase your chances of success.

There will also be periods during the rut where deer activity seems to fall off dramatically. This is because a lot of bucks are bedded down with does and can last for several days. Activity usually picks up back to rut levels shortly after.

Late Season:

After the rut has concluded, usually after two to three weeks, the focus switches back to feeding. Deer are in their worst state of the

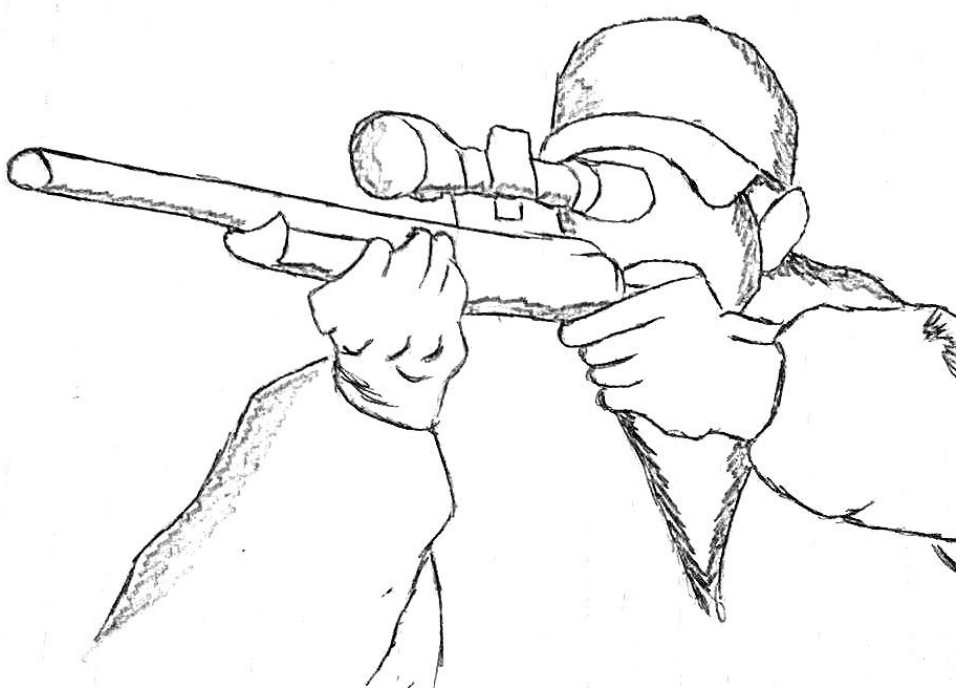
year at this point and are in high need of food after spending the last month breeding.

If there are winter crops in the area, these will be magnets for deer.

Browse is most often the top food source in non-agricultural hunting grounds as well as any leftover mast from earlier in the fall.

How to Set Up

There are several strategies for getting the drop on deer. If you have done your homework and have an idea of the general area deer are in, and their travel lanes, the most common method is an ambush. Setting up a tree stand or blind along these areas with clear shooting lanes and sitting and waiting for the deer to show up.



How close you are to travel lanes or feeding areas is going to depend on your choice of weapon as well. With a rifle or muzzleloader, there

is no reason to be set up in dense growth right over or on a trail where your chances for spooking deer is much greater.

All situations are different, and part of becoming an efficient deer hunter is putting yourself in those positions and having success and failures and learning how to adapt to what is around you and how the deer are behaving.

Scoping or glassing deer from a distance and then positioning yourself for a shot is another popular method and demands more physical fitness and another level of strategy.

This method is great when hunting more open areas that contain changes in elevation where you can view large areas of land. In dense woods, this tactic is much more difficult.

Regardless of the tactics that you choose to go with, there is a level of woodsmanship that goes along with success. You need to keep your sound and scent footprint down to minimum.

Being quiet in the woods just comes with practice, but you can always be cautious with your scent.

Using a scent masker is a good start, but more than anything you need to have yourself positioned downwind of where you expect deer to be.

You can have all the equipment, done all the scouting, and have a fantastic setup, but if you have not accounted for the wind direction and yours and the deer's location, it will all be in vain.

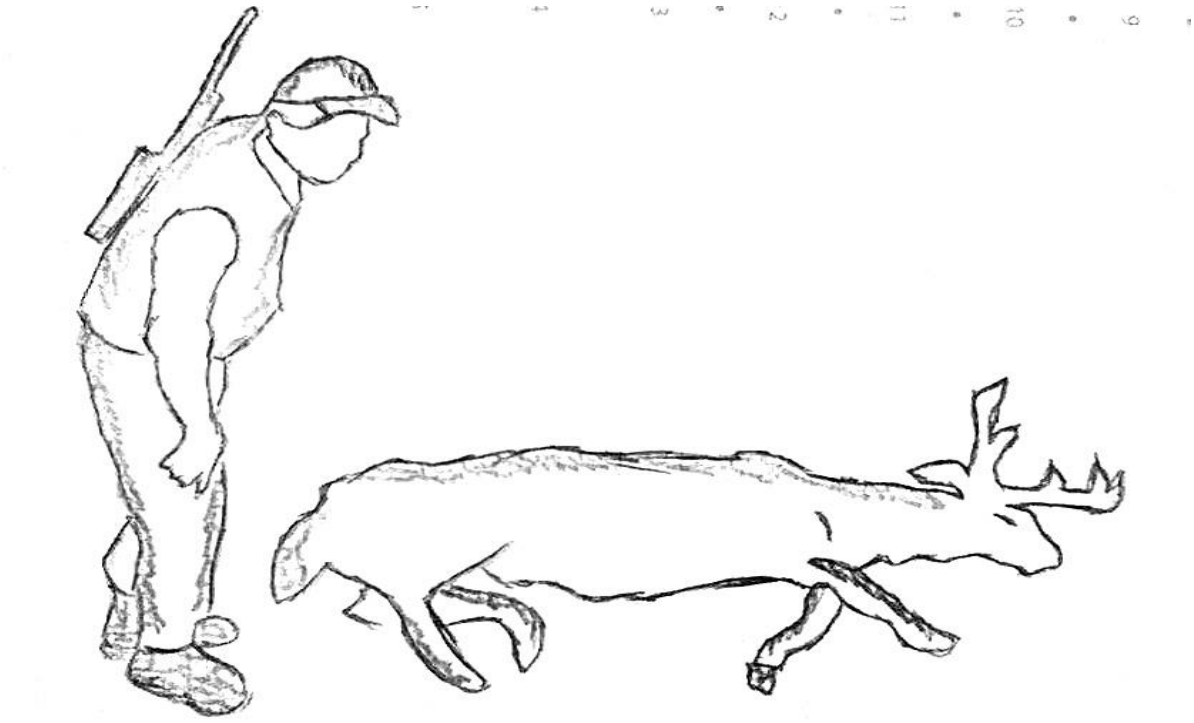
AFTER THE HARVEST/THE HIDE

At the advent of hunting, taking a deer was not just a sport but a means of survival. Too often hunters simply take the animals for the antler rack and neglect such valuable parts of the deer.

I have seen a trend back towards the full utilization of the deer, and I believe it is for the best.

Even with this trend of taking advantage of all of the resources a harvested deer can provide, the hide is still shamefully neglected. Most often the deer hide is used for decorations purposes, but the hide and buckskin can also be used to make wonderfully soft and beautiful garments and pouches if you have or know someone with the requisite skill set.

Tanning your hide is also going to save you a good deal of money compared to farming out the process to others.



TANNING GUIDE: STEP BY STEP

Removing the Hide:

I are going to focus more on the tanning process than the removal, but generally, I like to work with a hide that has been removed from

above the tarsal glands on the back legs to below the jaw. This gives a full hide that can be used for a variety of clothing or decoration purposes.

All cuts should be made on the inside of the body as this will make a better-looking hide in our opinion. You will also need to debone the tail if you want that part of the hide included.

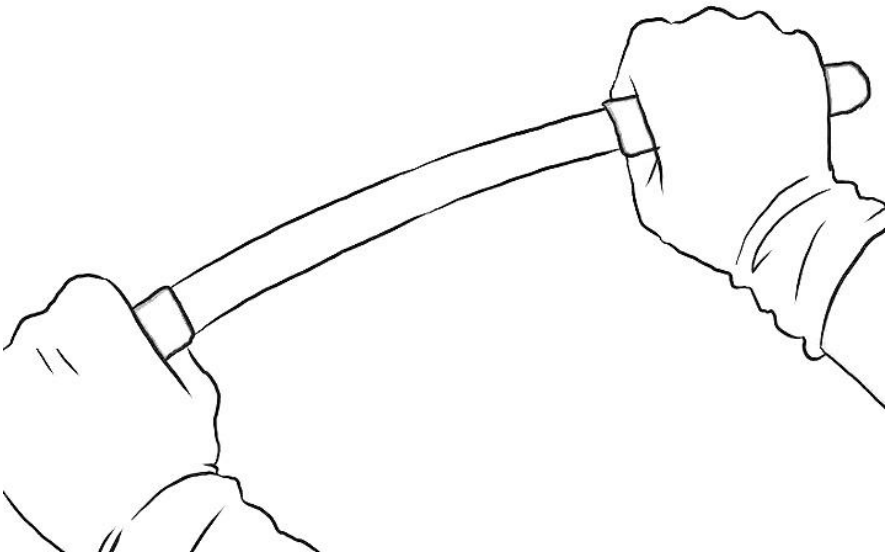
Removing the Flesh:

Once the hide is removed, you will notice that the underside of the hide still has a layer of cartilage and other tissue.

Removing all of this is critical to having a well-preserved hide and makes the tanning process much more effective. I don't like using a sharp knife; it is too easy to cut through or damage the hide.

A duller knife that still has a slight edge is the best tool to use. This process is extensive and time-consuming, but it has to be done to have an evenly tanned hide.

You will notice a white layer of skin, and this is right below the hairline. Be sure to not cut through this layer.



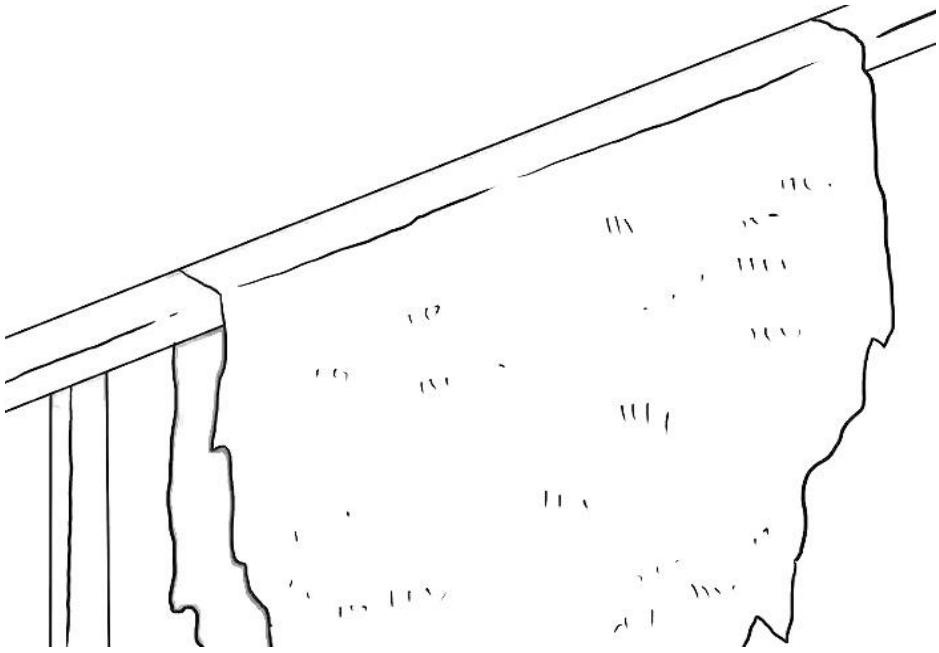
Hair or No Hair:

From here you have two options for the hide. You can keep the hair on or remove the hair to make buckskin. If you want to move forward with the hair intact jump ahead to step 5.

To remove the hair from the hide and make a buckskin, mix 1 gallon of hardwood ashes, 2 pounds of household lime (slaked), and 5 gallons of warm water. Stir the mixture until everything is dissolved.

Completely immerse the deerskin in the mixture. Stir the mixture several times a day until the hair comes off easily. This will take at least 2 to 3 days and maybe a fourth.

Be sure to check every day, keeping the skin in this solution for too long will cause it to deteriorate.



Removing the Hair:

Place the hide on a raised surface with the hair side up. Use the back of a knife to scrape off the hair and then rinse the skin several times with clean water. You then need to soak the hide for 24 hours in a

mixture of 5:1 ratio of water to vinegar. Stir this mixture with the hide in it every few hours.

Once the skin has soaked for 24 hours, soak the hide in the clean water overnight. This step neutralizes and removes the lime and ash mixture and keeps the hide from deteriorating.

Salting:

Once you have the flesh removed and/or removed the hair it's time to salt the hide hard. You can't over salt the hide, so be sure to be generous with it. I like non-iodized salt because it will not cause the hide to stain. What the salt is doing it drying out the moisture from the hide.

Several pounds of salt should be used. Work it into the hide and let the hide sit overnight. From here you can continue with the tanning process or freeze the hide for later work.

Salting also helps loosen up any leftover pieces of tissue so be sure to go through one more round of scraping before moving on.

Cleaning the Hide:

Before I get into the actual process of tanning, you need to wash as much of the salt off the hide as possible.

I like to soak the hide in several gallons of clean water for several hours and then going over the skin side of the hide with the backside of a knife or a similar surface. Having absorbent towels to blot dry is also very effective.

Tanning:

There are some options you have for tanning the hide. There are commercial tanning solutions that are probably the most convenient. Another option is a salt/aluminum alum solution.

The commercial kits often come with directions and usually take 4-5 days of soaking the hide or just rubbing in the solution and letting it sit for several days.

I soak our hides in large trashcans or buckets that will be able to hold at least 8 gallons of water easily.

The most common homemade tanning solution is made from 2.5lbs of salt in 4gallons of water with 1lb of ammonia alum that has been added to 1 gallon of water and is slowly added to the salt solution.

The hide should be stirred several times every day. Some tanners will tell you to refrigerate the soaking hide, but as long as the weather outside is staying under 45°F, it should be fine outdoors as long as it is covered.

Draining the Hide:

This step is especially important if you have to soak the hide for several days rather than let the hide sit with a tanning solution rubbed into it.

When using a soaking method, take out the hide and rinse it gently with water and allow it to drain for an hour.

You do not want it to dry out completely as it is much more difficult to soften the hide in this state. Once you have a moist hide that is not dripping, I like to add some oil or fat liquor into the hide.

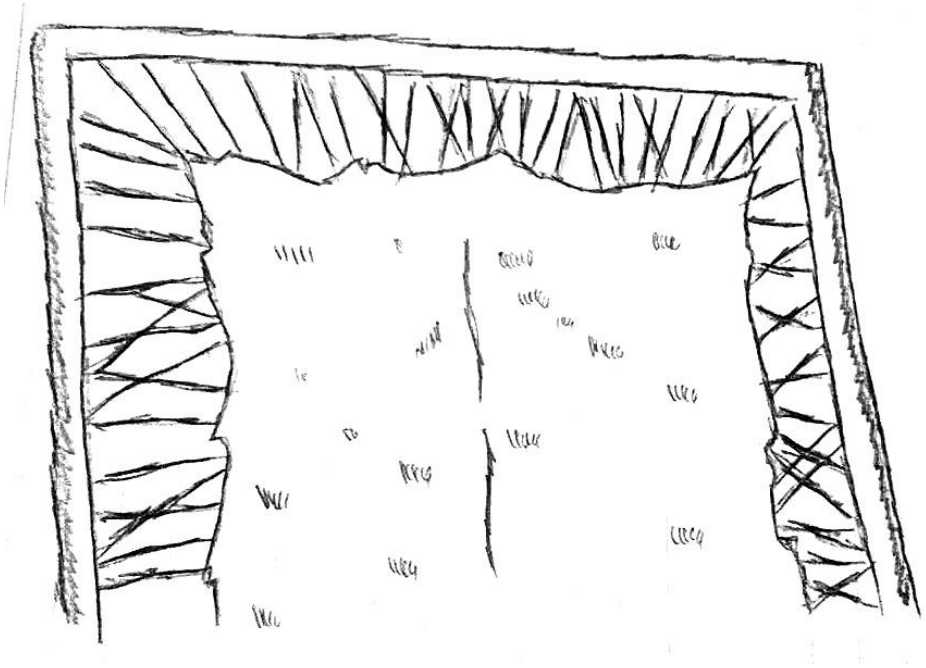
Softening the Hide:

At the end of the tanning process, however, you went about tanning and drying, you're going to have a stiff hide.

My favorite way to work the stiffness out is to use a saw horse, but any line or piece of flat surface you can pull the hide over will work.

As you stretch the hide and work it over the flat surface, you will begin to tell by feel the leather begin to loosen up and have a more subtle feel.

As the hide dries, moisten the skin lightly with a spray bottle of damp cloth and pull the hide back and forth over the sawhorse, dampening the hide as needed, until you have the hide as soft as you want it. During this process, you can also continue to add some oil or fat liquor as needed.



CONCLUSION

Hunting deer is a long process. It begins with scouting the land and studying deer movements, moves to getting boots in the field trying to harvest a deer, and hopefully ends with you utilizing as much of the deer as possible.

There is a plethora of information on deer hunting that is available. This is by no means an in-depth discussion on the intricacies of deer hunting, but I hope that it outlines some of the basic ideas behind the sport and provides a proven and detailed guide on how to utilize on of the most underused part of the deer.

You might find it time-consuming or you might find that it becomes part of the ritual of harvesting deer. Whatever it becomes, I hope you at least try it once.

Efficient Survival Strategies from Real People Who Made It Through the Great Depression

Who isn't worried about the risk of another economic crash? The global financial crisis of 2008 was bad enough, but many fear that it was just an outrider of an even bigger crash to come. The global economy is still shaky, the growth of eastern exporters could damage American industry, and the US government's own bloated spending programs are creating a debt timebomb that no politician has the guts to go near. What's going to happen to our affluent, complex society if a really serious financial crisis hits?

Luckily, history has some lessons here. The Great Depression started in the US stock markets on September 4, 1929 and quickly spread round the world. The global economy shrank by 15% and a quarter of Americans were unemployed. Finance, industry, agriculture… every part of the economy was devastated, and millions were thrown into poverty.

This was a tougher generation, though, and they didn't give up. Instead people used every skill they had to save money, keep themselves fed and slowly rebuild the country. Many of the worst affected were farmers; others were rural people, used to taking advantage of natural resources. They could make many things that we now rely on stores to provide, and that meant they could get by on much less income than the average person today.

If you want to maximize *your* chances of surviving the next financial crisis, a good place to start is by relearning the skills that served people so well in the 1930s. They might seem archaic, even primitive – but they work. If you rediscover the lost ways of our ancestors you'll be able to eat better and more cheaply; you'll know how to cook without running up your utility bills; you'll be able to fix things instead of throwing them away and replacing them; you'll be able to make household essentials from cheap ingredients instead of adding them to your grocery bill.

Most of today's economic threats are 21st century ones. Hacking, identity theft, globalization – they're modern issues. But when the crisis hits its effects on ordinary people will be the same as they've been throughout history; poverty, malnutrition, even homelessness. And if the effects are the same, the old solutions will still work, too. That's what this chapter is all about.

SAVE MONEY ON FOOD

The grocery bill for the average American is more than $75 a week. Even if you follow the USDA's "Thrifty Food Plan" you'll still be handing over more than $50 a week just to keep yourself fed. That's a lot of money – and in an economic crisis it could be money that you just don't have.

With mass unemployment, rising inflation and collapsing government assistance, there's no way you can guarantee you'll be able to buy those groceries.

This is the situation millions of people found themselves in during the Great Depression. Some of them had a choice between keeping a roof over their heads or buying food; some couldn't afford either. Luckily many of them were farmers and rural people, and they knew where to find food that was free for the taking.

That's right – there is free food all around you, if you know where to look. Every part of the USA has a rich variety of edible wild plants that you can harvest and eat without it costing you a penny.

Most people don't forage for food anymore. It's a lot more time-consuming than farming, even if you're just keeping a small plot to keep yourself supplied with fresh vegetables.

In a crisis, though, everything changes. What if you don't have land for a plot, or you've been forced to move and haven't had time to start planting yet? In those conditions, foraging makes a lot of sense.

Foraging isn't difficult and, while it takes time, it doesn't need a lot of strength or skill. Almost anyone can do it – so you can teach your kids to forage for some simple items while you get on with hunting or working in your vegetable plot. Foraging can be done in any spare time you get, giving you an effective way to add to your diet.

Is Foraged Food Worth Eating?

We're used to vegetables that have been selectively bred for hundreds, even thousands, of years for taste and nutritional value, so you might be wondering how wild food compares. Does the energy needed to collect it outweigh the energy and nutrients it contains – basically, is it even worth eating?

Well, some isn't. Grass, for example, isn't worth the bother of collecting. There's a reason cows have complicated digestive systems and spend pretty much all their time eating grass – it's a very low value food, especially if you have a normal human digestive system with only one stomach. No matter how hungry you are, it probably isn't worth expending any energy collecting grass.

There are plenty of wild plants that *are* useful food sources, though, and some of them are very common. Dandelions, for example. To gardeners these are a prolific and notorious weed; hard to get rid of, and growing almost everywhere in huge numbers unless you put a lot of work into eradicating them. But to the resourceful forager they're a valuable food source, and almost every part of the plant can be eaten.

In spring, young dandelion leaves can be used as a salad green; as summer approaches they start to become bitter, but you can boil that taste out of them. The flowers can be dipped in batter and fried – they're great with either salt or syrup.

Late in the year, and through winter, look for dead dandelion plants and dig up the roots below. These can be boiled and eaten as a vegetable.

Chickweed is another common garden pest that grows all across North America.

It grows in patches, and these can be easily trimmed with scissors – the roots will regrow, so you can come back later for another crop.

Flowers, stems and leaves can all be eaten as a salad, or boiled for two minutes and served hot.

One of the most versatile plants of all is the cattail, and it grows virtually anywhere there's a water source. This plant is also called corn dog grass from the shape of its flower heads – they look like a sausage threaded on a stick. It doesn't taste like a corn dog, but this plant has so many uses it's also called "the supermarket of the swamp".

Native Americans used cattails for many things. The fibrous stems can be used to make cords; fluff from inside the flower heads is excellent tinder and can also be used to insulate clothes or stuff pillows. The pollen helps stop bleeding; mashed roots are a great poultice for blisters and infected cuts, and the smoke from burning heads repels insects.

Cattails are also a really good food source all year round. In spring the young shots can be eaten raw, boiled or steamed; they're tasty, rich in vitamins and minerals, and a great source of protein and unsaturated fat. In late spring use the leaves as a salad vegetable.

When summer arrives collect the pollen by putting a bag over the head and giving it a shake. Unlike most plants, cattail pollen can be foraged in large quantities and it's very useful. It can be sprinkled on many foods, used to bulk out flour, or mixed into soups and stews as a thickener.

In fall and winter, dig up cattail beds and collect the roots. These are starchy and nutritious; they contain ten times as much starch as potatoes and can be boiled, steamed or fried. Clean the roots and crush them to separate the starchy flesh from the tough fibers, or boil them and strain out the fibers as the starch breaks down, leaving you with a thick carbohydrate-rich liquid. You can also dry them and pound or grind them into a flour substitute. An acre of cattails will produce over three tons of flour.

Because cattails grow in dense beds it's easy to collect large amounts of food from them. If you have a river or marshy area nearby get down there with a knife, shovel and collecting bucket, and start foraging!

BAKE YOUR OWN BREAD

Bread is a staple food – but it's not a cheap one. Generic white bread will cost you at least a dollar for a 20oz loaf, and what you get for that dollar is not, to put it mildly, great bread. If you want anything better than basic sliced white you're quickly into the region of three or four dollars for a loaf. Bread is expensive.

But it doesn't have to be. A 20oz loaf has under a pound of flour in it – and all-purpose flour costs less than $3.50 for a ten-pound bag. Most of the rest, by weight, is water. So the basic ingredients for bread are actually pretty cheap, and if you know how to bake your own you can save a significant percentage of your weekly grocery bill. Flour can be stored for a lot longer than bread, too, so you can save even more money by buying it in bulk.

Just two or three generations ago many people most people made their own bread, but most of us have lost the habit. Making bread doesn't take that much time, and in any case, in a financial crisis time is easier to spare than money. Once you master home baking you'll be able to have fresh bread every day for a fraction of the supermarket price – and home-baked bread is a lot tastier than a cheap processed loaf, too.

There are plenty ways to make bread, and the biggest differences between them are how the bread is made to rise. There are plenty ways to do that too; for example, you can add eggs to the dough. The most common way, however, is to use yeast or another active substance that releases gas and aerates the dough. Baker's yeast is easy to find and not very expensive, but it has a limited life – and, in a real crisis, you might not be able to guarantee a supply of it. Luckily there's an alternative.

Yeast has been vital to humans for thousands of years – you can't make beer without it, for example – but we've only really known what it was since the middle of the 19th century. Commercially available yeast has only been around since the 1870s. So how did we manage to make bread – and beer – before we understood what the key ingredient was?

There's a simple answer – we did it by accident. Now, bakers and brewers use carefully selected strains of yeast, but there are also wild yeast and most of them will work fine for either baking or brewing. Wild yeast can be found on the skins of fruit, they live in the soil and they're carried around by insects. They also drift around in the air, so if you leave any food exposed to the air for a while, soon enough yeast are going to land on it.

If you look at the German *Reinheitsgebot* – the famous Beer Purity Law – you'll notice something odd. It says that the only three ingredients you're allowed to put in beer are barley, hops and water.

It doesn't mention yeast, but without yeast to ferment it, it's impossible to make beer. The *Reinheitsgebot* was written in 1516 though, and nobody had heard of yeast. So, they just mixed water, barley and hops, and left it to ferment. And it did – because wild yeast landed in the huge open tubs, grew, reproduced, and fermented the beer.

For most of history, the most common way to make bread used a smaller-scale version of this. Bakers noticed that if they left a mix of flour and water exposed to the air for a while it started to form bubbles. If the bubbling mix was added to dough, the bread would rise perfectly; without the mix it stayed flat.

That bubbling blend of flour and water is a sourdough starter. It collects wild yeast from the air and starts the fermentation process, and if you mix it into dough it releases bubbles of carbon dioxide that raise and lighten the bread. Sourdough bread keeps better than commercial processed stuff, it tastes better, and it's easy to make. Best of all, as long as you have flour and water you can make a sourdough starter, so you'll never have to rely on being able to buy yeast again.

MAKING A STARTER

To get your starter going you only need four things:

- A glass bowl or wide-mouthed jar
- Water – filter it, or use water from a well or spring. The chemicals in tap water can kill wild yeast

- Flour
- Cheesecloth

Pour half a cup of water into the bowl and gradually add half a cup of flour, stirring constantly. Mix it well until it feels like thick pancake batter. Now cover the bowl with cheesecloth. This will keep dust and insects out, but the tiny yeast organisms will be able to get through.

Leave the bowl on a counter or on top of the fridge for up to 24 hours, to make sure it picks up wild yeast. Somewhere with a constant temperature of about 70-75°F is best. Then feed it by mixing in another half cup each of water and flour. By this time you'll probably see a few bubbles starting to form. Keep feeding it daily for the next few days. When it's foaming and looking lively, it's ready to use. You'll also be able to pick up a sour, vinegary smell.

Your starter will need to be constantly fed, or the yeast will eat all the carbohydrates in the flour and eventually starve to death. This is one of the great things about sourdough – the starter constantly grows itself, so once you have it going you'll never run out. If it starts to outgrow its container you can just split it in half and either throw half away or gift it to someone, so they can start making their own delicious bread.

Once the starter is ready to use, making bread is easy. Here's a simple recipe using basic ingredients:

- 3 cups all-purpose flour
- 1 tablespoon sugar or molasses
- 1 teaspoon salt
- 1/2 cup warm water
- 1 ¼ cups sourdough starter

Mix all the ingredients thoroughly and knead into a stiff dough, After eight to ten minutes of kneading, put it in a greased bread tin or shape it on a baking sheet. Cover it with a damp towel, put a dry towel over that, then leave it to rise until it's doubled in volume. This takes longer with sourdough – twelve hours, at least, and sometimes up to a full day. To check if it's ready, gently press the dough; if it dents, it's ready to bake. Now just put it in an oven at 350°F and bake for about 40 minutes, or until the top is golden brown. And there you are – tasty, and very cheap, home-made bread.

COOK EFFICIENTLY

Modern cooking appliances are great – but they use a *lot* of energy. If your ancestors knew how much you spend on gas and electricity for your kitchen they'd be appalled. People a few generations ago were much more concerned with saving fuel, because they had to collect most of it themselves, and that went double during the Great Depression. Most of the fuel they did use went on cooking, so they were very good at finding efficient ways to do it. A lot of these techniques can be very valuable if you're trying to save money during the next financial crisis.

One way you can save on energy bills is to cook over an open fire. If you don't already have a wood stove to provide heat in the winter, but there's timber on your property or nearby that can be cut for wood, you're missing out on a great renewable fuel supply. Make use of it

by setting up an outdoor fireplace and using it for cooking. This isn't just a good way to save money on gas and electricity; it's also the core of your survival kitchen if there's a major collapse and the utilities stop working.

You can do a lot with a well-designed fireplace; we're not talking wieners and s'mores here. Easy options are to set up a grill on it, and a spit for cooking meat – this is the most satisfying way to cook game you harvest. A heavy steel box at the edge of the fireplace will let you bake, and of course you can set up pot stands as well. Get a good bed of hardwood embers and you can cook practically anything on a fire.

For open fire cooking, look for old cast iron cookware at yard sales or on ebay. Iron pots and skillets are most effective at using the heat from a fire, and they also last forever if you care for them properly. In particular, look for the biggest iron Dutch oven you can find. Once you get it clean it up, season it properly, and get ready to be amazed at what you can do with it.

A proper Dutch oven has feet cast on the bottom and a deep rim round the lid. That's so you can stand it in a bed of embers, spread more embers over the lid, and let the food inside soak up heat from all directions. They're great for cooking soup, stew, spaghetti sauce or chilli. You can make fantastic cornbread in one, or line the base with pastry and make a pie. You can even bake regular bread, too. It's a combination pot and oven, and ideal for using over an open fire.

Dutch ovens are also ideal for slow-cooking economically. You can do that on quite a small fire, too. Just build a fire a bit bigger than the diameter of the oven, let it burn down, place the oven in the embers, then steadily feed it just enough wood to keep it alive. You can keep a fire going for hours that way without using too much wood. The benefit of slow cooking is that you can turn tougher – and cheaper – cuts of meat tender, which is also going to save you money. The same goes for dehydrated meat and vegetables; cook them slowly and you'll get great results. A Dutch oven sitting in the fire will also get on with cooking stews while you do other things. Just throw whatever meat and vegetables you have handy into the oven. Add water and seasonings, and let it simmer slowly most of the day. By dinner time you'll have a delicious, rich stew.

CHARCOAL, THE MIRACLE SUBSTANCE

Imagine a substance that can purify water so it's cleaner than what comes out of the tap, cure upset stomachs, burn hotter than wood or coal, and kick-start a metalworking industry – but doesn't cost anything more than a bit of time to make. Well, there's no need to imagine it; that substance is charcoal.

Most people think charcoal is those little briquettes that come from the gas station in a paper sack. It isn't; those are just compressed carbonized sawdust with a bit of clay or lime to bind it together. Proper charcoal is wood that's been heated for a long time, but not fed the oxygen it needs to burn. All the liquid and volatile chemicals are forced out of it, leaving a mass of nearly pure carbon. Charcoal can be used to generate intense heat – enough to smelt iron ore or work metal on a forge – and it creates a steadier heat than wood; it's ideal for baking. It can be chemically activated to become one of the most effective filter materials in existence. And you can make it in your yard.

The industrial way to make charcoal is to seal wood inside an airtight steel container called a retort, then heat it to very high temperatures for hours (sometimes days). That's great if you have the equipment and a lot of fuel, but it's not much use if you're trying to make charcoal cheaply. Instead, you want to use the traditional method.

If you pile up a lot of wood and set fire to it, you get a pile of ash. But what happens if, as soon as the fire has a good hold, you seal it in and shut off most of the air? The fire doesn't go out; it keeps burning slowly, but without a steady flow of oxygen most of the wood can't burn. Instead, it's heated intensely and the water and volatile compounds in it start to boil off. Eventually you're left with charcoal.

The traditional way to make charcoal isn't as efficient as using a retort, but it doesn't need any expensive equipment and the whole process runs on wood – it's both the raw material for your charcoal,

and the fuel that converts it. What you need to do is set up a small fire (don't light it yet) then build a tightly packed stack of firewood around it, leaving a tunnel into the kindling in the center. Cover the stack with a layer of turf, then a layer of soil, leaving a hole at the top. This kind of sealed fire is traditionally called a clamp.

Now make a torch by wrapping oily rags round one end of a stick, light it, and push it into the tunnel. When the fire has caught well, fill the tunnel with firewood and seal the end with turf and soil. Watch the smoke coming out the top hole until it turns to clear blue, showing that the wood is dry. Now seal that too.

Watch the clamp to make sure the fire doesn't break out through the soil covering. If it does, the whole thing can quickly burn to ash – it will be *very* hot inside, and if air gets in it can flare up dramatically. If smoke starts escaping, quickly seal the spot with a shovelful of soil – if smoke can get out, air can get in.

How long a clamp burns for depends on its size. Commercial burners used to make clamps as large as thirty feet wide and ten feet high, and they could burn for a week. The smallest one you can make has about ten pounds of wood and will go for four or five hours. Once you haven't seen any smoke appearing for an hour, carefully open a small gap in the covering. If there's a lot of smoke, or you hear wood starting to burn, seal it again; if not you can start taking it apart. Remove the covering, scatter the charcoal on a hard surface and damp it down slightly to make sure it doesn't catch fire. Then just let it cool, sort out any ash and chunks of unburned wood, and that's it – you have charcoal.

Once the charcoal is cool, sort out the smallest, cleanest bits – look for chunks that have no ash or unburned wood, and are pure black. Put these aside to be made into activated charcoal. Break the rest up into convenient-sized chunks, let it dry, then use it for grilling, baking or metalworking. Natural charcoal takes a bit more effort to light than

the stuff you buy, but it burns more cleanly and doesn't contain any toxic chemicals.

The best charcoal can be activated. This is a chemical process that increases the surface area by covering it with tiny pits and cracks. You can do that with high pressure steam, but an easier method uses calcium chloride. This is a useful chemical for all sorts of reasons; it's good for preserving meat and canned vegetables, for example.

To activate charcoal with it, the first thing to do is grind the charcoal roughly. Then mix equal weights of charcoal and calcium chloride and, using a coffee grinder or mortar and pestle, grind the whole lot to a fine powder. Put it in a glass bowl, then add three times as much water as the amount of calcium chloride you used and mix it well.

What happens now is that the water reacts with the calcium chloride to produce heat. Because you ground it together the charcoal has tiny particles of calcium chloride impregnated into it, and the heat causes stress that splits and cracks the surface of the charcoal. That increases its total surface area many times.

Once the mixture cools put it in a filter made of finely woven cloth and rinse it well. Then let it dry. The water you rinse it with will be black; run that through a coffee filter, because the black color is the finest (and most powerful) particles of charcoal. Dry that too, and save it for making charcoal pills – these are good for treating stomach upsets, and even poisoning.

Activated charcoal is so powerful because it's extremely good at trapping and absorbing chemicals. This makes it perfect for making water filters that will get rid of disease organisms and pollution, or gas mask filters that can eliminate most dangers – including chemical warfare agents.

Being able to make charcoal is pretty much essential if you want to rebuild society after a major collapse; without charcoal there won't

be any blacksmithing, iron smelting or metal casting. But it's also a good way to save money in an economic crisis.

Home-made activated charcoal water filters cost pennies, but are as effective as expensive commercial ones; you can access limitless purified drinking water for a couple of dollars a year. Just about any water source can be made safe with these filters, so there's no need to waste money on bottled water.

If you suffer from wind or indigestion you can stop spending money on Tums. Just get a bag of empty capsules from your pharmacist (they cost practically nothing) and fill them with activated charcoal. When you swallow them the charcoal absorbs stomach acid and relieves the symptoms.

Charcoal is one of the main ingredients of black powder, so if you can also find sulfur and saltpetre you can use it to reload ammunition. Many modern firearms won't work effectively with black powder but shotguns will, and most revolvers and bolt-action rifles will work pretty well – just remember that muzzle velocity will be a bit lower, and be extra careful to clean the bore, because the residue is corrosive.

Charcoal is a simple substance that's easy to make from cheap raw materials, but it can be used to replace a lot of more expensive things you use. That makes it an effective tool to reduce the amount of money you spend, and saving money is always valuable in a financial crisis.

PRESERVE YOUR OWN MEAT

The more processing meat gets, the more it costs when you pick it up in your local store – and no meat from a store is going to be cheaper than buying half a pig at the farm gate. Of course, if you raise your own pigs that's going to be even cheaper. The problem is, how fast can you eat half a pig? Unless you want to spend money keeping a big freezer running, you're going to have to start thinking about preserving the meat for long-term storage.

During the Great Depression, a freezer was an unimaginable luxury for rural Americans – but livestock still had to be slaughtered, and the meat had to last them through the winter. Luckily they had a whole assortment of tricks to preserve it for months. You can use exactly the same traditional methods to preserve meat without using electricity.

One of the simplest ways to preserve meat is to cure it with salt. Salt's a natural preservative, and it can keep meet safe to eat for a *very* long time – in the age of sail, ships would set off on voyages lasting years with a hold full of salt beef and pork. When salt meat is needed, all you have to do is soak the excess salt from it. It's perfect for making soups and stews.

Any kind of meat can be salted, even the risky ones like pork and poultry; just make sure it's as fresh as possible when you start the process. Cut the meat into pieces – small game like rabbits can be salted whole. Next, get a large container – a plastic crate works fine,

as long as it's watertight. Put an inch of salt in the bottom of it. Next, put the meat into the container one piece at a time and rub each piece with the salt. Make sure you do this as thoroughly as possible. When each piece has been rubbed, stack it in the container. You should finish up with some salt left in the bottom, so add more if you need to. Don't stack the meat too deep – two or three layers is fine.

Now cover the container to keep insects out and put it somewhere cool. A root cellar is ideal, or you can do your salting in fall or winter. Around 43-46°F works well. Now let it sit for a couple of days. The salt will draw juices out of the meat, and that will collect in the container. After about two days use the juice to wash the salt off the meat. Then wash and dry the container, and salt the meat again. This time you should salt it heavily enough that the meat's almost hidden.

Leave the meat in the salt for about two weeks, turning it twice a day, then wash it off with its own juice again. Then you need to make a curing broth. The basic ingredients of this are water and brown sugar, but to give the meat more flavour you can season the broth as heavily as you like. Add the sugar and the juice from the meat to the water, along with any seasonings, then boil it for half an hour and let it cool. Then add the meat to it. To check there's enough salt in the broth, drop in a fresh egg; it should be about half submerged. If there's less than half showing, or it sinks, stir in more salt until half the egg is above the surface.

Now leave the meat in the broth for two more weeks. After that, take it out, let it drain, then store it in a dry, well-aired place until it's needed – again, a root cellar is perfect. If necessary, make a cheesecloth cover to keep insects off. The meat should last for up to a year. To use it simply soak it in fresh water for 24 hours, changing the water three or four times, then it's ready to go.

Another classic meat preservation method uses simple lard. Lard is another substance that has lots of uses, from lamp fuel to butter

substitute to raw material for soap, but one of the least known ones is as a meat preservative.

You can render your own lard from pork back fat – simply cut it into half-inch cubes and render them down in a heavy pan over a medium heat. When the pan fills up with boiling fat and the cubes start to turn crispy and golden, take it off the heat and leave it for five minutes. Then strain out the cubes – these are called lardons, and they're delicious – then filter the fat, and pour it into heated glass jars or enameled metal containers. Let it cool and solidify, and there you go – you've made lard.

Raw meat can be preserved with lard for about a month; just cut it into chunks, put it in a jar then pour hot lard over the top. Pour in enough to cover the meat completely, plus at least another inch. If you use exactly the same technique with smoked meat or sausages it will last up to a year, if you seal the jars tightly and store them in a cool, dry place. A side benefit is that meat preserved this way is very tender, and comes with the fat you need to cook it in!

Another way to preserve meat with rendered fat is to make pemmican. This works best with red meat, like beef or deer. First, cut the meat into thin strips and dehydrate them at a temperature of under 120°F – higher temperatures will destroy many of the nutrients in the meat. When it's as dry as possible (it should weigh about a third of what it did at the start) pound or grind it thoroughly then mix it with

an equal weight of rendered beef tallow. Finally, split it into portions and bag them, or press it into cupcake molds, and let it cool. You'll end up with a solid, energy-dense meat product that can be stored for months or even years.

MAKE YOUR OWN HOUSEHOLD PRODUCTS

Look at your grocery bill and see how much of it goes on non-food items. You'll probably be surprised at how much you spend on personal and household cleaning products, among other things. The good news is that you can make a lot of them yourself, from cheap ingredients, and free up your cash for more important things.

One product we all buy, but that our fairly recent ancestors made themselves, is soap. Is that worth making yourself? You probably don't spend that much on soap; a bar of it doesn't cost a lot and lasts for a few weeks. Isn't making your own going to take more time and effort than it's worth?

No, it isn't. A lot of other products you buy are, basically, soap. Shampoo, shower gel, dish soap, laundry detergent, shaving cream and many household cleaners – they're all variants on soap, and they can all be *replaced* with soap. Plain soap might take a bit more effort than some specialized cleaners but it will still get the job done, and it's a lot cheaper.

Soap is easy to make; you just need fat and lye. Traditionally lard or beef tallow was used, and processed with lye made by filtering rainwater through hardwood ash. That's always an option, but you

can also buy the ingredients. That has the advantage of being more consistent, and while it does cost a bit more it's still a lot cheaper than buying soap-based products.

Basic soap is very simple to make. You only need three ingredients:

- 48oz oil (olive or canola are both fine)
- 15.5oz cold water
- 6.1oz lye crystals

Getting the proportions right is important, otherwise your soap will either be caustic or won't set (caustic soap is great for tough degreasing jobs, so if you do end up with some it's not a disaster). A set of accurate electronic scales will help you out here. You'll also need glass or metal containers, a metal pot, thermometer and some basic protective gear to protect against splashes of lye.

Start by putting the water in a glass bowl or jar, then adding the lye to it – never add water to lye, as it can explode. Add lye a bit at a time and stir thoroughly, then add some more. It'll start to fume; let the gas evaporate before the next step.

Measure out your oil and heat it to around 130°F. You want it at 110°F, so by the time you've collected the lye it should have cooled down to the right temperature. Now pour the lye into the oil, stirring constantly. Keep stirring until the mix is thick enough that you can draw on its surface.

Now pour the mixture into molds. Small Tupperware boxes are ideal for this. You can line them with food wrap first, to make the soap easier to remove, but it isn't really necessary. Seal the molds and wrap them in a towel, to let them cool slowly, then leave them for a day to set. Finally, remove the blocks of soap and cut them into conveniently sized slices with a cleaver. You can leave them to dry for a couple of weeks – that isn't really necessary either, but you'll end up with firmer soap.

A big part of coping with a financial crisis is repairing things instead of replacing them. If you look at pictures from the Great Depression era you'll see the evidence of that – people wore patched clothes and repaired shoes. They fixed up their homes with scrap wood. Everything that broke or wore out was either repaired, repurposed or cannibalized for useful materials. Nothing was wasted.

The trouble is that a lot of repairs need glue, and while modern glues are great, they're also expensive. Even a simple glue stick costs a couple of dollars, and that isn't even very strong. A lot of the time it really is cheaper to replace things, once you've figured in the cost of the glue you need to fix them.

On the other hand, what if you could make glue from natural ingredients? Good news – you can. All you need is pine resin and charcoal, and both of these are free. Collect pine resin by tying a can or bucket to a pine tree then cutting V-shaped grooves in the bark above it. The rate resin collects in the can will depend on the time of year, but you can tap as many trees as you like to speed up production. Collected resin will harden; just break it up into lumps.

While you're waiting for resin to collect in your buckets, make some charcoal and crush it to powder. This will act as a binder.

When you have enough resin, put the chunks in a tin and heat it over a fire or stove; make sure it doesn't overheat and burn. Heat it until it melts and thins out, then filter it through a fairly large mesh to get rid of any pine needles and bits of bark – do this quickly, or it will harden on the strainer. Finally, heat it up again then stir in one part

charcoal to two parts resin by volume. Mix it in thoroughly, then pour the mixture into metal containers and let it cool.

This glue is versatile and surprisingly strong. To use it, just heat the container until the glue melts; then use it to stick practically anything together and just let it cool. Prepare smooth surfaces with sandpaper first, if you can – but it will still bond pretty well even on smooth glass.

CONCLUSION

We've had plenty of economic crashes – and the 2008 crisis was bad – but *nothing* in living memory compares to the Great Depression. The USA has never experienced anything like it before or since; nearly 90 years later it's still one of the most traumatic events of the past century.

But, despite the severity of the Depression, the people who had to live through it generally coped very well. They adapted, eliminated waste from their lives, and used their practical skills to supplement whatever money and resources they had. It was a tough time for them, but in general they survived – and then they went on to fight and win the worst war in history and kick-start the USA's post-war economic growth.

If we can learn to cope with hardship as well as the survivors of the Great Depression did, we'll be able to get through almost anything life can throw at us. A big part of that is having the skills to replace things we buy with things we can make ourselves. Once you can do that, you'll find yourself spending a lot less on "essentials" – and that can make all the difference between getting by and going under.

75 Obsolete Things That Will Be Essential Again

During the Cold War everyone's greatest fear was of the carnage that would be caused by a thermonuclear war. That danger hasn't gone away, but it's certainly subsided. Of the four countries capable of launching a major nuclear attack on the USA, two – the UK and France – are allies. China is too locked into the US economy to contemplate a war, and while Russia is the only potential opponent that has the nuclear firepower to destroy the USA, they know that the retaliatory strike would destroy *them* just as thoroughly. The risk of a major nuclear war is as low as it's been any time since the 1950s.

Unfortunately, there are other ways to use a nuclear weapon, and some of *those* risks have increased sharply. Nuclear terrorism is one of the current nightmare scenarios – just imagine the devastation if extremists managed to smuggle a nuclear weapon into a major city and set it off. Luckily, it's still not easy to make a nuclear weapon, and even harder to get hold of a working one. There was a scary period in the mid-1990s, as the wreckage of the USSR collapsed and nobody was quite sure where all its warheads had gone, but that risk is over now. A nuclear terror attack *could* happen, but it's still not very likely.

The *real* risk is an intermediate-level attack – something that's too big for a terrorist group to pull off, but still short of full-scale nuclear war. This is much more likely to happen, because a rogue state might just think it could get away with it. And, if they're smart about how they set up and carry out the attack, they could even be right. The scenario that gives an attacker the best chance of getting away with it is an EMP attack.

Even the craziest dictator knows that if he launches an ICBM at an American city there's going to be a counterstrike that will incinerate his country. It's impossible to win a nuclear exchange with the USA; unless you're Russia, in which case you can expect a messy draw, the only question is how badly you're going to lose. Dictators don't

want to lose, because even if they survive the counterstrike the chances are they're going to be killed by the remains of their own people. That means they'll do everything they can to avoid retaliation.

An EMP weapon is probably the best chance anyone has of hitting the USA and getting away with it. For starters, you don't need many weapons. There's no way to hide where a full-scale strike is coming from, but if you only need to launch three or four missiles to cripple most of the country, that's a lot easier. A handful of SCUD missiles fired from hijacked cargo ships off the coasts would do the job. It could take a long time before the government could be sure who was to blame. They might never know.

Even if the USA *did* find out who was responsible, it might be politically difficult to launch a nuclear strike in retaliation. After all, an EMP wouldn't directly kill anyone – the weapons would go off far too high for any physical effects to reach the ground. They wouldn't explode on US soil, or even in US airspace; national airspace extends to a height of 50 miles, but EMP weapons detonate 300 miles up or even higher. Legally, an EMP going off 350 miles above the USA wouldn't be an attack. It would violate treaties about nuclear weapons in space, but that's about all.

Because space doesn't belong to any country, there's a lot of potential to create confusion. What if the attacker claimed they'd just launched a nuclear-powered satellite and something had gone wrong? It's not likely anyone would really believe them, but it might just create enough doubt to deter a US response.

There's one final reason the USA might not fire back after an EMP attack – it could be impossible. The US nuclear arsenal is the most secure in the world, with multiple layers of fail-safe systems built in. Every missile silo, every Trident submarine and every strategic bomber is fitted with a Permissive Action Link. Unless the PAL is unlocked with a code sent out by the commander in chief, the

strategic units can't launch their weapons or even arm the warheads – the arming and firing circuits are all routed through the PAL, and until the right code is entered none of them will work.

Fail-safe means exactly what it sounds like – if the USA's strategic command systems fail, it defaults to the safe option. Britain and Russia are vaguer about how their nuclear forces operate, but both have hinted that they might have a fail-*deadly* system. American missile submarines will only launch if they get an authenticated message telling them to do it; British and Russian ones might fire if their commanders stop telling them *not* to. That makes attacking them a gamble; even the most successful surprise attack could trigger a nuclear response. But a surprise attack on a fail-safe system *can* prevent retaliation, and an EMP is one way to do that.

The US fail-safe system relies on a lot of electronics, from the computers and radios that send out the unlock codes to the PAL itself. Most of those electronics have been tested against simulated EMP, but there's no guarantee they'll survive a *real* one – and if they don't, the USA can't launch any nuclear weapons. It would take weeks, maybe months, to modify the warheads to activate without an active PAL, and who knows what the enemy would do in that time?

So an EMP attack is attractive because it's deniable and there's a good chance of getting away with it, but also because it has the potential to cause huge destruction. EMP has been understood since early in the atomic age but it was always seen as a minor effect of nuclear weapons – a nuisance, but not as important as heat and blast. Most military equipment built before about 1993 was hardened against EMP, usually by using older or simpler technology where possible and protecting everything else inside Faraday cages. The rest of society was on its own, but it could survive pretty well anyway.

If the USA had been hit with an EMP attack in the last years of the Cold War it would have been bad news, for sure, but not a disaster.

TVs and entertainment systems would have been wiped out, but essential utilities were robust enough to cope. A big EMP can bring down power lines but most power stations could have been brought back on line by resetting a few circuit breakers. Cars would have kept running, and most businesses weren't computerized enough to be severely damaged. The country would have survived.

Just imagine the consequences now. Most of our data is stored on computer, and nowhere else. Your bank doesn't have a paper record of how much money's in your account, and its computers aren't hardened against EMP. Neither are your doctor's, and he probably doesn't have paper records either. All your utilities rely on computerized control systems, and they're not hardened either. Even stop lights rely on computers to run – but that doesn't matter much, because the engine management systems in any modern car will be fried by the pulse.

Our society and economy could have survived an EMP attack in 1990, but they can't now. If someone can fire three or four nuclear warheads at high altitude over the USA, everything is going to crash. The power will go off; for most people, the water will go off. The phones will stop working and the internet will be history. And, very soon, people are going to start dying.

Faraday cages will protect some systems against EMP; you should be able to preserve some radios, and maybe enough parts to keep a vehicle running. Most of the technology will be gone, though, and that's going to have a huge impact. To survive you'll need to be able to cope in a world without electronics, a world mostly without electricity itself – a world where most of the modern things you've accumulated up are just paperweights.

After an EMP people are going to have two choices. Revert to using older possessions (and the skills they need), or degenerate into squalor and starvation. The thing is, getting by without electronic

gadgets isn't that difficult if you have alternatives to fall back on. Until three generations ago *nobody* relied on electronic devices, and even a couple of decades back we depended on them much less than we do today. The good news for pack rats is that lots of old stuff you didn't want to throw out will be useful again when the technology dies.

In fact a good rule to follow is that, when you get the latest gadget, don't throw away whatever it's replacing. Instead clean it, fix any issues, grease it if it's metal, and store it in a safe place with all its accessories.

That makes sense in everyday life – you'll have a replacement if the new one breaks. But it can also help you evade the worst effects of an EMP. Even electronic items have more chance of survival if they're powered off and unplugged; simple electrics are even more likely to make it, and non-electric stuff won't be affected at all.

An EMP attack will send the target area back decades in the space of a couple of a few seconds. The 21st century and all its appliances and information superhighways will be gone. You can go back to older technology, or you can do without. Here are 75 obsolete items that will get a new lease of life after the attack.

1. Wood-burning range

Your kitchen stove is one of the most important items in your whole house, but unless it runs on bottled gas, after an EMP it's going to stop working. For most people that's going to be a disaster; if you have an old wood-burning range around, you'll be fine.

A century ago most homes had a solid-fuel kitchen range. This was the ancestor of the modern Aga or Rayburn, and burned wood or coal. A good range had hotplates on top and at least one oven – often separate baking and roasting ovens. Many of them also had a heat exchanger to heat water. The range was the home's life support system, providing cooking, central heating and hot water.

Solid fuel ranges don't let you adjust cooking temperatures like a gas or electric one does. They also take their time to heat water, can burn a lot of fuel and need regular cleaning. On the other hand they're immune to EMP – and just about anything else short of a determined assault with a sledgehammer. Look for them at house clearances, scrapyards and salvage dealers. They're basically huge chunks of cast iron, so even a badly rusted specimen can be cleaned up and restored.

2. Wood stove

If you can't use your range to power central heating you're going to need some other way to keep your home warm. Wood stoves are a great option. The fuel is cheap, the stoves are simple to maintain, and they do a great job of heating a room in winter. Wood stoves often get thrown away during renovations of older houses, so check out builders' dumpsters in likely spots. If you prefer a new one, plenty of wood stoves are still being made.

3. Rotisserie spit

A couple of centuries ago, most kitchens had a spit mounted over an open fire. That was the most common way of cooking meat for thousands of years. You can easily build one out of steel bars, and mount it on any open fire – even outdoors.

4. Swing trivet

Why light a stove to boil water if you already have an open fire going? A swing trivet is a hinged support that can be stored against the wall or swung out over the flames. There's a hook on the end that you can hang a kettle – or a Dutch oven with a handle – from.

5. Maps

When did you last use a map to find your way around? Twenty years ago GPS was an expensive novelty, used by the military and offshore sailors. Now it's everywhere. Most modern cell phones have a built-

in GPS chip, and dedicated hand-held devices are rugged, accurate and cheap enough for any hunter or outdoor enthusiast to own. It's never been easier to navigate with pinpoint accuracy – but that's going to change the moment an EMP goes off. The satellites are safe; they're 12,000 miles up, far beyond the reach of the weapon.

But all the receivers have antennas that can pick up the faint electromagnetic signals from those distant satellites. When they're suddenly hammered by the much stronger pulse of an EMP, their electronics will be instantly fried. A few hardened military systems will survive, but none of yours will. Store any maps you have – everything from road atlases to tourist maps to USGS topo sheets.

6. Compass

A map isn't a lot of use without a compass. Your smartphone probably has a compass function, but that probably runs on GPS and *definitely* relies on electronics. It's going to get fried. Make sure you have a proper compass – at minimum a Silva, and ideally a military-style lensatic or prismatic one – and know how to use it.

7. That old truck

If you're replacing an old vehicle, consider hanging on to it. If it's old enough there's a good chance it's going to be EMP-resistant. Anything with electronic engine management will be instantly immobilized by an electromagnetic pulse, but old-style engines are a lot tougher. Something like an early 1980s Toyota Hilux is sturdy, it has good cross-country performance and it can be picked up cheaply. It also

has an excellent chance of surviving an EMP, especially if you take the distributor wiring out and store it in a Faraday cage until it's needed.

8. Bicycles

There's no shortage of bikes around, but for most people they're a hobby or fitness aid. With most vehicles immobilized by electromagnetic damage, they'll become a vital tool for getting around beyond easy walking distance.

9. Landline phones

The landline phone system is actually pretty resilient. An EMP will destroy all the modern add-ons to it, but a lot of the basic infrastructure will survive. What isn't going to survive is modern phones with sophisticated electronics. Anything cordless, or with an internal memory, will be killed off by the pulse.

If you have an old-style phone, however, that's much more robust. A dial model is best, but even a basic push-button phone is likely to keep working. If your friends and family in the local area also have old phones you'll be able to keep in touch.

10. Old-school flashlights

Modern LED flashlights are awesome; they're powerful, have a long battery life and many even have SOS or strobe modes. Unfortunately they rely on electronics, so they probably won't make it through an EMP. When you buy one, hang on to your old Maglite or GI right-angle flashlight. They're just batteries, bulbs and a mechanical switch, so they're practically immune to EMP. They might not have all the advanced features of a newer model, but they'll still be working.

11. Hurricane lanterns

Most outdoor people have at least one lantern hanging around somewhere. Whether it's a blue gas one, a Coleman or an old-style paraffin lantern, they're great sources of light when you're working outside. Like flashlights, though, they're being replaced by modern LED models. LED lanterns are excellent; they're much brighter than the old ones, the batteries last for days and there's no fire hazard. On the down side they're just as vulnerable to EMP as their smaller flashlight relatives. A real lantern that burns fuel isn't, so don't throw them away – clean and store them, and make sure you have a supply of fuel for them too.

12. Light bulbs

While we're talking about LED lighting, what do you have in your house these days? LED bulbs have become very popular; they're a lot cheaper to run than the old incandescent ones, and their light is a lot more pleasant than compact fluorescents.

Many people have also started using smart home technology, that lets you control Wi-Fi-enabled LED bulbs from a device like Amazon's Echo or even through a smartphone app. But guess what's going to happen to all this technology when an EMP goes off?

Yep, you got it. You might have a generator to power your home off the grid, but that won't help if all your bulbs have been fried. Keep a supply of old ones – ideally in a Faraday cage; a really strong EMP can set up currents in the filaments and destroy them.

13. Candles

In the worst case you'll have no home power at all. You can use lanterns indoors, but some kinds release dangerous carbon monoxide and they all burn fuel. If you need intense light then a Coleman or gas lantern is your only non-electric option, but for generally lighting the house candles are excellent. They're cheap,

durable and don't take much storage space. Keep a few boxes in your emergency supplies.

14. Candle sticks

Put the candles in them; they're less likely to fall over and set things on fire.

15. Candle snuffer

Candles are easy to blow out – but it takes a surprising amount of effort (and puff) if you have a couple of dozen of them around the house. A candle snuffer is much quicker and easier.

16. Adding machine

If you run a business, and plan to get it running again after an attack, you're going to need some way to keep track of stock, cashflow and all the other numbers. Unfortunately, your computers and calculators will all be scrap. An old mechanical adding machine will give you a head start on competitors who're doing it all with paper and pen.

17. Kerosene heater

Wood stoves and open fires are excellent at heating a room – but most homes don't have one in *every* room. Kerosene heaters are low-tech, cheap to run, and very effective. Some people don't like them because of the smell, but there's a simple trick to avoid that. The smell is caused by unburned kerosene vaporized in the first few seconds after you light it; when it's burning properly it's odorless. Take it outside, fill it, light it and let it burn for a minute. Then take it back in to where it's needed.

18. Wash board

Modern washing machines are computerized, and vulnerable to EMP. Their metal casing *might* act as a Faraday cage to protect it, but it probably won't. Older machines are less vulnerable – but they're not

much use if the power goes out. Even if you have your own generator a washing machine uses a lot of juice. Hand-washing is the way ahead.

Unfortunately, hand washing in the sink is fine for your good jeans, but it's pretty hard work getting outdoor clothes clean. A washboard will make it much easier. If you don't have an old one sitting in an outhouse check ebay – you can find plastic ones for under $10 - or local junk shops.

19. Wash tub

An old-fashioned washtub will give you plenty of room to let your clothes soak as you wash them. You can use a wash board in the sink, too, but a tub is more spacious and makes the job a lot easier.

20. Hand cranked washing machine

There are alternatives to a wash board and tub. Some early washing machines were electric; others were hand-cranked. You just loaded in your washing, water and detergent, closed the barrel and started turning the handle.

Washing a full load would give you a good upper body workout, but it did get your clothes clean without needing electricity or anything else an EMP might wreck.

Antique washing machines don't survive as well as some other home appliances, but there are modern versions available. These are much easier to use, too, because their drums are lightweight plastic instead of metal or wood. You can find them on Amazon or eBay for less than $50.

21. Wringer

Hand-washed clothes come out the tub with a lot of water in them, so they take much longer to dry than machine-washed ones. In cold weather, if you're drying them indoors, they also saturate the air, causing condensation and making your home damp. Speed things up by running them through a wringer. This is a simple device – just two rollers powered by a hand crank – but it will do a great job of squeezing excess water out.

Most wringers clamp to the edges of a table or counter, and have a channel to direct water into the tub below. Like wash boards and tubs, you can often find them in junk shops or on Ebay. A lot of them have been cleaned up and used as decorative antiques, so check they actually still work and the rollers are in good condition – damaged rollers will be less efficient, and can even damage your clothes.

22. Washing line

When you take your clothes out the washing machine you probably throw them in the dryer. Maybe you even have a combined washer/dryer that does it all in one cycle. After an EMP attack you won't have. You'll be drying clothes the old-fashioned way – hanging them on the line.

23. Clothes dryer

Obviously, a washing line isn't a lot of good if it's raining or freezing outside. You'll have to hang your clothes up indoors, and unless you're into stringing lines from the coat hooks that means you'll need a clothes dryer. Many old houses had one that hung from the ceiling

and could be pulled up out of the way with a rope; more modern ones are metal racks that fold up when you're not using them.

24. Copper

If there's no power, where are you going to get the hot water to wash your clothes in? You'll need a good few gallons to fill a wash tub, and if you're relying on the water supply from the kitchen range you're going to struggle. That's where a copper comes in. A copper is just a big metal bucket (an old steel trash can will do) built into a brick structure with a firebox at the bottom. A small fire, burning for a few hours, will give you plenty water for your clothes, and a wooden lid keeps the heat in. Very dirty clothes could be soaked in the copper for a while before transferring to the wash tub.

A copper is also good on bath day.

25. Tin bath

Built-in baths with plumbing are a fairly recent luxury for most people. Apart from the rich, up to the mid-20th century most people took their baths in a steel tub that was stored out of the way most of the time. It would be filled with water heated on the stove, or in the copper if they had one. After bathing the dirty water would be tipped down a drain.

26. Bed warmer

Most of us can sleep pretty comfortably even on the coldest winter night, thanks to modern heating and electric blankets. Modern heating systems are computerized, though, so they'll be casualties of an EMP – and while your electric blanket is simple enough to survive, that won't help if the power is out. There are older solutions that will get your bed nice and toasty, though. A hot water bottle is surprisingly effective – and so are those brass bed-warming pans that some people hang on the wall as decoration. Anything that can be

filled with something hot, whether it's water or hot ash from the stove, will warm your bed and drive out any dampness.

27. Sextant

If you have a boat, and go offshore, you probably navigate with GPS and a chart. If GPS is gone you can get away with a chart and good compass, as long as you stay within sight of landmarks on shore – but once the land drops below the horizon you're lost. That's where a sextant comes in. If you have a good mechanical chronometer to tell you the time, a sextant and a book of sun and star tables, you can accurately plot your position.

28. Plow

If you have some land, and you're using a mini tractor to plough it, you might want to look at alternatives for when technology gets wiped out. A horse-drawn plow is slower than a modern one, but it does just as good a job.

29. Sailboat

Obviously, you can't get offshore without some way to power the boat, and modern marine diesels are heavily computerized. Sails might be old-fashioned, but they're reliable.

30. Tinder box

This list is full of things that need to be lit – lanterns, stoves, ranges and so on. Lighting things is easy as long as your supply of matches and cigarette lighters holds out, but depending on how long the collapse lasts, you might need an alternative. A tinder box is the answer. With a flint, steel and a nest of shredded cloth to catch the

sparks and start a flame, it will carry on setting fire to things for decades.

31. Wind pump

If you get water from your own well, and it's raised by an electric pump, you might have some trouble after an EMP. Wind pumps used to be a common sight on farms, and they're not difficult to make.

32. Playing cards

A few games of Solitaire on the PC are always a good way to pass some time – until your computer's innards are fried by a high-level nuclear detonation. If you keep a spare laptop in a Faraday cage, you'll still have Solitaire, but you can forget online poker games – they won't be back for a long time. Luckily there's a hardware-only backup – get a couple of packs of cards.

33. Egg beater

What happens when you need to whisk something in the kitchen but there's no electricity? Using a fork is fine for scrambling a couple of eggs, but if you're mixing a batch of pancake batter it gets old in a hurry. A wire whisk will work, but it can be messy. An alternative is an egg beater with a crank.

Two interlocking whisks will beat eggs, batter or cream more effectively than a simple whisk.

34. Egg timer

Of course, you can just boil your eggs, but how do you know when they're done? An egg timer will sort that out for you. Clockwork ones will keep working until the spring wears out. Sand-filled glass ones will keep working forever.

35. Fire screen

After an EMP, a lot of people will be reopening fireplaces that have been blocked up for years. Why were they blocked? Because when a fire isn't lit, wind across the chimney sucks air out of the house – and cold drafts rush in to replace it. A fire screen across the front of unlit fires prevents that.

36. Notebook

It's never been easier to make notes and memos as you go about your business; just tap it into your phone, or record a voice memo to yourself. Before portable electronics you had to scribble it down in a notebook. After an electromagnetic pulse you'll be doing that again.

37. Meat grinder

It's easy to make your own ground meat with a food processor, and even quite entertaining to watch the blades chop it up. That needs power, though, and even if you have a generator there's a good chance an EMP will burn out the coils in the motor. A cast iron meat grinder with a hand crank won't just survive an EMP; it will even survive a direct nuclear attack that isn't actually close enough to vaporize it.

38. Camera

Who remembers the "Kodak moment" ads? The giant film company had their own Kodak moment when they decided digital cameras were never going to catch on with the public. Now everyone has a high-resolution video and stills camera built into their phone, and Kodak is a small business specializing in business document storage.

Just remember that an EMP will kill every digital camera and wipe all their images; if you need a camera after the attack, make sure you have an old 35mm somewhere and a stash of film in the refrigerator. Even a sophisticated 35mm SLR camera will work after an EMP; its advanced electronic features won't, but the optics and shutter will be fine. Disposable cameras are good too, if you can find them.

39. Developing kit

It isn't hard to develop your own photographs; you just need the right chemicals and some basic tools.

40. Photo album

Electronic photo frames are impressive – who wouldn't love a slideshow that automatically runs through all your favorite pics? If you want your photos to survive an EMP attack, however, you better forget digital and keep them in a proper photo album.

41. Window screens

If you want to keep your house cool in summer you turn on the air conditioning. EMP will kill your air conditioning, so you're going to have to open the windows. Then flies will come in. Window screens will stop them.

42. Can opener

The electric can opener is a very American gadget, a symbol of just how advanced and wealthy the country became during the post-War economic miracle. Today you can get appliances that do just about anything, even as simple a task as opening a can. As long as the power's on, of course. If you have an electric can opener make sure you have a manual one as a backup, otherwise eating that three-

month supply of canned food is going to be a bit of a pain. Even a military P-38 will do, but a proper rotary one is much easier to use.

43. Mechanical clocks

Even if you don't need to know exactly what time it is, you *do* need to be able to track how much time has passed. Cooking and baking are a lot more difficult if you don't know how long something's been in the oven. The problem is that most modern clocks will stop dead the moment an EMP goes off. Hang on to any old mechanical clocks; they're immune to the effects. Keep at least one wound and running. If an EMP goes off in the middle of the night you could wake up to find all the modern clocks are dead, and you don't know what time it is.

44. Alarm clock

Now you know what time it is, but you probably also need to know that it's time to wake up. Most of us use our phones as alarms, but a wind-up alarm clock with bells and a clapper on top is much better at surviving asymmetric nuclear warfare.

45. Mechanical watch

For the same reason as your old clock will come into its own after an EMP, keep any old mechanical watches that are still in running order, too.

46. Rolodex

Most records are on computer now. Computers don't like EMP. Card indexes don't care.

47. Gas-powered refrigerator

Just about every refrigerator sold today is electric, and in the USA most of them also have sophisticated circuitry that warns of open doors and lets you set temperatures accurately. However, when refrigerators were a new technology many of them weren't electric at

all – they were powered by propane or natural gas. Gas-powered fridges are still made in small numbers (they're popular at hunting lodges and lumber camps, where there often isn't electricity) but for domestic use they're obsolete. Until there's an EMP attack, of course. Almost every modern electric fridge will be destroyed by the pulse; a gas one won't even notice it. Having a fridge is useful if you want to keep food fresh in summer, and vital if you have medication that needs to be kept cold.

48. Ice box

Not everyone could afford a gas-powered refrigerator; in fact, until the late 1940s most homes still relied on the older alternative – the ice box. This is about the simplest refrigeration device you can think of – an insulated cabinet with a rack at the top to hold a block of ice. Air chilled by the ice sank down through the food stored below; as it warmed, it rose back to the ice to be chilled again. Meanwhile the hollow walls, stuffed with sawdust, straw or cork, minimized the amount of heat that got into the icebox.

You've probably spotted a problem – for an icebox to work, you need a supply of ice. If an EMP goes off in summer it isn't going to help you much. On the other hand, an EMP would be most destructive in winter, so that's the most likely time for it to happen. If it does, start storing ice. Put out buckets of water, break up the ice on ponds and rivers, pack snow into boxes and ram it down hard. Collect as much ice as you can. Then insulate it with sawdust or straw and store it in your basement or root cellar. Make sure any meltwater goes into a drain or drip tray.

You might not think ice will last for long, but in the 19th and early 20th century it was a huge industry. New England ice companies cut blocks from ponds all winter, and the rest of the year they kept the fishing fleet supplied with ice to preserve their catches. Every big town had an ice man who would deliver blocks to your door. It was even possible to send ice from New England to India by sailing ship,

in sawdust-packed holds, and sell it at a profit. If you put some work into it, you can store enough ice to last you through the year until winter comes again.

49. Books

OK, these aren't *exactly* obsolete, but eBooks have certainly taken a big share of the market. They're cheaper, you can store thousands of them on a small device, and almost all portable electronics now have the ability to display them. They're also going to disappear when an EMP hits – the electronics that display them will be fried, and the files themselves will probably be corrupted or wiped. That doesn't happen to physical books.

Books aren't just good for entertainment; they're also stores of knowledge. Any books on medicine or other practical skills should be kept on old-fashioned paper, because they're guaranteed to be there when you need them.

50. Encyclopedia

Yes, they're books, but encyclopedias are useful enough to deserve their own mention. They're how people found stuff out before Wikipedia, and they'll survive when nuclear warheads have turned Wiki into a memory. They're also more likely to be accurate, which is another good reason to have one.

51. Typewriter

Most of us have to write stuff occasionally, and generally we do that in Microsoft Word. What if you didn't have a working computer to run Word on? Then you need a typewriter – a manual one. Antique typewriters are getting expensive, because they're

decorative and crafters love to make things out of the keys, but you can pick up a less exotic one for under $50.

52. Correction fluid

Typewriters are more robust than word processing apps, but they don't let you fix typos with a click of your mouse. You're going to have to roll the page up, brush on some Wite-Out then find something else to do while it dries.

53. Toasting fork

Toasters are great. Just drop in some bread, push the lever down, and a few minutes later toast will pop out, browned just the way you like it. As long as the power grid hasn't been devastated by a North Korean warhead, of course. When that happens, you're back to making toast the old-fashioned way.

For perfect old-school toast you need a toasting fork – basically a giant fork that's long enough to the toast gets properly browned but your hand doesn't. Brass ones turn up in antique shops because they're popular ornaments, but a lot of older brass contains up to 2% lead and you probably don't want to be heating that while it's imbedded in something you're about to eat. Look for a steel one.

54. Thermometer

Electronic thermometers are easy to use and super-accurate, but they're not very EMP-resistant. An old-style glass one, filled with mercury (if you can get it) or alcohol is a lot more durable. It won't need batteries, either.

55. Carpet sweeper

Vacuum cleaners were first invented in the mid-19th century; they were powered by hand-operated bellows and they were completely useless. The rise of electricity changed all that, and now almost every

home has a compact, powerful machine that can quickly clean carpets even when they're loaded with ground-in dust.

Between the hopeless manual vacuum cleaners and the ubiquitous electric ones came the carpet sweeper. A simple mechanical device on the end of a long handle, the action of pushing it across the carpet turned a series of brushes that swept dirt into a container. They were light, cheap and surprisingly effective – and totally impervious to EMP. If you want one, they're still being made – and they're a much easier way to clean carpets without power than getting down on your knees with a stiff brush.

56. Carpet beater

If you have loose rugs or unfitted carpets, there's a simple way to get deeply embedded dust out of them. Take them outside, hang them over a rope and whack the hell out of them with a carpet beater. Usually made of bamboo, these are just a pole with some loops at one end – but they deliver a lot of force to the carpet, and they'll take care of anything that the carpet sweeper didn't manage to remove. Before vacuum cleaners came along the usual routine was to sweep the carpets a couple of times a week, then take them outside for a good beating in spring and fall.

57. Phonograph

An EMP means you can say goodbye to any music collection put together in about the last 35 years. Most tape players, and all CD players, will be destroyed by the pulse; the media for them will be fine, but unless you protect it in a Faraday cage the hardware will be toast. As for MP3s and other digital media, it's definitely not going to make it.

Luckily there's an alternative – find yourself an antique phonograph. These have been around since the 1870s, and by the 1920s they were using the 7-inch and 12-inch disks that are still standard, at the familiar 33⅓, 45 and 78 rpm speeds. Electric models started to

appear about the same time, but most of them were purely mechanical; you cranked them up to wind the spring, put the needle on the record and sat back to listen. Phonographs were a luxury item before WWII, but there are still plenty left and they don't cost that much, even in good working order. Look on ebay or local antique shops. There are also some working modern reproductions.

58. Travel robes

Central heating is great. You can keep your house at a comfortable temperature, and sit around in short sleeves on the coldest days. Life hasn't always been like that, though. A century ago, when people sat reading or socializing on a cold night, they'd cover themselves in woolen "travel robes" – blankets that could also be used to stay warm in a cold horse-drawn carriage. When EMP has destroyed your furnace, you'll be grateful for a few woolen or fleece blankets to wrap up with.

59. Fly paper

Your electric insect zapper won't work without power, and chasing flies with a swatter is hard work. Hang up some old-style fly paper (traditional hardware shops often have a dusty box of it somewhere) and the problem will take care of itself.

60. Charcoal iron

Ironing your clothes isn't essential, but it does make you look and feel better. If you use cotton or linen bedsheets, they'll also be more comfortable if you take the wrinkles out before using them. But how do you iron anything when the power lines have collapsed under EMP-induced thermal stress?

Again, our ancestors had to cope with this every day – and they did it by using an iron. They just weren't electric ones. A charcoal iron's baseplate had the same familiar shape as a modern iron, but above that was a heavy iron box that could be filled with hot embers from

the fire. A thick lid with a wooden handle protected your hand from the hot coals.

A charcoal iron didn't heat up quickly – there was a lot of metal in it – but once it was hot it stayed that way for a long time. To get the temperature up, fill it with charcoal that's well alight or red coals from the heart of your fire.

61. Flat irons

A charcoal iron wasn't the only option; many people preferred flat irons. Again, these had a thick iron plate in the usual shape, but with the handle bolted straight onto it. They are heated directly on a fire or stove; when they're hot enough you simply pick it up and use it. Flat irons cool down quite quickly, though, so you need a few of them – two or three heating while you use one.

62. Coffee pot

Modern coffee makers are awesome, whether it's a simple percolator or a $1,000 super-machine that can produce espresso, latte and cappuccino at the press of a button. Of course, without electricity they're useless. If you want to continue getting your caffeine intake post-EMP, you'll need a less sophisticated solution.

A coffee pot or French press will make coffee as long as you can boil water. Americans are lucky here; stovetop kettles are still common. If an EMP hits Britain their whole civilization will collapse, because they all have electric kettles and they won't be able to make tea anymore.

63. Board games

Most of our entertainment is delivered through some kind of screen these days. After an EMP the screens will all stop working. You can spend your free time bored, or you can dig up a couple of classic board games and entertain yourselves that way.

64. Sewing machine

In the economic collapse that would follow an EMP, it's going to be impossible to buy new clothes for a long time. You're going to have to rely on repairing, altering and repurposing the ones you already have. Hand sewing is a slow process, though, and unless you're very skilled the results don't look good. Take the effort out of it with a sewing machine.

Before electric motors became affordable there were two ways to power a sewing machine. High-end models had a treadle that could be pumped with a foot to spin a flywheel; a belt carried the power from the flywheel to the machine.

Cheaper ones had a crank that had to be turned with one hand as you fed the work through the machine with the other. Both kinds show up at antique shops and on ebay, because they're popular decorative items – but most of them still work. Neither kind is as efficient as a modern electric machine – but they're both miles ahead of hand-sewing.

65. Safety razor

Modern razor blades won't be harmed by EMP, but the whole retail system that you get them from will be wiped out. You can build up a stockpile but that's expensive. On the other hand, if you have a safety razor that uses double-edged blades, you can get a pack of ten blades for a couple of dollars. For real self-reliance buy a straight razor; with a leather strop to keep it sharp, that will give you close – if dangerous – shaves for decades.

66. Shaving brush

When the cans of shaving gel run out, you'll be forced to rely on soap. Luckily, soap is something you can make yourself – all you need is fat and wood ash. Not so luckily, you can't just squirt some from the can and start shaving. You have to work up a lather, and for that you need a shaving brush. You'll have no trouble finding one; just enough die-hards prefer them that they're still being made.

67. Ice crusher

Crushed ice is great for cocktails, but it also comes in handy for making cold compresses. Many of us can get crushed ice by just pressing a button on the front of the freezer. That freezer has a lot of electronics in it, though. In the future you might be very grateful for a hand-cranked ice crusher; you can drop in chunks of the ice you stored in the root cellar, and grind them into chips.

68. Hand saws

Power saws have made wood and metal working much easier, but apart from gasoline-powered chainsaws you can't rely on them after an EMP. Make sure you have hand saws capable of tackling any building or repair jobs that are likely to come up. At a minimum you should have wood and hack saws. A tenon saw and a bow saw will give you even more flexibility.

69. Bit and brace

If power saws are useful, power *drills* have become the only way for any self-respecting workman to bore a hole. But, like everything powered by electricity, you can say goodbye to them after an EMP. You're still going to have to make holes in things though, so you'll need some kind of hand-powered drill. A drill with a crank is one option.

A bit and brace – a bar with an offset handle, and a chuck at one end to hold the bit – can deliver more force, and once you've got the knack

of using it you'll be able to drill faster. You can even drill metal, if you start with a small pilot hole then progressively enlarge it with bigger bits.

70. Screwdrivers

If you've been using a cordless drill to drive screws, be ready to go back to doing it by hand.

71. Baking tins

Your bread maker isn't going to survive an EMP, so if you want to keep making bread after the attack, you'll need to do it in the oven. That means you'll need loaf tins to put the dough in. Once you've baked it you can make toast.

72. Address book

Cell phones and e-mail apps make it easy to store, share and use people's contact details. You can have everyone's name, address, phone number, email and other information at your fingertips, wherever you are. But how much of that information will survive an EMP? Probably none. Eventually communications networks will come back up, and you'll be able to replace the devices that got destroyed by the attack, but your contact lists will be gone forever. Unless you've written them down in an old-fashioned paper address book, of course.

73. Telephone directory

Some landline phones will make it through an EMP, and unless society collapses most of the network will be up and running again fairly soon. That won't help much if you can't find anyone's number, though. The phone book and Yellow Pages are still handy things to have.

74. Slide rule

Pocket calculators are great – but electronic. If you need to do any complex math after an EMP, you need a slide rule. Every engineer used to have one of these stuck in a pocket, but calculators made them obsolete. An electromagnetic blitz will make them essential again. Practice with it occasionally to make sure you know how it works.

75. Cash

Cash isn't obsolete yet, but it seems to be heading that way. Between online shopping, contactless cards and even Bitcoin, there aren't that many times when you really need to pull a fistful of dollars from your pocket. That's likely to change in a hurry if we're attacked. Some people put their faith in gold, but that has problems when it comes to making small payments – and many people won't know how much it's actually worth, anyway. An emergency reserve of greenbacks is much less complicated.

The Most Effective Remedies That We Lost To History

Modern medicine is fantastic. Of course, things go wrong sometimes, but generally it's safe and very effective. That's the main reason life expectancy is a historic high. Diseases that used to kill millions have been brought under control or even eradicated. Drugs can control many chronic conditions. There's medication to control blood pressure, heart disease, even HIV. We just don't have to fear illness the way our ancestors did.

But, although it's effective, modern medicine is also fragile. It wouldn't take a lot to blow the whole system apart. Even without a crisis, there are growing problems. Antibiotic resistance, for example – overuse of antibiotics, by industrial farmers and people who take a couple of pills when a mug of hot chocolate would do more good, have saturated most of the environment with a low-level dose of antibiotics. That kills a lot of bacteria, but the ones that survive are stronger and more virulent. We might be just a couple of decades away from the point where antibiotics stop working.

Now imagine there's a major crisis. Civil unrest, a natural disaster or an EMP attack has thrown the USA into chaos. That will cause plenty of problems for everyone, but it might be worst for those who need medication. Some modern drugs have a limited shelf life unless they're kept refrigerated. Others will last for years, but might be stolen by looters.

Drug stores are going to be attacked and pillaged by addicts, and a lot of their stocks will be stolen or destroyed. Meanwhile the federal government will probably impound the stocks held by manufacturers as a strategic asset.

If you're on regular medication you should keep the largest possible stock of it, and of course every prepper will have a good first aid kit that includes basic medication. There's a limit to how much you can stockpile, though, and sooner or later supplies will run out.

Luckily, that doesn't mean you have to just give up and die. Medicine isn't a new idea. There were doctors in ancient Egypt, and China has a history of herbal medicine stretching back thousands of years. The Greeks and Romans made many advances, and as well as developing surgical techniques they improved on older herbal medicine by making stronger extracts from healing plants.

Plants were the basis of most medicine from the ancient world, through the Middle Ages and up to the 19th century. In fact, they still are. Drug companies don't invent new chemicals then see what effect they have on sick people; usually they look for existing substances that have a healing effect, then try to fine-tune them. Most of these substances come from plants, and usually it's a plant that's been used for traditional herbal medicine.

Once a medicinal plant has been identified chemists isolate the active chemicals, purify them, then try to develop similar but more powerful versions that can be synthetically produced. Aspirin is based on a chemical found in willow leaves. Quinine, the first effective malaria treatment, was originally extracted from the bark of the cinchona tree. Digitalin, which is used to treat cardiac arrhythmia, is found in foxgloves.

The truth is, many modern drugs have natural equivalents that are almost as effective – and sometimes safer. If you know where to find these it's often possible to switch to the old remedies when modern ones run out. Some care is needed, because bark and leaves don't come with a carefully measured dose of the drug, but if you know what you're doing this can be amazingly effective.

As well as medicinal plants there are a whole host of other old remedies that have faded into history. A lot of folk medicine won't do any good, and some is actively dangerous, but many of these remedies can be very effective. In fact the only reason they've fallen out of use is that we've come to trust modern medicine more than

older kinds. This is a lazy way of thinking. People used folk medicine for centuries because, often, it worked. And, when a crisis takes modern medicine away from us, we're going to have a choice between the old remedies or nothing. What would you rather have?

It does have to be said that not all folk medicines work. Some of them are based on complete misunderstandings about how disease works; keep in mind that, two centuries ago, nobody knew what a bacteria was. If you don't know what the problem is, your chances of finding a solution go way down. Some old remedies have gone because they deserved to – they didn't work, and taking a medicine that doesn't work gives you a false sense of security. Instead, it's better to look for an alternative that *does* work – there's usually one available.

In this book we'll look at many old remedies that might still have a useful place in your post-SHTF planning. Some are well proven; they have a known effect that you can rely on. Others are up for debate. They might not work, but there's enough supporting evidence that they're worth a try if nothing else is available. Finally there are a few that you shouldn't try; they've either been proven to be ineffective, or they're actually dangerous. This book aims to give you useful information that can save you from discomfort, pain or even death – and there are a few so-called remedies that can lead to all of these.

PROVEN REMEDIES

A lot of folk remedies have been tested by scientists, and proven to work. Other reliable ones involve plants that definitely contain chemicals similar or identical to modern drugs. This section of the book contains the most dependable remedies that were abandoned before they should have been.

Epsom salts

Let's start off with one that isn't *completely* lost yet. Epsom salts – magnesium sulfate – are still on the World Health Organization's list of essential medicines. It's nowhere near as common as it used to be, though. In the 19th and early 20th centuries most homes had a big jar of it, and it was used to treat a wide variety of illnesses.

Like most 19th century medicines it was used as a remedy for a lot of illnesses it didn't actually work on, but there are many things it does work for. Here are some uses for Epsom salts:

- **Eclampsia**. If women have seizures during pregnancy, Epsom salts are a very effective treatment. It lowers systolic blood pressure but leaves diastolic pressure unchanged; that eliminates the seizures but keeps up the blood supply to the fetus.
- **Splinters.** If you work with wood, especially with hand tools, you're going to get splinters sometimes. They're painful, and if you don't get them out they can cause serious infections. If you don't have access to antibiotics that can be very bad news. To remove splinters easily dissolve 1/3 cup Epsom salts in a cup of warm water, and soak the splinter in it for ten minutes. That will soften it and make it easier to remove – and it will reduce the pain, too.
- **Constipation.** Its high magnesium content makes Epsom salts an effective laxative. Dissolve two to four teaspoons of salts in a cup of hot water and stir well. You can flavor it with lemon juice to hide the salty taste.
- **Asthma.** A fine spray of Epsom salts dissolved in water can be used to treat an asthma attack. A medical nebulizer is the best way to deliver it, but anything that can create a fine mist will

do. It can also be given intravenously to manage serious attacks.

- **Stress.** The evidence isn't quite as strong on this one, but many people believe a bath with Epsom salts dissolved in it can help relieve stress.

Epsom salts are easy to buy. Just be sure to get pure magnesium sulfate, without any additives like scents – these can be toxic. It's not expensive and it's a very versatile remedy. It also has a lot of household uses, so adding a few pounds of it to your supplies is an excellent idea – and one that our ancestors would definitely have approved of.

Baking Soda

Another all-purpose substance you should stockpile is baking soda. As well as the obvious uses for baking, its chemistry gives it a number of medical uses as well.

If you're suffering from indigestion or heartburn, two tablespoons of baking soda mixed into a glass of water will quickly have an effect. Baking soda reacts with stomach acid to produce salt, water and carbon dioxide; in the process the acid itself is eliminated.

The anti-acidic properties of baking soda also make it useful in cases of acidosis, where the acidity of the body increases. Respiratory acidosis can be dangerous, and baking soda is an effective treatment.

It also has uses for more minor problems. A solution of baking soda can soften splinters and make them easier to remove. The same solution, applied to bee and wasp stings, relieves pain and swelling. It has the same effect on irritating plants, including reactions to poison ivy and poison sumac. It even works on tear gas – if you've been gassed, a weak baking soda solution can be used to rinse your eyes.

Honey

If you're interested in being prepared to survive in the long term, getting yourself a hive and some bees is a great idea. Honey is tasty, a powerful natural sweetener, and unlike refined sugar it's a renewable resource. What many people don't appreciate is that honey also has medicinal uses. A century ago many people still prized it for its healing properties. Now it's been relegated to an ingredient in soothing drinks – but it can do a whole lot more.

- **Wound dressings.** You'd never know from the taste, but honey contains potent natural antibacterials. Under the sweetness are a range of chemicals including methylglyoxal, royalisin and even hydrogen peroxide; all of these are very good at killing bacteria. If you're treating a burn or open wound, wash it with honey diluted in warm water then cover it with a clean dressing – the honey will attract insects and, being sticky, also dirt and dust. On the other hand it also kills bacteria and promotes healing.
- **Ringworm.** Despite the name, ringworm is a fungal infection of the skin. It forms circular red, itchy patches that can be very unpleasant. Mix a teaspoon of honey with a teaspoon of powdered cinnamon, spread it on the affected areas and cover with a loose dressing.
- **Coughs.** Yes, honey *does* help suppress coughs. It's not as effective as many people believe, but it's certainly better than nothing. Tea heavily sweetened with honey will help ease a cough, and take some of the discomfort out of a sore throat. You

can also make honey-based hot drinks flavored with lemon, ginger, cinnamon or even pepper.

Foxglove - DANGEROUS

Cardiac arrhythmia is terrifying, and often fatal. If the heart isn't beating in a proper rhythm it isn't transporting oxygen around the body efficiently, and without oxygen your organs – including the heart itself – will start to die. There are excellent modern drugs for arrhythmia, but if you don't have them the arrhythmia can accelerate into a tightening spiral of cardiac failure, ending in total cardiac arrest.

If someone is going into arrhythmia the symptoms will include a fast and irregular heartbeat, loss of consciousness and difficulty breathing. It's a life-threatening situation, and if you don't have access to modern drugs or a defibrillator you might be justified in using a dangerous traditional remedy. The foxglove, or *Digitalis*, plants are a genus of about 30 species, with *Digitalis Purpurea* being the most common. Growing to over six feet high and with a spike of purple or pink bell-shaped flowers, it's very distinctive. It's also loaded with digitoxin, a powerful poison that can have lethal effects on the heart.

In the right circumstances, however, it can actually stabilize the heart. If the heart is in arrhythmia then digitoxin and related chemicals in the plant can slow and strengthen its beat, bringing it back to a normal rhythm. Digoxin, also sold as Lanoxin or Digitalin, is a modern medicine made from foxglove extracts.

The problem is that there's a *very* narrow gap between an ineffective dose of natural foxglove and a lethal one – and, to help the patient, you have to land in that gap. Never use foxglove as a medicine unless there's no alternative, and if you have to use it, give the smallest dose you can. The best way to prepare it is to crush a handful of the plant in a pint of hot (not boiling) water, then give the water to the patient half a teaspoon at a time. Wait a few minutes between doses, checking the pulse constantly; as soon as it starts to strengthen and stabilize, stop giving doses.

Even if you're extremely careful, it's not hard to kill someone with foxglove. This remedy works, but it's for dire emergencies only.

Comfrey

This flowering plant has been used in herbal medicine for centuries, but it's become controversial in the last few years. It contains allantoin, which stimulates cell growth and is also an anti-inflammatory. Soak crushed comfrey in vodka or ethanol to create a healing tincture that works well on small cuts – but don't take it internally.

Traditionally comfrey was made into a tea that was drunk to treat a whole range of ailments, from ulcers and menstrual disorders right up to fractures; one of its traditional names is knitbone. It was even given to children to help them grow strong bones and teeth.

Unfortunately, as well as allantoin comfrey contains high levels of dangerous alkaloids; excessive doses can cause liver failure, and the

plant has been linked with at least one death. Use it on burns and cuts, but keep it outside your body.

Cattails

This wetland plant is often called "nature's supermarket" because every part of it can be used for food. If it's a supermarket it also has a drugstore counter, because there are medicinal uses for most parts too.

- **Bleeding.** Cattails produce large amounts of pollen. In fact, they're one of the few plants whose pollen can be collected in large enough amounts to be used as a flour substitute. Don't use it all for baking, though, because the fine powder is also astringent and hemostatic – it slows bleeding. Dust clean, dry pollen on a wound to reduce blood loss and encourage clotting. In traditional medicine it was also believed that it can help with internal bleeding. This belief probably comes from an assumption that if it worked outside it would work inside too, so it was eaten to treat any internal bleeding or circulation problems. Unfortunately, that's not true. It is a mild diuretic, though.

- **Burns, blisters and scrapes-** Small burns and other injuries can be treated with a cattail poultice. Collect fresh roots, peel and wash them thoroughly, and pound them into a paste. Then spread it over the wound and cover with a dressing.

- **Cuts and abrasions.** The ash from burned cattails has antiseptic properties. Dry the plants thoroughly, burn them then grind the ash to a powder; use it to dust small cuts and scrapes before covering them. You can mix it with the pollen, too.

Activated charcoal

You probably have a few plans for this already – it's great for making all kinds of filters. It has medicinal uses too, though. Get food grade activated charcoal for your stores – or make it yourself; it's easy. Then make your own charcoal crackers by mixing charcoal into plain dough, rolling it thin, cutting into squares and baking until it's dry. Make some up into capsules, too.

- **Poisoning.** The power of activated charcoal is its ability to absorb other chemicals – including poisons. If you suspect someone has swallowed poison, give them four capsules or a heaped teaspoon of charcoal right away, and repeat the dose every ten minutes until you can get them medical help or the symptoms start to fade.
- **Indigestion and wind.** If you suffer from wind or acid reflux after a meal, eat a charcoal cracker or take a couple of capsules. The charcoal will absorb the chemicals that cause wind, and it's also great at soaking up excess stomach acid. If your dog is prone to passing gas, fed him charcoal crackers too.
- **Bites and stings.** If you're suffering from insects, mix a little finely ground charcoal into a paste with water and use it to cover the bite or sting. It will draw out some of the poison – not all of it, but usually enough to stop the symptoms getting any worse.

If you're using activated charcoal to deal with any kind of poison – including stings – remember that it can't do anything about

chemicals that have already been absorbed into the body. It *can* soak up ones that are still in your stomach or just under the surface of a sting, so the quicker you can take it the better.

Balsam fir

The balsam fir is a strongly scented tree, and that made it a good candidate for traditional medicine. It was a good choice, too, because some of the remedies involving it really work.

- **Congestion.** If you burn the needles of the balsam fir, and inhale the smoke, the aromatic vapor will help relieve congested nostrils and sinuses. It might be effective against headaches too, although that's not as clear.
- **Wounds and sores.** Blisters on the balsam fir's smooth bark are filled with resin. If you collect this resin, and apply it to small cuts, scrapes, sores or skin diseases, it might help them heal.
- **Vitamin C supplement.** The needles are rich in Vitamin C. Use them to make a vitamin-rich tea that prevents scurvy and may help with cold symptoms and coughs.

Black locust

The berries of this tree are prized, but the bark and leaves are toxic. In small doses, though, the toxins actually make them medically useful.

- **Constipation.** The flowers of the black locust are an effective laxative. They can be eaten – try one or two petals, and increase the dose in small steps if necessary – or made into a tea.
- **Purgative.** If you need to induce vomiting – for example, you suspect you've eaten something poisonous – then chewing a piece of the root bark will work pretty well.
- **Toothache.** Holding a small piece of the root bark in your mouth might reduce the pain of a toothache – but don't chew it!

Indian Gooseberry

Don't confuse these with the common gooseberry; they're not closely related. Indian gooseberries can be eaten, but they're also used in traditional medicine to treat a variety of diseases. There's good scientific evidence that they're powerful antioxidants, and they've also been proven to help control both regular and Type 2 diabetes.

Clinical trials have been carried out in India using both extracts and whole fruit, and both are effective on diabetes. Indians usually pickle the fruit with salt, oil and spices, but they can also be eaten raw or soaked in syrup.

Indian gooseberry is also a good source of Vitamin C and other nutrients, so eating it can protect overall health.

Chickweed

This small plant has been used as a salad vegetable and also features in many folk remedies, most of which aren't supported by any evidence. It does have one proven use, though – treating iron deficiency. The plant is very good at collecting iron from the soil, and you can get the benefits of that if you eat it. Chickweed is a good support treatment for anyone who's suffering

from anemia, and can also be useful for pregnant women. Be careful, though – it contains saponins, which can be toxic in large quantities.

Kelp

This common seaweed used to be a well-known remedy for iodine deficiency. If someone is suffering from hyperthyroidism – with symptoms including fatigue, goiter or depression – kelp can be an effective treatment. It can be eaten raw or made into soup; either way the iodine can be absorbed.

After a nuclear attack or radiation accident, eating kelp will help keep the thyroid loaded with safe iodine and prevent it accumulating radioactive iodine-131 from fallout. Be careful though – as time passes, more iodine-131 can build up in the kelp itself. Collect kelp in the first days after the attack, then leave it alone until at least two months have passed and the iodine-131 has decayed.

Chicory

Most famous as a coffee substitute, chicory also has medical uses – and some of them are well proven.

- **Intestinal parasites.** Chicory contains volatile oils that are toxic to intestinal parasites. These oils are found in all parts of the plant, but they're most concentrated in the roots. Many farmers add chicory to their cattle feed to help eliminate worms, and it will work for you, too.

- **Stomach upsets.** The flowers of the chicory plant can help calm an upset stomach.

Chicory has been used as a traditional remedy for chancres. **Don't try this!** A chancre is usually the first symptom of syphilis, and the only treatment that will work is antibiotics. A single dose will stop it at this stage, but chicory won't. The chancre will go away, but the disease will be progressing quietly – and by the time it comes back, you really won't like it.

Chufa Sedge

Although it's not widely known now, this plant is one of the most ancient human food sources – and it's also been widely used in traditional medicine. The tubers of chufa sedge (sometimes sold as "tiger nuts) are rich in antioxidants, vitamins and nutrients, so they're good for general health. They also help treat diarrhea and upset stomachs, and there's scientific evidence that the compounds they contain can benefit diabetics.

Wild Lettuce

This plant doesn't look like the familiar vegetable – and it doesn't taste much like it either, thanks to a strong bitter taste – but it's an effective painkiller. In fact, one of its other common names is the opium lettuce. In the 19th century doctors used it when they couldn't get opium. It isn't as powerful as any opiate, but it's a lot better than nothing.

There are two ways to prepare wild lettuce as a medicine. One is to simmer the chopped plant, along with plenty of sugar, in a pan of water until it's reduced to a thick syrup. It's still pretty bitter even with the sugar, but the natural painkillers are more highly concentrated in this form. The other option is to dry the leaves and stems, then chop them coarsely – a couple of seconds in a blender will do it – and make them into tea.

Finally, by slowly cooking a lot of leaves in just enough water to cover them until the water is dark brown, straining it, then reducing the liquid until it's a paste, you can make a concentrated wild lettuce extract that has a lot of painkilling effect in a small dose.

Curled Dock

The root of curled dock is a rick source of iron and was traditionally used for treating anemia. The leaves and roots also have a laxative effect on some – not all – people. Dock leaves are well known for having a soothing effect on skin irritations and nettle stings. The Zuni people use a poultice of powdered dock root to treat sores, rashes and skin infections.

Black Draught

The ominously named black draught was one of the staples of Victorian medicine, usually used as a laxative (it's a very effective one) but also applied to many other common problems including upset stomachs. It disappeared from pharmacies long ago, but it can be made at home.

Dissolve 3oz of Epsom salts in a pint of water, add three ounces of senna pods, a teaspoon of coriander seeds and half an ounce of crushed fresh ginger, then slowly simmer in a covered pan for three or four hours. Strain the liquid and add a large shot of vodka to act as a preservative. Three tablespoons of the draught, given to an adult, will rapidly clear any intestinal blockages.

Pine Syrup

Sore throats and scratchy coughs can make life pretty miserable, so it's no surprise that many traditional remedies are aimed at them. One that really works is pine syrup. First make a basic syrup. Heat a cup of water plus two extra tablespoons to allow for evaporation. Add two tablespoons of corn syrup or sugar, and a pinch of salt. Bring it to the boil; while it's heating up rinse a cup of pine needles and chop them finely.

Once the syrup boils, leave it to boil for one minute without stirring. Then take it off the heat and stir in the chopped needles. Let it steep for two or three hours, then strain it. The syrup will keep in the refrigerator for up to a month, and one or two tablespoons of it will take the worst edge off a cough or sore throat.

Clove Oil

Modern dentistry has made a huge difference to our quality of life. You might not enjoy a session in the chair, but it's a lot better than what people had to live with just a few generations ago. Unfortunately, it will be one of the first things to collapse in a major crisis. Luckily, there are some traditional remedies that do work. One of the best is clove oil. This used to be the first choice for relieving the pain of a cavity. Just apply some to the cavity with a cotton bud or fingertip, and it will quickly soothe the pain. Repeat whenever it starts hurting again; this will make things much more pleasant until you can get some more permanent treatment.

Garlic

People have been using garlic as a remedy for thousands of years – it was valued for its medical properties at least as long ago as ancient Rome, and probably much longer. Today it's believed to help prevent heart disease, some cancers and many other conditions. The evidence for this is variable; for example, garlic probably doesn't do anything to prevent cancers or even the common cold (although a

sandwich filled with sliced garlic is a traditional preventative). It probably *does* have some benefits for heart disease, because it looks like it prevents platelets clumping into clots.

One thing garlic can definitely do is act as a natural painkiller. A slice of raw garlic held against a cut or sting can take away much of the pain. Some people can react badly to it, but for most it works well. Garlic, like clove oil, is also good at relieving toothache; just hold a slice of garlic against the cavity until the pain subsides.

Garlic also has antiseptic effects. In both world wars medics used it to protect wounds from infection when their regular antiseptics ran out. It isn't as effective as a modern antiseptic, but it still gives reasonably good protection and you're a lot better using garlic than not using anything. Poultices of crushed garlic can be applies to wounds or sores to fight infection and take down inflammation.

Onions

If you can't get garlic, onion contains the same active ingredients but at lower concentrations. It can be used as a substitute for garlic, but it might have a less powerful effect or need more to get the job done.

Dandelion

The common weed is edible, and makes a good salad vegetable or green. It's also been used as medicine for centuries. Herbalists use it to "detoxify", but there's no scientific support for detoxification. However, dandelions do make a good potassium supplement, and they're also a laxative and diuretic. If you're suffering from constipation or difficult urination dandelion tea can help.

Castor Oil

These days castor oil is mostly used in industry, but it used to be one of the favorite cures of every doctor and medically inclined housewife. It's classed as safe by the FDA but not many people use it as a medicine anymore. A lot of that is down to its reputation – a spoonful of castor oil was a common punishment for Victorian children, because it tastes pretty bad.

However, behind the scenes, castor oil extracts turn up in a lot of modern medicines – and the oil itself is still a good thing to have in your emergency supplies. It's a very effective laxative, and it probably helps to induce labor in pregnant women. For that reason, it shouldn't be used to treat constipation in pregnant women who aren't at full term, because it can bring on premature labor.

In alternative medicine castor oil is also used to treat skin conditions, cysts and even cancer. There's no good evidence that it works on any of these, although it might be worth trying on skin problems if you don't have any other remedies.

Possible Remedies

As well as the proven remedies we've already looked at there are many others that *might* work. Usually there's been some scientific study of them, but not enough to be sure. In other cases, there's so much evidence from people who've used them, and say they helped, that it's hard to ignore. Just be aware that there are no guarantees with any of these remedies. It would be a very bad idea to switch from modern medicine to anything in this section – but, if you can't get a hold of modern medicine anymore, these lost remedies are worth

trying. If they don't work, you're no worse off than you were before; if they *do* work it could be a life saver.

Fenugreek

This distinctive sweet-smelling herb is used in Indian, Persian and Turkish cooking – but it could also help diabetes sufferers. The evidence isn't clear, but some scientific studies suggest that it could reduce hypoglycemia and TC; it might also lower cholesterol levels. This isn't completely reliable, but if you're out of medicine and have access to fenugreek it's certainly worth a shot.

Thyme

Another herb, and a more common one – most people have some in the kitchen. It isn't just great for seasoning chicken and fish, though. Thyme has also been used as a remedy for thousands of years, both as a herb and as an essential oil.

- **Wound dressings.** Before antibiotics were invented, bandages were often treated with oil of thyme – it can help prevent infections thanks to its natural antibacterial properties. It's not as effective as a proper antiseptic, though.
- **Toenail fungus.** Studies suggest that oil of thyme might be effective against several common fungi that can infect toenails. Rub the affected areas with oil every day for a week; it might clear up.
- **Coughs.** A tea made with thyme leaves (dried or fresh) is a traditional herbal remedy for coughs – and there's some evidence that it actually works. Allowed to cool, it can also be used as a gargle for sore throats.

Potato

Potatoes are a lot less exotic than herbs, but they might also have some medicinal uses.

- **Warts.** An old gypsy remedy for warts is to cut a potato, rub the exposed flesh on the wart, then bury the potato. If you dig it up a week or two later, the wart will have grown on the potato – and it'll be gone from you. Obviously, this story is nonsense, but there might be a core of truth in it. Many people say they've got rid of warts by rubbing them with a slice of raw potato. Try applying fresh potato to the wart at least once a day for a week, then see if it's having any effect. If it seems to be working, keep going until the wart is gone. Don't bother burying the potato, though – just throw it in the trash.
- **Scurvy.** The evidence behind this one is a *lot* stronger. Mashed potatoes is a traditional remedy for scurvy – Vitamin C deficiency – especially in infants. That isn't a surprise. When we think about foods rich in Vitamin C most of us think of oranges, lemons and blackcurrants. Potatoes won't be high on the list, but they should be. Wash and slice them, boil them lightly with the skins still on, and they're a very good source of the essential vitamin. You'll lose a lot of it if you peel or bake them, though.
- **Digestive problems.** Water that potatoes have been boiled in is a traditional remedy for stomach upsets. It's starchy, and may also have anti-inflammatory properties. Some people advise drinking juice squeezed from raw potatoes, but uncooked potato contains toxic alkaloids, to be very wary of drinking too much of it – not more than half a cup, twice a day.
- **Constipation.** Steamed potatoes might be effective at clearing up constipation. You can also make them into a soup – boil the potatoes in broth, then either mash them in the broth or run the whole lot through a blender.

Oak

Oak trees have provided wood for fuel, charcoal, construction, weapons and tools. The acorns can be used as food. You can even make ink from oak gall. It's a very useful tree – and some of those uses are medical.

- **Bleeding.** Dried, powdered oak root is astringent and helps to control bleeding. It might also be able to prevent infections.
- **Wound healing.** Make a poultice from oak leaves and apply to a wound – there's some evidence it can promote healing.
- **Swollen joints.** A cold compress made from oak leaves can take the heat out of a sore joint and bring down the swelling. To be fair, though, a cold compress made from just about any leaves will do that.

Beech

The beech is another useful tree. In medical terms it doesn't do anything spectacular, but various parts of it are still believed to be handy remedies:

- **Inflammation.** A tea made from beech leaves and bark is a mild anti-inflammatory.
- **Stomach upsets.** An infusion of beech leaves can calm an upset stomach.
- **Burns.** A poultice made from boiled beech leaves may help burns heal more quickly. Some people believe it also works on skin damaged by frostbite.

Fiddleheads

The fiddlehead, or ostrich fern, is a good source of antioxidants and omega-3 and -6 fatty acids, so adding it to a survival diet is good for general health. Its leaves have also been used as a poultice to treat wounds, infection and boils; just place the fresh leaves against the injury and hold them in place with a cloth or bandage.

Blackberry

Collecting the sweet, dark fruit of the blackberry is an old tradition that still survives in many areas, but a few generations ago the plant was also valued for medicinal reasons.

None of the health claims made for it have been scientifically verified, but a lot of people swear by them – and as blackberry is easy to find in most rural areas, it's definitely worth a try. What scientists do know is that the leaves and root bark are strongly astringent and can act as a diuretic, so while blackberry remedies aren't proven to work, they're certainly credible.

- **Diarrhea.** A tea made from the root bark and leaves is a traditional remedy for diarrhea. Some people even claim it can treat dysentery, but that might be over-optimistic.
- **Mouth ulcers.** Mouth ulcers can be painful. Make a mouthwash from boiled blackberry roots; that might help them heal. It can also be used as a gargle for sore throats, and to treat thrush.

Blueberry

As well as being tasty, blueberries have gained a reputation as a healthy "superfood". There's probably no such thing as a superfood, but blueberries do feature in some traditional remedies. They're also high in natural antioxidants, so eating them regularly could protect your DNA and reduce the risk of cancer.

Traditionally, blueberry juice has been drunk to treat urinary problems. It's believed (but not proven) to be effective against cystitis, and it's possible that it can prevent or even reduce kidney stones. Drinking it certainly won't do any harm, and it probably will help your overall health at least slightly.

Burdock

This is another plant that used to play a big part in folk medicine. Most parts of it, but specially the roots, were believed to have healing properties. Dried burdock was used as a diuretic, a diaphoretic – to make people sweat – and a blood purifier.

Oil pressed from burdock root was used to treat acne, eczema and other skin problems – and a lot of people believe it's effective.

Red clover

Tea made from red clover flowers and leaves has been used to treat everything from sore throats to cancer, but there's no evidence it works on most of them. One exception is hot flashes in menopausal women; there's good evidence that extracts of red clover help relieve those. Tea made from the plant is likely to have some effect, too.

White clover leaves were also made into tea, which was a traditional remedy for coughs, colds and fevers. There isn't strong evidence to support this, but it could work.

Port

It's usually not a good idea to try using alcohol as a medicine, because its effects on the body can make a lot of symptoms worse. Alcohol depresses breathing, and if someone already has trouble breathing that can be dangerous. It also affects blood pressure and can make bleeding worse.

On the other hand, there are exceptions to every rule. If you have a dry, painful throat, try a small glass of port. The heavy, sweet wine can have a soothing effect. It's a favorite trick of singers who want to polish their voice before a performance.

Some people believe port can also help reduce fevers. In Argentina, a traditional remedy is an egg yolk mixed into a glass of port. It doesn't sound very appetizing, but many believe it works.

Loquat

The loquat, or Japanese plum, is a small tree that produces oval yellow fruits. Several parts of the plant have medicinal uses, and it's been used in Chinese medicine for thousands of years. Sweet syrup made from the fruit is used to soothe sore throats, and is still a popular ingredient in Chinese cough drops.

A tea made from the leaves can also help sore throats, and the Japanese believe it can heal skin conditions like eczema (although there's no solid evidence for this). If you're stressed or can't sleep you can eat a large helping of loquat fruit – it's a mild, but effective, sedative.

Crab Apple

The small, sour fruit of the crab apple is used to make apple sauce, jelly and pies; most parts of the tree also have medicinal uses. The fruit is an effective laxative, and its juice is astringent. A poultice made from crushed crab apples is a traditional remedy for inflammation, and may help wounds to heal. The root bark is a mild sedative and believed to help eliminate worms and intestinal parasites. The leaves also contain antibacterial agents. *Don't* eat the seeds – they're toxic.

Heal-All

Prunella vulgaris is commonly known as heal-all, self-heal or woundwort, which is probably a clue that it's been used in medicine.

It's edible and very rich in vitamins, so adding the leaves to salads is one way to promote general health. It also has some more specific uses in traditional medicine. The dried leaves can be made into a tea which was believed to cure diarrhea, kidney problems and goiter. It was also thought to bring down fevers.

Not all the medical claims made for Heal-All have strong evidence to back them up, but they're certainly plausible. The plant has antibacterial and antiseptic properties, and it's also astringent. Using fresh leaves to cover a wound is likely to help prevent infection.

Vinegar Socks

Many people say vinegar has medicinal powers, and through the years it's been used in some very odd remedies. One of the oddest is soaking your socks in it and wearing them to bring down a high fever. The technique is simple – just put your socks on and soak them in vinegar. Every half hour add some more vinegar to keep them nice and wet, and repeat until the temperature starts to come down.

Unsurprisingly there's no solid evidence that this works, and no convincing scientific reason why it should. On the other hand, a lot of people swear that it *does*, so if you have a stubborn fever (and spare socks) it's worth a try. The worst that can happen is your feet smell of vinegar for a couple of days, and if you're sweating with a fever that's probably going to be an improvement anyway. You can use either regular or apple cider vinegar.

Nut Shell Tea

Nut shells are an old Southern remedy for a bad cough. Take five ounces of shells – walnut or pecan are good – and boil them in a pint of water for at least half an hour. Then strain out the shells and drink. Many people swear that this will soothe your throat and help relieve the cough.

Rose Hips

The most prized traditional garden plant is the rose, and it's also worth looking for when the SHTF – the petals are edible, and make a good salad. The rose has medicinal properties too, though. Forget the flower – what you want is the rose hip, the small fruit that forms after the flower has died.

Rose hips have a high Vitamin C content, so they're good for general health. Tea made from them has also been used to treat colds, fevers and upset stomachs.

Remedies To Avoid

For a variety of reasons, the remedies in this section should be avoided. Some are ineffective. Not *possibly* ineffective – *definitely* ineffective. Trying them might give you a false sense of security, when you'd be better off looking for something that might actually work. Others are capable of hurting or killing you on their own. It doesn't matter who tells you to try them; don't listen.

Hair of the dog

The expression "Hair of the dog" now applies to a simple, traditional hangover cure; have another drink when you wake up. That's not a good idea for many reasons, including alcohol dependency, poor nutrition and the risk of a DUI charge, and it also doesn't work. You might not notice the hangover as much, but it's still there under the alcohol buzz – and soon enough it'll resurface, worse than ever.

Hangovers weren't the original target of this myth, though. In its older and more literal form, it was prescribed as a treatment for one of the

most terrifying diseases in the world – rabies. From ancient times until as late as the 19th century people believed that if you were bitten by a rabid dog, placing hairs from the animal in the wound would protect you from the lethal madness.

It won't. The only thing you should do with a rabid dog is shoot it and incinerate the body where it lies. Trying to catch it just invites more bites; even plucking hairs from its corpse carries a risk, because all its fluids will be loaded with the virus. If you can, find a doctor and get rabies prophylaxis as soon as you can; if that isn't an option wash the wound thoroughly with soap and hot water – and antiseptic, if you have it.

Black cohosh

Traditionally this plant was used to treat arthritis and muscle pains. Extracts from it can be processed into medicines, but the plant itself is bad news. In pregnant women it can cause miscarriages; in everyone else it's been linked to liver disease and can cause existing cancers to spread and metastasize. There's evidence it can have beneficial effects, but the dangers of consuming it outweigh these.

Rum and gunpowder

In the era of sailing ships, a traditional Royal Navy cure for a fever was a large shot of rum with a dash of gunpowder mixed in. It may have originated with the buccaneers in the Caribbean, and it was spread round the world by sailors.

The reason this fearsome remedy spread so far is that there's a big grain of truth in it. The effect comes from the alcohol in the rum; if

someone has a fever alcohol *can* bring their temperature down. Drinking alcohol tends to dilate blood vessels close to the skin, and more blood flowing in shallow body layers means more heat radiated out of the body – that's why drinking alcohol is so dangerous in cold weather. So, a heavy dose of rum can very easily bring a fever down by a few degrees.

Unfortunately, any benefits from bringing down the fever will be outweighed by the other harm the remedy causes. A large enough dose of alcohol to have much impact on temperature will also risk causing nausea, vomiting and respiratory depression. In general, alcohol is not a medicine and shouldn't be used as one – it's more likely to kill than cure.

Crab Apple Seeds

Many parts of the crab apple tree have medicinal uses, but one should be avoided – the seeds. Some people claim that a chemical they contain can help treat cancer. Unfortunately, the chemical is hydrogen cyanide.

There's no good evidence that it can treat cancer, but it can definitely kill people and crab apple seeds contain quite a lot of it. In large quantities the seeds can shut down your respiratory system very quickly.

Pennycress

Various parts of this small plant have been used in traditional medicine. It has antibacterial properties, which means it can be effective at fighting infections, but it also has dangers.

In large quantities it reduces the white blood cell count – so while it can fight infections, it makes you more likely to get one in the first place. Unless you know exactly what you're doing it's safer to avoid using this plant on sick people, although if you're healthy it's fine to eat moderate amounts in salad or greens.

Kudzu

In Asian traditional medicine, kudzu is used as a treatment for cancer. However, there's no evidence it slows or stops the growth of any kind of cancer – and in some cases it can actually make a tumor grow and spread faster. Any cancer that's influenced by hormones can be made more aggressive by kudzu.

Mercury

We all know that mercury is poisonous. If you're interested in history you might also know that it used to be taken as a cure for several deadly diseases, especially syphilis. Mercury *does* fight syphilis, but it's still toxic. Regularly ingesting mercury will seriously damage your health and can easily kill you; there's no point at all in risking that when syphilis can be wiped out as soon as the first symptoms appear by a single dose of antibiotics. It's never worth taking mercury as a medicine.

Any "natural cancer cure"

There are no traditional remedies or diets that will treat cancer. Some plants contain antioxidants that can help *prevent* cancer, but once a tumor has actually appeared you should rely on medicine if you can. Eating onions, or rubbing castor oil on your skin, isn't going to help.

Conclusion

Modern medicine isn't perfect. Some drugs have unwelcome side effects, some – like thalidomide – go horribly wrong, and others cause harm because they're prescribed indiscriminately. These are exceptions, though. In general, modern remedies are pretty good, which is why life expectancy is longer than it's ever been.

The downside is that modern medicine is delivered by the sort of huge, complex and technology-heavy system that's going to collapse quickly in any real crisis. We've all seen how hospitals get overwhelmed when there's a bad storm; imagine how bad it's going to get if whole states – maybe the whole country – have collapsed into chaos. Our modern healthcare system won't last a week. That's when we'll have to reach for remedies that had been abandoned as we made progress.

Luckily, many of these remedies weren't abandoned because they didn't work; they were abandoned because they don't work *quite* as well as the modern drugs that replaced them. If you're suffering from poison ivy then baking soda might not be as good as the latest anti-inflammatory skin cream, but it's a whole lot better than nothing.

Many traditional remedies – baking soda, for example – have other uses in everyday life or an emergency. Activated charcoal is used in water filters and is a component of gunpowder. Castor oil is a good low-temperature lubricant that doesn't degrade rubber seals. Vinegar has so many uses that anyone who wants to be prepared should have gallons of it stockpiled. The fact these substances have medicinal uses too is just a bonus.

Knowing what medicinal plants to look for is also a good idea. Many of our best drugs are based on plant extracts, and when the drugs are gone the plants will still be there. They might not be as potent, but they'll still help.

Don't reject remedies because they're in the "possible" section of the book; lots of people are convinced that these treatments work, and in general they aren't going to do any harm even if they're ineffective. If you don't have any other medicines available, they're definitely worth trying.

Finally, some remedies have been lost to history for a reason. They're either totally ineffective or actively dangerous. People have killed

themselves trying to treat cancer with crab apple seeds; it doesn't take much cyanide to turn your lights out for good. Sometimes it really is best to stick with the devil you know.

A well-stocked first aid kit and medicine cabinet will be your fist resources when illness or injury strikes, but if they don't have what you need try reaching into history instead. Some of the remedies in this book have kept millions of people alive; the next life they save could be yours.

Sealed Foods that Last Forever

It seems as if the beginning and ending of prepping is stockpiling food. I say that because that's how almost all of us start out and it's something we keep on doing, even after most of our other preps are done. With no sure idea of how long we're going to have to survive off of our stockpile, it just seems to make sense to keep letting it build, even past what we originally intended.

Yet at the same time that we keep adding to our stockpiles, there's a concern about whether all that food will last. As it comes from the supermarket, most foods won't last long. So, we tend to repackage much of what we buy, making sure that bacteria, insects and rodents can't get to them. Properly packaged, there are actually a number of foods which will last much longer than you'd expect.

Of course, a lot of this has to do with how well we package and store these foods. Proper packaging needs to be airtight, moisture-proof, and critter proof. Removing the oxygen from the package can help, as insects need oxygen to survive, just like we do. Some nutrients in foods tend to oxidize, so the oxygen absorbers help protect from that as well. Dry foods have to be really dry, without any chance of moisture contaminating them. So, it can be worthwhile to add silica desiccant packages. But all this is within the realm of possibility; even, at times, within the realm of factory packaging, so that we don't have to repackage it.

Don't forget that when they dug up the tombs of the Egyptian Pharaohs and Mayan Kings, they found food that had been buried hundreds or even thousands of years ago. While much of it was lost, there was still some that had survived all those years; mostly grains. And those ancient people managed to do that, without our modern methods of packaging and storing food.

How did they do it? To start with, they started with dry foods, because bacteria can't survive in a dry environment; they need a moist environment to live. Then they put those foods in sealed containers,

where insects and rodents couldn't get to them. Those same keys will work for us, even better, because we've got better containers and better technology than they did.

NATURE'S PRESERVATIVES

There are three natural preservatives that nature provides. We've already mentioned one of them, by mentioning that bacteria can't attack dry foods. While that doesn't mean that dry foods can't spoil in other ways, we'll show you in a moment how to protect those dry foods from other pests.

The other two natural preservatives are salt and sugar. Both work the same way, although salt is much more commonly used as a preservative, than sugar is. The problem with sugar as a preservative, is that while it kills bacteria, it can also attract insects. Salt works against both bacteria and insects.

Salt and sugar are interesting chemicals in that they force osmosis. This is a chemical process by which water or other solvents pass through a semipermeable membrane from a less concentrated solution to a more highly concentrated one, with the intent of making the concentration equal on both sides of the membrane.

Ok, so that does this mean for preserving food? Plant and animal cells are all surrounded by semipermeable membranes. If you take a piece of steak, pat it dry with a paper towel and put it on a plate, then cover it with salt, the salt will become wet. This isn't because of the moisture on the surface of the steak, because you just removed that. Rather, it's because of osmosis causing water to come out of the meat cells, trying to balance the concentration of salt inside and outside the piece of meat.

Left long enough and with enough salt, the salt alone will do a lot to draw the moisture out of the meat, although it won't dry it as

thoroughly as jerky is dried. But it will do something else as well. It will draw the moisture out of any bacteria that are on that meat, dehydrating them to the point where it kills them. Salt and sugar create an environment that is inhospitable to bacteria, thereby preserving food.

OUR "FOREVER" FOODS

So, what sorts of foods can we package and expect them to still be good 10, 20 or even 30 years from now?

Pemmican

The American Indians invented pemmican as a means of preserving food to get them through the winter, as well as for use in long journeys when there wouldn't be time to hunt and gather. It is a mixture of lean meat and fat, which is pressed into a little cake. Berries and nuts are sometimes added for flavor, as well as to give the pemmican added calories and bulk.

Grains

Many sorts of grains will keep indefinitely, if they are packaged to protect them from moisture, insects and rodents. In ancient times they did this with clay pots. Today, we can do it with aluminized Mylar bags and plastic buckets. Add an oxygen absorber and most of those grains will be just as good in 20 years as they are today.

Unprocessed, unground grains are best for long-term storage. Oatmeal is actually one of the best; not instant oatmeal but the

original rolled oats. While that will take longer to cook, it will provide you with a wholesome, nutritious breakfast.

White Rice is actually better for long-term storage than brown rice is, as long as you follow the same process of putting it in an aluminized Mylar bag, inside a five-gallon plastic bucket.

Corn Starch

While we don't use corn starch alone as a food product, it is useful in thickening gravy and making the broth for stew. In that manner, it adds carbohydrates and calories to our foods. As long as it is kept dry, corn starch will last virtually forever.

Popcorn

One grain that you may not think of is popcorn. Actually, much of the grain found in the tombs of those kings was dried corn. While I doubt they had microwave popcorn back then, corn was often ground for making various kinds of bread and tortillas. You might want to have a hand-crank grain mill to go with your popcorn and other grains, so that you can use it for baking with. That will be easier to work with than the stone grinding they did and not leave chips of stone in your meal.

Beans

Dried beans of all sorts are one of the staples eaten around the world. There are a large variety of beans, or legumes, sold on the market; some of which you may not be familiar with. Some can even be ground into flour, for baking with. Chick peas, for example, are ground in the Middle East for making a

variety of dishes. Make sure you stock up on good recipes for using your bean hoard, especially if you are stockpiling beans that you aren't used to eating.

As with grains, beans don't come from the grocery store packaged for long-term storage. You'll need to repackage them in aluminized Mylar bags, inside of five-gallon plastic buckets. But once you do, they'll keep a good 30 years.

Pasta in a Bucket

As it comes from the store, pasta will keep on the shelf for about a year. That's mostly because it's not all that attractive to bugs and bacteria. But left that way, it will supposedly go bad, eventually. To keep it for the amount of time we're talking about, something more needs to be done with it, like putting it in an aluminized Mylar bag, with the air sucked out of it, inside a five-gallon plastic bucket. Stored like that, pasta may just last till sometime in the next century.

You can actually buy pasta already packaged this way, as "survival food" or you can do it yourself. If you want a variety in your pasta's shapes (And who doesn't?) then you're probably better off packaging your own.

Hard Tack

Hard tack is a simple bread or cracker, made of nothing more than wheat flour and water. It was used extensively as rations during the Civil War and during the expansion of the West as a food staple, as it is so dry that bacteria and mold are unable to live in it, unlike other breads.

Salt

If you've done any food preserving, such as canning or drying food, you've run across salt as one of nature's preservatives. It draws moisture out of food, through osmosis. This kills bacteria, which need a moist environment to survive. So, you can imagine what a pure salt

environment would do to those bacteria. The only thing you really have to protect salt from is moisture. Back to the buckets again.

Cane Sugar

Like salt, sugar is a natural preservative, although it is normally only used for preserving fruit. Like salt, it needs to be protected from moisture. But it also needs to be protected from insects, as many insects love sugar. Ants will go to great lengths to get to it, if the packaging isn't strong enough to keep them out. So, a bag, like the aluminized Mylar bags I mentioned isn't enough, as ants can get through. This is one place you really need that plastic bucket, with a good seal.

Honey

Like sugar, honey will keep forever. But you need to make sure that you have pure honey. Some brands of honey, especially those which come from China, add fillers. You're better off buying honey that is stored in glass containers, rather than plastic, as the chemicals from the plastic can actually leech into the honey.

Honey also has medicinal properties, so there's more than one reason to stockpile it. But you really shouldn't give honey to children under five, as it isn't good for them.

Pure Maple Syrup

Real maple syrup, stored in a glass bottle or jar, will keep virtually forever, just like honey will. It is also healthy in that it is loaded with vitamin D. The key to keeping it for a prolonged period of time is

keeping it in a sealed container. Once the container has been opened, it will start to crystallize.

Pure Vanilla Extract

While this may not be a prime diet item, real vanilla extract, and other extracts as well, are alcohol based. As such, they kill any bacteria which come into contact with them. Keeping a good stock of real vanilla extract (not the artificial kind) on hand can make for better baking in a post-disaster world, giving your family a more enjoyable diet.

Finding pure vanilla extract can be difficult in the United States, as most of the vanilla extract sold in our grocery stores is fake. But if you ever happen to travel to Mexico, you can pick it up there, extremely cheaply. Another option is to make your own, by soaking vanilla beans in vodka.

Baking Soda

Unlike baking powder, which doesn't last for a prolonged period of time, baking soda will last a lifetime. The only thing you've really got to watch out for is that it doesn't get wet. As long as you can protect it from moisture, it can't go bad.

Granted, you can't bake everything with just baking soda; but if you take some time looking in the recipe books, you can find that lot that you can do with it, even if you don't have baking powder to use.

Powdered Milk

The powdered milk you find in the grocery store isn't really ideal for long-term storage. Not only is it not packaged to keep for a long time, but the milk itself isn't prepared properly for long-term storage. However, you can buy buckets of powdered milk that are properly prepared for long-term storage, which you can count on keeping good for 20 years or more.

Just a note here; some of the survival food companies who packaged powdered milk for long-term storage; but you have to buy it from them, not the grocery store.

Ghee

Ghee is butter that has been boiled until all moisture has evaporated, leaving nothing but the milk fats. Without any water content, it cannot support bacteria and will keep, without spoiling. At the same time, it can be used much like butter, albeit with a stronger flavor.

Cacao

The Mayans prized Cacao (cocoa) as a food of the gods. It was considered to have incredible health benefits for those who ate it. It's useful to energize you, in addition to its wonderful flavor. It will also keep virtually forever, especially when properly sealed away in a bucket.

Freeze-dried Coffee

Any true coffee snob will tell you that coffee needs to be fresh, to be good. While the rest of us might not notice if the coffee we used to make ourselves our morning cup was a couple of months old, we would if it was a couple of years old. However, freeze-dried coffee will

keep virtually forever, without changing. One of the first foods ever freeze-dried, coffee is still one of the best.

Tea

Like coffee, tea will keep well for a prolonged period of time. But in this case, the tea leaves themselves can be kept; rather than needing it freeze-dried. The only thing needed, for keeping it safe, is to keep it in a moisture-proof container.

Soy Sauce

Believe it or not, soy sauce will keep indefinitely. It is a fermented food, which makes it impossible for it to go bad. Some other condiments are also fermented, like Worcestershire sauce, so they will keep indefinitely too.

The key here though, is that it has to be in glass bottles, as the chemicals in plastic will leach into the food, if kept long enough.

Apple Cider Vinegar

Not many people would want to call apple cider vinegar a food, nor would they put it on their menu. Nevertheless, it is a food item and like the others on our list, it will last virtually forever.

This is useful, as it can be used in the making of salad dressing and as a marinate on meats. It is also useful for pickling other foods. So, while you may not want to wash your meal down with a nice cold glass of apple cider vinegar, you can still make use of it to pickle a wide variety of vegetables you grow in your garden.

Alcohol

Distilled alcoholic drinks will not go bad, even after the bottle has been opened. This is one of the best "food" items for killing bacteria. In fact, the process of creating alcohol uses bacteria and then kills off the very bacteria that it uses.

Wine, for example typically contains 12% alcohol. That's because the bacteria which eat the grapes and produce the alcohol as a byproduct die off when the alcohol content reaches 12%. Higher "proof" alcoholic drinks, like whiskey, gin and vodka surpass this alcohol level through the process of distillation, as alcohol evaporates when heated, faster than water does.

While these alcoholic drinks aren't nutritious, they are useful in a post-disaster world, both for medicinal purposes and as barter goods. You can be sure that any alcoholic drink will be in high demand as trade goods in a post-disaster world.

PACKAGING DRY FOODS FOR LONG-TERM STORAGE

Dry foods are fairly safe from bacteria, as long as they stay dry. But that doesn't mean that they are safe from being destroyed. Rather, it's insects and rodents we need to protect those dry foods from. Both

would love to chow down on our grains and dried beans, destroying them for us. So we need to package them in a way that protects them from those pests.

These foods generally come from the supermarket in plastic bags or thin cardboard boxes. Sometimes, the two are used together. If we buy them in quantity, such as buying 50 lb. bags of rice and beans, we're still buying them in plastic bags. So they aren't protected at all. Ants, other insects and all rodents can chew their way through this packaging, gaining access to the food inside.

The key here is to put them in five-gallon buckets, which rodents and insects can't chew their way through. I know, as I've had rats try to eat their way into the bucket where I keep the dog food. While they made tooth marks into it, they never got to the food.

To make that storage a bit better, we should put them in those buckets in such a way that they are waterproof, air tight and where as much oxygen as possible is removed from the container. The following procedure will accomplish this.

You'll Need:

- Five-gallon plastic food grade buckets, preferably with new lids – These are available from the major home-improvement centers
- Six-gallon aluminized Mylar bags – Available online through a variety of websites
- Oxygen absorbers – Available from the same websites
- Large quantities of dry food to store
- Hair straightener or clothes iron
- Vacuum cleaner with hose
- Large permanent magic marker
- Rubber mallet

It is best to do this so that you are putting only one type of food per bucket. Some people like mixing their foods, packaging the different types of foods in separate bags, together in one bucket; but that really doesn't gain you anything. We're trying to get long-term storage of 20 years or more here, and when you do have to open it, you will probably be using it all within a period of several months.

The oxygen absorbers are very fast-acting. Because of this, you need to be ready to package a large amount of food at the same time; something like 10 five-gallon buckets worth. That's a lot of food. Buy only the amount of oxygen absorbers you need and use them all at once.

These oxygen absorbers come in different sizes. The websites you buy them for can tell you what size you need, for the kind of food you are storing. What I usually do is buy the largest necessary size for the food I am storing and use that size for everything. It doesn't hurt to have too much oxygen absorbing capacity, although it can hurt to not have enough.

Packaging the Food:

It's a good idea to have an assistant for this project, giving them the responsibility of dealing with the oxygen absorbers. That way, you can have those exposed to the air for as little a time as possible, keeping their potency for absorbing the oxygen in your packaged food, rather than in the ambient air.

- Start by opening the six-gallon aluminized Mylar bags and putting them in the five-gallon food-grade buckets.
- Fill the bags with dry food, stopping about one inch from the rim of the bucket.
- Mark the outside of the bucket with the contents, using a large, permanent marker. I always mark my buckets three places,

around the outside, so that the marking is always visible, regardless of how the buckets are stacked.

- Using the hair straightener or clothes iron, heat seal shut a band of the bag about 2" wide at the top of the bag, leaving a large enough opening on one end for the vacuum cleaner hose to go in. This will actually leave several inches of flap for the bag, which can be used for resealing later, if the bag is opened to remove food and needs to be resealed.
- Working quickly, insert an oxygen absorber into the opening in the bag. Then put the end of the vacuum cleaner hose just barely into the bag opening to suck out as much air as possible. Hold the bag sealed, pull out the hose and then seal the bag the rest of the way with the hair straightener or clothes iron.
- Fold the bag flap down and put the lid onto the bucket. Driving it down with the rubber mallet to seal it. You will be able to tell that it is all the way down, as the sound will change.

Buckets packed in this way should be stored in a cool, dry place. While the buckets themselves are moisture-proof, keeping them in a dry place will help prevent rusting of the handles and mold from growing o the outside of the buckets.

PACKAGING WET FOOD FOR LONG-TERM STORAGE

Wet foods can't be packaged the same as dry foods can; they need their own method. That method is the common food storage technique called "canning". Any grocery store is going to have a wide variety of canned foods in it, ranging from fruits and vegetables, up to meat. You'll also find that a lot of condiments are canned.

Canning is an amazing process, which combines several different preservation techniques to ensure that the food which is canned, is just about as protected as it can get. Some foods that were canned over 100 years ago have been opened, finding them perfectly good after all that time.

This is not to say that canning never fails. I've had commercially canned foods go bad. There were two reasons for this. The first, and most common, was that something happened to damage the can. Highly acidic foods can actually attack the metal of the can, if the coating on the inside of it gets scratched. It will take some time, but the acid in the food will eat through the metal, causing the cans to leak and spoil.

The other thing that happens is when canning is done in plastic jars. Some foods, like fruit juices and applesauce, are commonly canned this way, which provides for effective short-term preserving of the food. However, it is not effective for long-term storage, as the chemicals in the plastic can leech into the food contained within the can, spoiling it.

Proper canning is either done in metal cans or glass jars. Glass jars are most commonly used for home canning, as buying a canning machine to seal metal cans is considered by most to be an unnecessary expense. Jars work just as effectively and are reusable, with only the seals needing to be replaced.

The way that canning works, is that the food to be canned is put in sterile canning jars, with the empty space filled with saltwater or

sugar-water (for fruit). The jars are then capped with a lid and placed in a hot water bath where their internal temperature is raised to 160°F, so as to kill any bacteria that might be in with the food. As the jars cool, the water compresses, creating a vacuum, which draws the lids on tight.

Specific foods require specific temperatures and times in order to properly preserve the food. Meats, which are the most difficult foods to can, require canning under increased atmospheric pressure, in a pressure canner (similar to a pressure cooker, but larger). This higher temperature ensures that all bacteria contained in the meat are killed.

Once properly canned, there are no live bacteria left in the foods to cause decomposition. The cans or jars themselves provide protection from insects and rodents. Since the cans are filled with water, there is little to no possibility of food oxidation. This makes canning an almost perfect means of preservation.

Pickling

Some food items are pickled, in addition to being canned. Pickling requires the use of acid, usually in the form of vinegar. The higher acidity of the foods kills bacteria. These foods tend to store extremely well, as long as the acid in the food does not attack the metal of the can.

Dry Canning

There has been some experimentation with dry canning, using a similar method for canning dry foods. The major differences are that no water is used and the canning is done in an oven, rather than a pot of water. While this looks to be effective, there is not enough long-term data on the results of this method to prove its effectiveness.

Plants You Should Grow Around Your House to Repel Insects

Nobody likes to be bugged; at least, nobody I know likes to be. Yet we live in a world where we are surrounded by bugs; billions of insects who are just trying to live their lives and, in the process, manage to bug us. They probably aren't bothered in the least by having us around, but we can sure be bothered by them.

In fact, we are so bugged by bugs, that one billion pounds of pesticides are used in the United States each year. While a lot of that is used on farms and for other commercial uses, there's still a fair amount used around people's homes; either to keep pests out of the garden, to kill them in the home or to just keep them from pestering us.

This constant exposure to chemical pesticides is clearly not good for us. There seem to be a steady stream of news stories coming out, from all parts of the political spectrum, talking about the health risks of pesticides, both to us humans and to our friends in the animal kingdom. There has even been a considerable amount of evidence to connect declining bee populations with chemicals that aren't even supposed to affect them.

While you and I can't do a thing about the pesticides and other chemicals used in modern industrialized farming, we can do something about the chemicals used around our homes. There really is no reason why we should continue to add to what is poisoning us on a daily basis, if there are natural alternatives available, which are not harmful.

PROTECTING YOURSELF AND YOUR GARDEN FROM BUGS

A number of plants are useful in protecting your garden from bugs; a total of 55 of them that I've been able to find. These plants, most of

which are aromatic, have the ability to keep bug away, so that they are not bugging us. Not all of the plants work for all types of bugs, but planting an assortment of these plants around our homes can do a lot towards ensuring that we live as bug free a life as possible.

- **Alliums** – There are a number of onion-like plants which fall into this category, including: chives, leeks, onions, garlic, scallions and shallots. These are an excellent addition to any vegetable garden, not only because you can eat them, but because they will help protect your garden against slugs, flies and worms. However, there is a risk that they can attract moths, so don't use them if that's a concern. They can also be extremely toxic to dogs and cats.
- **Basil** – Basil is one of the main ingredients in Italian Seasoning, as well as being a herb used widely in cooking. It is also useful for keeping mosquitoes away.
- **Bay leaves** – Repels flies, when grown in the garden. Planting them around your patio or deck will help keep flies from bothering you while eating outdoors.
- **Catnip** – You might want to be careful about this one if you have cats; but catnip repels mosquitoes even better than DEET, the chemical most commonly used in insect repellants. You can crush a few leaves and rub it on your skin to keep mosquitoes away;

although you may attract every cat in the neighborhood. Be careful planting catnip, as it spreads; you're better off potting it and placing the pots in your garden, rather than having it take over from other plants.

- **Chives** – Not only useful for your salad, but can also be sued to repel carrot flies, Japanese beetles and aphids. To use chives to repel aphids, be sure to scatter them throughout the garden, not just in one area.
- **Chrysanthemums** – The chrysanthemum flower produces a compound called pyrethrin, used in many commercially manufactured insect repellents. It is good for keeping away mosquitoes, roaches, beetles, ticks and silverfish.
- **Dill** – This useful herb will repel aphids, squash bugs, spider mites, cabbage loopers and tomato hornworms. This herb can then be harvested and dried for use in seasonings or for canning your own dill pickles.
- **Fennel** – Actually related to the carrot, the seeds of this perennial are harvested for use as a spice. The plant is able to repel aphids, slugs and snails. Few plants work for snails and slugs, so this one is extremely useful. It grows well in warm to hot climates.
- **Floss Flowers** – This plant produces small flowers in blue, pink and white, throughout the summer and fall. They grow extremely well in rock gardens, as an edging plant and in flower beds; but they need a lot of fertilizer. They are known

for producing cormarin, one of the ingredients used in bug repellents.

- **Garlic** – Garlic is an amazing plant, usable as an antibiotic, antiviral and antifungal. It's also a pretty good repellant for blood-sucking vampires… I mean mosquitoes.
- **Geraniums** – These plants love sunny, dry climates. They are excellent for repelling leafhoppers and other types of insects. One type of geranium, the pelargonium citrosum is known as the Mosquito Repellent Plant.
- **Lavender** – Almost all bugs will avoid lavender, with the exception of bees. It is also useful to keep moths away from your clothing. Just hang some dried lavender in the closet or put it in the dresser to keep moths from eating sweaters and other clothing. A drought-resistant perennial, lavender is great in areas which are rationing water for gardening.
- **Lemon Balm** – This is actually a type of mint, often used as a seasoning for fish and used in herbal medicine, infused into a tea. It is also another plant that repels mosquitoes.
- **Lemon Grass** – Lemon grass produces citronella, commonly used as a mosquito repellant. The plant itself does an even better job of repelling these pests than burning candles or torches. It doesn't stand the cold well though, so should be planted in pots, so that it can be moved indoors in the wintertime. Lemon grass is also useful as an herb for cooking.
- **Marigolds** – These colorful flowers have a distinctive smell that is actually used in many insect repellants. This smell repels mosquitoes, squash bugs and tomato worms. Marigolds can be planted among your vegetable garden as a protection against insects.

- **Mint** – The strong odor of mint works incredibly well for keeping ants and mice away. In the garden, it will help to ward off other insects, including mosquitoes.
- **Nasturtiums** - These flowers could be considered to be the poster child of companion planting. They repel many of the insects that attack common vegetables, such as tomatoes, cucumbers, kale kohlrabi, collards, broccoli, cabbage and radishes. Yet they do not repel bumblebees. This makes them ideal for planting around the edges of garden beds, protecting the platns.

- **Oregano** – This common herb is used in a wide variety of Italian, Mediterranean and Mexican foods. Its pungent odor repels many pests. It is also useful for planting around peppers of all kinds, where it helps provide humidity to the plants. Oregano is also an excellent ground cover.
- **Parsley** – If you are growing asparagus, you should plant parsley nearby. Not only is this plant useful for cleaning your palette and breath after eating, it also repels asparagus beetles, so can be used to protect this slow-growing grass.
- **Petunias** – These annual flowers grow best in cooler climates. They produce a licorice-like scent that repels many insects, including aphids, tomato hornworms and squash bugs. However, slugs and caterpillars are attracted to them.
- **Rosemary** – Another useful herb, rosemary's pungent odor repels flies and mosquitoes, as well as other bugs. If you have cabbage planted in your garden, plant some rosemary nearby,

as it will help protect the cabbage from cabbage moths. This plant thrives in hot, dry weather.

- **Thyme** – In addition to being a very common herb, thyme is one of the better insect repellents to grow, as it will repel whiteflies, cabbage loopers, cabbage maggots, corn earworms, tomato hornworms and small whites.

Keep in mind that these plants can only repel insects as far as their odor reaches. So, planting one mint plant in your garden isn't going to keep all bugs off of your patio or deck. Rather, you need to have them all around the areas that you want protected, preferably as close to the seating areas as you can. Using planters on your patio or deck, in addition to that which you have planted in the ground, will help considerably.

In the case of your garden, you'll want to scatter these plants between the others you are growing, ensuring that there is no area that is farther than three or four feet from an insect-repelling plant. If you still find bugs there, bugging your vegetables, then you should probably plant a few more or move some of what you already have.

In summary, here are the best plants to use, sorted by the type of insects they repel:

- To repel mosquitoes: basil, lavender, mint, rosemary, lemon grass, marigolds
- To repel flies: lavender, basil, rosemary
- To repel moths: lavender
- To repel vegetable bugs: rosemary, alliums, marigolds, chrysanthemums, petunias, alliums

Carnivorous Plants

We don't always think of it as anything more than a novelty, but there are a few different sorts of plants which actually eat bugs; not just

the Venus Fly Trap. But we shouldn't overlook the Venus Fly Trap, as it is useful for controlling the population of insects, both inside and outside our homes. While they will catch and eat flies, they are more likely to catch crawling insects, like ants.

These plants need lots of water and sunlight; but as long as they have those two things, they do quite well. The Venus Fly Trap is a very sensitive plant, so avoid touching it. It's not a good idea to show it off to your friends, showing how the leaves close over something. Typically, the leaves can only close three or four times, before they fall off and others replace them.

Another common form of carnivorous plant is the pitcher plants. These exotic-looking plants have a tall vase-shaped leaf, which is colored at the top and holds a combination of water and nectar. Insects are attracted to the plant by a combination of color and aroma. But once inside, they find a slippery slope, with downward facing hairs. Insects fall into the water at the bottom and drown, when they are unable to climb back out. They eat a combination of ants, flies, wasps, bees, beetles, slugs and snails.

These plants can be difficult to grow, as they need moist ground, growing in bogs in the wild. You can grow them in pots, if you set the plant's pot in a pan of water, to help keep the soil moist. This is better than watering the plant directly, which can cause overwatering.

OTHER NATURAL INSECT REPELLANTS FOR YOUR PLANTS

Of course, there are more ways to go about protecting your plants from insects, than just using other plants. While the use of other plants is ideal, when you can; not all insects can be repelled this way. There are always times when you need other things that you can use.

- **Diatomaceous Earth** – This natural substance is not a repellant, but rather kills insects through abrasion. While soft to our touch, its many sharp edges come from being made of sedimentary rock created by fossilized algae. When sprinkled around your garden, it will scrape the lipids from insects' exoskeleton, causing them to dehydrate and die. However, it must be reapplied after each rainfall.
- **Neem Oil** – Oil extracted from the seeds of the neem tree is a powerful natural insecticide, which is able to disrupt the life cycle of insects at all stages (egg, larvae and adult). It is also a natural antifungal. At the same time, it is non-toxic to pets, birds, fish and wildlife. A mixture of 2 teaspoons neem oil, 1 teaspoon of mild dish soap and 1 quart of water works well.
- **Soap Spray** – Speaking of dish soap, a simple insecticide can be made by mixing 1 ½ teaspoons of mild dish soap with 1 quart of water. This can then be sprayed on the leaves of the plants to control mites, aphids, whiteflies, beetles and other insects. The soap blocks the pores in the insects, through which they breathe.
- **Oil Spray** – This works essentially the same as the soap spray and is useful against aphids, mites, thripes and other similar insects. The only difference is that it is made from a mixture of 1 cup of vegetable oil mixed with 1 tablespoon of soap. Shake this mixture thoroughly, then use at a ratio of 2 tablespoons,

mixed into 1 quart of water. The soap will allow the oil and water to mix.

PLANTS THAT MAKE GOOD PERSONAL INSECT REPELLENTS FOR YOU

It's one thing to use plants to protect other plants; but I'm sure you will want to use them to protect yourself from those bugs as well. Who wants to be bitten by mosquitoes anyway? A few of the plants I mentioned above are excellent for use as insect repellants, when crushed and rubbed on your skin. Obviously, you'll want to avoid some such plants, like garlic and onion; but there are others which work well, such as:

- **Catnip** (might drive your cat crazy though)
- **Chrysanthemums**

In addition to those, there are a few others which work well for insect repellants, which I haven't mentioned above as the growing plants don't keep away insects. Rather, the leaves of the plant need to be removed and crushed, rubbing them on the skin. Some of these include:

- **Lemon thyme** – A type of thyme which grows well in shallow soil, as long as it has strong sunlight. Be careful though, as some people's skins are sensitive to this plant.
- **Sage** – This perennial plant grows in the wild and is a common food for antelope. It can be grown potted or in your garden and produces a pungent odor which repels insects. If you have a fire going, toss some sage on the so that the smoke will repel unwanted insects.

You can also make insect repellent out of some of the herbs and plants mentioned above.

Rosemary Insect Repellant

To use rosemary as an insect repellent, boil 1 quart of dried rosemary in a quart of water for 20 to 30 minutes. Strain out the liquid and add a quart of cool water. Mix and store in the refrigerator until needed. Use a spray bottle to apply when going outdoors.

Sage & Mint Insect Repellant

Measure out 2 tablespoons of the following into a quart canning jar:

- Dried sage
- Dried rosemary
- Lavender
- Thyme
- Mint

Add 32 oz. of apple cider vinegar, covering the herbs. Place the lid on the jar and seal it.

Shake the jar every day for two weeks.

Strain out the herbs from the vinegar. Add water to equal 64 oz. (1/2 gallon). Use the liquid in a spray bottle as an insect repellent. Keep refrigerated when not in use.

But what About Termites?

Perhaps one of the biggest concerns, as far as dangerous pests is concerned, is termites. While termites don't bug us in the classic sense, like flies and mosquitoes do, they can cause great damage to our homes, even destroying them. Yet these dangerous insects don't get anywhere near the attention that some of the peskier bugs do, simply because they are not usually seen.

There has been less scientific study about using plants to repel termites and even less anecdotal information to go by. Even so, there are a few plants which have shown great promise in use for repelling termites and keeping them away from your home.

- **Catnip** – The oil of the catnip is a natural termiticide. However, it breaks down in soil more quickly than the chemicals used in commercial termiticides. The other potential problem with using catnip is that it spreads and may try to take over your lawn.
- **Hot Chili Peppers** – Hot chilis act as a repellent for many kinds of crawling insects, such as ants and termites. The acid in the chili pepper is dangerous to these insects. However, it can be dangerous to children as well, so you want to be careful where you plant them.
- **Mint** – While not as commonly used for repelling termites, mint repels a wide variety of insects, including those wood-eating pests.
- **Vetiver Grass** – Vetiver is probably the best natural defense against termites. Although a grass, the vetiver grows more like a shrub, forming clumps. It is related to lemon grass and has a pleasant smell. Its deep root system is commonly used for controlling erosion, especially in reclamation projects. But that same root system is a great deterrent for termites, as well as ticks and cockroaches. The plant contains chemicals which are toxic to these insects.

When using plants as a deterrent for termites, there are two strategies you can use. If you already have them on your property, then what you want to do is keep them from getting into the wood

structure of your home. Termites in the middle of your yard aren't a problem; termites in the home are.

To keep them out of the home, plant the abovementioned plants around the foundation, forming a barrier against the termites. Remember that termites are extremely small, so they don't need much of a space to get though. Therefore, it is important to make as much of a continuous barrier as possible.

It is also important to make sure there is nothing that the termites can use as a hidden pathway from the ground to the wood structure of your home. Stacks of potting soil, bricks or lumber, up against the side of your house are likely to become pathways, where the termites build mud tunnels to use in gaining access to your home's structure. Simply moving those items a few inches away from the home will do a lot to protect your home from termite infestations.

Gardening Companions Chapter

Companion planting can not only help your growing plants thrive but deter pest infestations that can greatly diminish your harvest yield. Grouping specific plants together can also help prevent nutrient depletion in soil.

Some common garden plants curtail the ability to thrive when they are either planted close to each other or near specific trees and bushes that are growing near your gardening areas.

In this chapter, we will discuss which plants should be planted together and which should never be planted together. If you follow these guidelines, you harvest will improve and you should be able to get the most from your gardening space.

BENEFITS OF COMPANION PLANTING

Soil Enhancement

Using companion planting techniques to group together crops that can infuse additional nitrogen into the soil can improve your harvest by making sure each plant gets the nutrients it needs.

Beneficial Insects

Not all bugs are bad. Courting beneficial bugs into your garden and providing them a home in a grouping of companion plants just might bolster your yield. Helpful insects do not eat your plants, but do eat the bugs that dine upon them.

Physical Support

Some plants, such as pole beans, can grow steadily while providing support to other crops – in this case, corn stalks. When plants become heavily laden with vegetables, they can sag and cause breakage that will kill the plant of allow harmful bugs and bacteria to infiltrate it.

Protective Herbs and Flowers

Planting a border of specific herbs and marigold plants around the border of the garden and in with some companion plant groups will protect the most important crops from harmful insects and wind damage.

Trap Crops

This type of companion planting uses both herbs and ornamental plants that urge harmful bugs in their direction only to sicken or kill them after being snacked upon. Trap crops like geraniums and borage should be planted as protective herbs and flowers at the border of the garden or only several feet in front of the protective border as a first line of defense against harmful insects.

Both geraniums and borage should be planted in the vicinity of crops that Japanese beetles love – like broccoli and cabbage. The scent of the plants will draw the highly destructive beetles in their direction and then kill them after being chewed upon.

Nasturtiums are also superb trap crops to use in your companion plant layout. Beetles of nearly all types and aphids will be attracted to them. Once the nasturtiums are filled with the harmful insects, carefully remove them from the ground and drown or burn the insects.

Shelter

When plants sensitive to either sunlight or wind, or both, are overexposed to such weather extremes, they can die within days. Following companion planting protocols, less environmentally fragile plants in a grouping can protect the others, without harming their own growing course.

Why Some Plants Should Never be Planted Together

There are many reasons why certain plants should not be planted together. Sometimes it is a matter of height. For example, a tall tomato plant will steal the sun from smaller plants nearby. Or it could be a matter of moisture. Mint, a water seeking plant, and a desert cactus will not do well next to each other since they have conflicting needs.

Sharing Diseases

Another problem is plants that are susceptible to the same diseases. For example, if you live in a very humid environment and have problems with fungus on squash, don't plant melons too close to the squash, they will also be infected. By keeping them separate, the melons survive long enough to produce a crop.

Allelopathic Plants

Additionally, there are plants that chemically damage other plants or prevent their growth. These plants are called allelopathic plants. They leave behind chemicals that can harm or kill certain other plants. Some of the plants mentioned in this article are allelopathic. You may be planting these plants together and then wondering why your plants aren't doing well, especially if you have a small garden where the plants are all snuggled in together.

Allelopathic plants make planning your garden more difficult. Most home gardeners have not considered allelopathic chemicals, and simply plant wherever they have space. I suspect that allelopathic chemicals are probably the source of many crop failures for beginning gardeners.

Keeping the border around your growing plots clear of debris and harmful trees and plants like the Black Walnut, an allelopathic plant, will help prevent both yield problems and eliminate places harmful insects winter over or make their homes during the gardening season

Now that you know about these plants, your crops will be more reliable.

COMPANION PLANTING GUIDE

Asparagus

Asparagus does not like other plants growing too close, so give the bed a little space. It is especially vulnerable to poor growth when planted next to onions, garlic, and potatoes.

Basil

I like to plant basil near the house because it repels mosquitoes. It also does well planted with tomatoes and improves the flavor and growth of tomatoes. Never plant it near rue.

Bush Beans

Plant bush beans with corn cauliflower potatoes, cabbage, carrots, beets, cucumbers, summer savory, potatoes, strawberries, catnip, marigolds. Never plant them with garlic, onions, shallots, or fennel. Green beans help curtail potato beetles. Beans have negative effects on some plants including peppers.

Pole Beans

Plant pole beans with radishes and corn. Never plant with beets, garlic, potatoes, kohlrabi, marigold, leeks, or shallots.

Beets

Plant beets with onions, bush beans, cauliflower, broccoli, cabbage, chard, kohlrabi, and Brussels sprouts.

Beets do not grow well near charlock, mustard plants or any member of the pole bean or pea family.

Borage

Plant borage with squash, tomatoes, and strawberries. Borage is helpful in curtailing tomato worms.

Brussel Sprouts

Plant near thyme, carrots, beets, dill buckwheat, onions, chamomile, calendula, sage marigolds, hyssop, rosemary, nasturtiums, and wormwood.

A cruciferous vegetable, brussels sprouts don't grow well next to strawberries or tomatoes.

Broccoli

Plant near thyme, carrots, beets, dill buckwheat, onions, chamomile, calendula, sage marigolds, hyssop, rosemary, nasturtiums, and wormwood.

Neither broccoli or cauliflower will grow well near peppers, strawberries, tomatoes, and squash of all types, including zucchini, yellow squash, and winter squash like pumpkins.

Cabbage and Cauliflower

When cabbage and cauliflower are planted together, they are more likely to be affected by Plasmodiophora brassicae, also known as club root. The fungus causes the roots to swell and become unable to take up water and the plant quickly dies. Radish and tomato also do not do well near cabbage and cauliflower.

Plant with chard, broccoli, celery, brussels sprouts, tomatoes, and spinach, and tomatoes. Never plant near strawberries.

Cantaloupe

Cantaloupe loves to be near corn.

Cantaloupe are susceptible to funguses caught from squashes and also should not be planted near potatoes or cucumbers.

Carrots

Carrots don't grow well when planted too close to dill. I learned this one the hard way. I had conditioned the soil perfectly for those carrots, but they ended up small and malformed. The dill had a very noticeable effect on the crop. Now, I know to keep them separate. Carrots don't like to share space with parsnips, either.

Plant carrots near chives, leeks, sage, cabbage, rosemary, peas, early potatoes, radishes, lettuce, wormwood, and salsify, Leeks, wormwood, and onions can deter carrot flies.

Celery

Celery is a little difficult to grow under normal circumstances, but for best results, it should never be planted near potatoes or parsnips.

Chives

Plant near grapes, peas, apples, tomatoes, berries, roses, and carrots. Chives deter aphids, and Japanese beetles and help their companion crops thrive.

Corn

Corn and tomatoes should be separated due to their susceptibility to a common fungal infection. If your tomatoes become infected, they will infect the corn if they have been planted too close together. Both plants are also susceptible to cotton bollworm, also known as corn earworm and tomato fruit worm, another good reason to keep them apart.

Plant corn near early potatoes, melons, squash, pumpkins, green beans, cucumbers, and peas. Planting near soybeans will help prevent chinch bugs.

Cucumbers

Cucumbers are one of the first vegetables that many new gardeners plant and they usually give good results. However, they do not like to be planted near late potatoes, tomatoes, cauliflower, or any of the strong aromatic herbs like cilantro, basil, rosemary, thyme, or lavender.

Plant cucumbers with radishes, early potatoes, corn, sunflowers, green beans, cabbage. Radishes will ward of various types of beetles that attack cucumbers.

Dill

Plant dill with onions, broccoli, lettuce. cucumbers, Brussels sprouts, and cabbage. Dill will bolster the growth of cabbage plants and may improve flavor. Never plant near carrots.

Eggplant

Plant eggplant with potatoes, tomatoes, peppers, and green beans.

Garlic

Plant garlic near fruit trees, cane fruits, cabbage, tomatoes, and roses. Never plant with peas or green beans, garlic will stunt their growth.

Garlic will deter Japanese beetle and aphids. They also help prevent blight in late potatoes.

Kale

Plant near buckwheat, marigolds, cabbage, nasturtiums, and aromatic herbs. Never plant with pole beans or strawberries.

Kohlrabi

Kohlrabi is a cruciferous vegetable in the cabbage family and like other members of the family it does not like to be planted near pole beans, tomatoes, or strawberries. Never plant next to peppers.

Lettuce

Lettuce is easy to grow when planted away from beans and beets. Surprisingly, they also do not like to be near parsley. Never plant lettuce next to cabbage.

Plant lettuce with strawberries, carrots, beets, radishes, and parsnips.

Marigolds

Marigolds are a popular addition to the vegetable garden because they keep away so many pests. However, they have a detrimental effect on beans and peas. Pole beans, bush beans, and peas should be planted far away from the marigolds.

Melons

Melons are susceptible to funguses caught from squashes and also should not be planted near potatoes or cucumbers.

Mustard

Plant mustard amid fruit trees, legumes, alfalfa cover crops, and grapes.

Onions and The Allium Family

Onions, garlic, leeks, and shallots have a discouraging effect on beans and peas. When planted nearby, plants in the Allium family, like onions, stunt the growth of beans and peas.

Plant onions with carrots, beets, chamomile, cabbage, parsnips, and lettuce. Onions deter maggots and a myriad a of potentially harmful insects.

Oregano

Plant as a garden border to repel destructive insects. Oregano is safe to plant near any standard garden crop or fruit producing tree or bush.

Parsley

Plant parsley with tomatoes, corn, and roses.

Parsnips

Plant near onions, wormwood, and radishes.Onion and wormwood plants will deter root maggots from feasting upon the parsnip crop.

Peas

Plant peas near corn, carrots, early potatoes, green beans, turnips, cucumbers, and radishes. Never plant peas with onions, shallots, garlic, or leeks.

Peppers

Plant next to carrots, onions, tomatoes, basil, eggplant, parsley, and eggplant. Never plant near fennel or kohlrabi.

Potatoes

Potatoes have problems with many plants. I tend to stick them off in a far corner of the garden because they don't grow well with many of the plants in my garden.

Potatoes and tomatoes are members of the same family, but they do not grow well when planted together. Potatoes slow the growth of the tomato plant and themselves become more susceptible to Phytophthora, known as potato blight, when the plants are together.

When rotating plants, do not plant potatoes or tomatoes where the other grew the previous year.

Potatoes also don't play well with cucumbers, melons, tomatoes, squash, turnips, or sunflowers. Never plant near apple trees, walnut trees, raspberry bushes, cucumbers, pumpkins, birch trees, cherry trees, tomatoes, or sunflowers.

Plant near cabbage, flax, peas, hemp, marigolds, squash, basil, eggplant, green and other bean varieties. When planted nearby, basil will ward off potatoes beetles.

Radishes

Plant near peas, lettuce, chervil, peas, melons, cucumbers, nasturtiums, and root crops. Never pant near hyssop.

Rosemary

Plant next to any type of bean crop, carrots, and cabbage. Rosemary can help thwart carrot flies, cabbage moths, and bean beetles.

Sage

Plant sage next to carrots, cabbage, and tomatoes. Never plant sage near cucumbers. Sage can thwart carrot flies, cabbage moths, and help the tomatoes grow.

Soybeans

Plant next to corn and potatoes. Soybeans can kill weeds and enrich the nutrient content of the soil.

Spinach

Plant with or near cauliflower, eggplant, celery, and strawberries.

Strawberries

Plant near borage, spinach, pyrethrum, bush beans, and lettuce.

Sunflowers

Sunflowers emit a chemical from their roots that prevents nearby plants from growing and competing for nutrients. This chemical affects an area of at least 12 inches around the plants. The seed shells also contain toxic chemicals that will kill grass and other plants, so harvest the seed heads before the seeds begin to drop. Don't plant other plants within 12 inches of sunflower plants. Also be aware that they grow very tall and can shade out sun loving plants.

Swiss Chard

Plant with kohlrabi, onions, and bush beans. Never plant with pole beans.

Tarragon

Plants near or in with any standard garden vegetables. Tarragon can bolster plant growth and enhance flavor of companion plants.

Thyme

Plant near any standard garden vegetables. Thyme deters cabbage moths.

Tomatoes

Cucumbers, cilantro, and tomatoes are delicious together, but they do not like to grow too close together.

Plant next to onions, basil, carrots, asparagus, mustard, cabbage, mustard, rosemary, stinging nettles, gooseberries, sage, and parsley. Never plant with walnut trees, fennel, kohlrabi, or early potatoes.

Rutabagas and Turnips

Plant near or with peas.

Never plant with knotweed or mustard. Either vegetable will diminish the growth of these plants.

Walnut Tree Dangers

These trees should never be anywhere near your garden. A single black walnut tree located within 100 feet of the growing space will destroy all of your diligent companion planting efforts.

Walnut trees release juglone, a chemical compound, into the ground. Juglone provokes wilting and a yellowing of leaves – and even untimely death of otherwise healthy plants. The chemical compound in black walnut trees is present not only on branches and leaves, but in the nuts that lay on the ground. Juglone is also secreted through black walnut tree's root system.

How much juglone is excreted by the black walnut trees will vary by season. The percentage of juglone present in the tree hits its peak as the nut start to reach maturity. It takes at least two months for the chemical to be removed from the soil after cutting down the tree.

All breeds of walnut trees make juglone, including hickory, pecan, and butternut trees, but the black walnut boasts the highest percentage of this crop killer. Plants that are the most vulnerable to juglone include tomatoes, pepper varieties, eggplant, and potatoes. Onions, corns, beets, and carrots tolerate the chemical compound better than others.

Walnut tree leaves can be composted safely but not until two weeks after they have fallen to the ground or remain on a cut branch. It takes at least 14 days for air, water, and environmental bacteria to detoxify the matter once it has been separated from the tree.

Asparagus, Cabbage, Peppers, Tomatoes, Rhubarb, Eggplant, Alfalfa, Narcissus, Potatoes, Jack in the Pulpit, Columbine, Crab Apple Trees, Chrysanthemum – select varieties, Phlox, Nectarine Trees, Cherry Trees, Bugleweed, Lilies, Hydrangea, Spiderwort ,White Birch Trees, Bellflowers, Ginger, Lilac Bushes, Plum Trees, Peach Trees, Lamb's Ears, Hollyhocks, Rhododendrons, Hostas, Geraniums, Crocus, Wood Ferns should never be cultivated near juglone producing trees.

PLANNING THE GARDEN

Planning your garden is hard enough when you are limited in size and adding this information will make it even more difficult. However, it is worth considering the effects that plants have on each other when you draw up your garden plan. Otherwise, you may end up with a disappointing yield and never understand why.

After doing a walk around your garden area to clear it of walnut trees or debris bugs could thrive in, sketch out your rows or container alignment with the border areas first followed by companion plant groupings to help give your crops the best start to life – and your family a bountiful harvest.

Where Free Land Can be Found in the USA

Anyone who has spent any time around the prepping and survival community knows that the goal of every prepper is self-sufficiency. But just what does that mean? How self-sufficient do you need to be, before you can consider yourself truly self-sufficient? How big a stockpile do you need?

Actually, there's more to it than having a stockpile; for no matter how big your stockpile grows, it will eventually run out. That's why experienced preppers tend to look towards growing their own food. Put another way, these experienced preppers aren't looking to their homes just being a survival retreat, but rather, being a homestead.

But just what is a homestead? There are many different definitions given to this word, depending on whether you are thinking in a legal sense, or in the sense of someone who is thinking of self-sufficiency. That's really what we're talking about, and in that regard, a homestead is a small, subsistence level farm, allowing one to grow enough food for their own or their family's survival. It's not a commercial farm, but rather the true expression of self-sufficiency.

Once upon a time, early American settlers who were willing to move into the sparsely populated western territories of the United States were given the opportunity to scoop up a parcel of land and use it to make their own destiny. Known as the Homestead Act of 1862, any adult citizen who had not fought against the United States in armed conflict could travel west and claim a 160 acre plot of land, so long as they were willing to make improvements to that land (usually building a home) and stay, working that land (usually farming) for at

least five years. Soldiers who fought in the civil war could count the time they served as time spent on the land, so they had even easier access to free land.

Of course, settling out west in the mid-19th century, even on free land, didn't come without hardships, but the Homestead Act fast tracked settlement of the western frontier and brought to life the homesteader spirit that is such a prevalent part of U.S. history. It removed several huge barriers, most notably the cost of the land, which many poor people came up against when it came to carving out a place of their own. Homesteading gave them a way to make a living and feed and care for their loved ones – not to mention a legacy they could pass on to their children and grandchildren.

HOMESTEADING TODAY

This seems like a complete and total pipe dream these days, doesn't it? Yet more and more experienced preppers are turning to homesteading. No, they aren't getting 160 acres of farmland and working it with a horse-drawn plow; but they are homesteading nevertheless. Actually, the modern homestead is much smaller, usually ranging one to two acres. Some people get by on even less.

I'm sure you've seen an article sometime about a family who grew all their own food in the backyard of their suburban home. That's homesteading and it can be done on as little as 1/5 of an acre. I had a neighbor once who farmed his backyard and about half of mine, growing all his own produce and even passing some on to me.

Modern gardening techniques make this possible. Granted, people who are doing this style of suburban homesteading aren't usually raising any livestock larger than chickens and rabbits. Nor are they typically growing their own grains. What they're doing is raising mostly vegetables, along with possibly a few fruit trees. Even so,

they're successfully growing food to feed their families. In the case of a major disaster, the best of them are ready to expand their operations to the point of growing enough food to fully feed their own families.

If you want to be truly self-sufficient, having a place where you know you can care for your family, then homesteading is the way to go. If you can, get yourself a couple of acres and really set yourself up right. But if you can't; at least get a good-sized suburban lot and turn it into an urban homestead. Using raised beds and planting properly, you'll be surprised how much you can grow.

Two acres is considered enough to do a complete homestead, meaning that you are growing your own grains and have a little bit of livestock as well. But as we've already discussed, you can get by on much less, if you limit yourself to growing fruits and vegetables, as well as limiting your livestock to chickens and rabbits. The only problem with that, is that the normal diet is about one-half carbohydrates, which means grains. There's no way you're going to be able to do that on a 1/5 acre suburban lot.

Don't give up just yet, though. There are still places out there where you can get a plot of land for free or pretty close to it.

LAND FOR FREE

Don't assume that this list is by any means complete. These are a few places I was able to find, where land is available for free. Mostly, they are small communities which have land that is available, usually home lots. While that may not be as big as what you want, you could do suburban homesteading. Take a look at the opportunities below and decide if any of them might be right for you and your family.

One thing to keep in mind is that such land is constantly coming available and then being snapped up by people like you and I, who want their own piece of the pie and are willing to work for it. Just recently, a small town about 30 miles from where I live, gave away 90 lots and homes. I don't mention it, because the giveaway is already over. But you never know when such a giveaway might happen.

I don't know if they still are, but for a while the city of Detroit was giving away homes to anyone who wanted them. While those homes may not have worked out well for any sort of homesteading, it does serve to illustrate that these opportunities exist all over. So keep your eyes open for new opportunities.

When you find one of these places, you will have to pass through an application process. The city giving away the land will expect you to move in fairly quickly and start making improvements on your homestead. So be ready for that. While they will give you some months to move, they won't allow you to just sit on the land and not do anything with it.

Besides, the whole idea is to take possession of the land and start building your homestead. You don't want to wait until a disaster strikes, in order to start homesteading. Rather, the idea is to have

your homestead in operation, so that when the disaster strikes and everyone else is in a panic, you're already self-sufficient and ready to go.

NEBRASKA

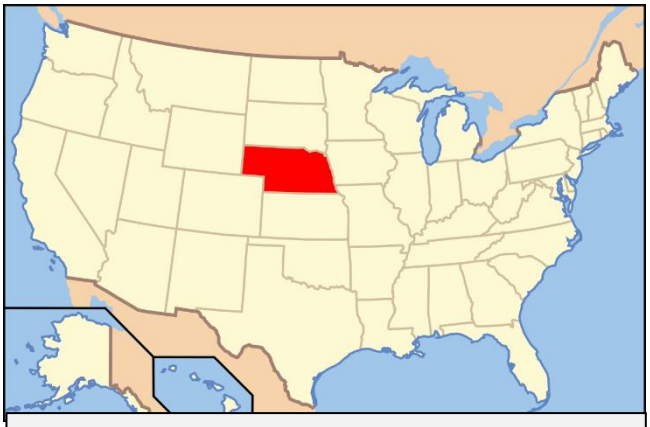


Photo by Wapcaplet [CC BY-SA 3.0]

Nebraska is one of our nation's great farming states. In the northern part of the American Breadbasket, this state has produced a sizeable portion of not only our country's food, but the world's food for the last 100 years or more. With plentiful water and good farmland, Nebraska is a good place to live.

The only thing I could say against Nebraska, as a state for homesteading, is that your growing season will be a bit shorter than it would, if you were living farther south. To compensate for this, you'll probably want to build some greenhouses, which will allow you to start your growing season a few weeks earlier and end it a few weeks later, getting more from your farming efforts.

Beatrice, Nebraska

Unlike a lot of places you'll find on this list, Beatrice is not super rural – nor is it a very small community that needs an influx of new faces and businesses. The city uses their Homesteading Act of 2010 to keep lots in the city from becoming run down. Like the Homesteading Act of old, people must build a home on the property within a year and stay for at least five years. While there aren't any lots currently available, it's worth checking regularly to see if any new ones come up.

Curtis, Nebraska

The small town of Curtis, NE offers free lots for the building of single family homes on paved streets with all utilities provided. With a population of under 900, Curtis claims to be a great place to raise a family or retire. Curtis also offers the unique opportunity to get a free lot on which to build a business, as well.

Ellwood, Nebraska

This small community has set aside a number of lots to be given away. While some are already gone, there are others which are still available as of this writing. The lots are 110 foot by 150 foot, which is a pretty good size. You must build a home that is at least 1400 square feet, with a two-car garage.

Loup City, Nebraska

This city offers two different programs, for those who are looking for free land to build a home. The Workforce Homes program offers free residential lots for those with qualifying income and assets. In some cases, they might also offer up to $20,000 in down-payment assistance. The other program, which they call the Market Rate Homes, offers homes on a first-come, first-serve basis. Only a $1,000 deposit is required, which is refundable upon completion of construction.

IOWA

The climate in Iowa is going to be roughly like it is in Nebraska. There is plenty of water and good farmland to be had. But once again, you're going to either need

Photo by Perry-Castaneda Library [CC BY-SA 3.0]

to have your harvest in early or have greenhouses to extend your growing season.

Manilla, Iowa

This small town is known for a low cost of living. Add that with the free land they are offering to build on, and you have a winning combination. You'll need to contact the city directly for information, as their website doesn't say a whole lot about the program.

Marne, Iowa

The small farming community of Marne, Iowa has free lots that it will give away to people willing to either build a home or place a modular home there, assuming that home meets some basic requirements laid out by the city. The lots are fairly small at approximately 80 ft by 120 ft, but they are free and you can't really beat that. Marne is located east of Omaha, NE and west of Des Moines, IA. It may be just the place if you're looking for a new place to put down roots.

KANSAS

Photo by Perry-Castaneda Library [CC BY-SA 3.0]

The state of Kansas has to be just about the ideal state for growing anything. If you've ever driven though the state, it is 500 miles of nothing but farmland. So a homestead fits in just right. Your growing season will be a bit longer than in either Nebraska or Iowa, but you'll have a good winter as well, so that you can stay indoors and work on those projects that need to be done by the fire.

Lincoln, Kansas

Among the picturesque hillsides of Lincoln, KS, you'll find several free lots to be had in their new subdivision. Along with the opportunity to snatch up a building lot for free, Lincoln boasts recent improvements to their school facilities, updated parks, and access to medical care right there in town.

Mankato, Kansas

Located in Jewell County, Mankato is giving away free lots for building. You'll have to have finances in place to build your new home, and an agreement with a contractor to get it started within 6 months, plus they require an interview with the city council. Homes have to adhere to some basic standards set out by the town.

Marquette, Kansas

The town of Marquette offers free lots on the western side of town for people to build homes on. The town prides itself on its great sense of community and the safe environment it provides for everyone, young and old.

Osborne, Kansas

While they boast about their fiber optic communications network that provides high speed internet access to the community, the town of Osborne also offers free land for both residential and commercial purposes. You could build a home and a business without paying for land in this cozy little town, and the town itself may even be able to help you with financing your business through their revolving loan fund.

Plainville, KS

The town of Plainville, located in Rooks county, has free lots available for new construction homes on full foundations. The lots are 155 ft by 93 feet. Along with the free land, they also offer their free land

homeowners a property tax reduction to help making living there even more affordable. They'll give you a couple years to build your home – which must be at least 1,400 square feet – and get settled into it.

MINNESOTA

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Minnesota is going back north again, this time even farther than Nebraska or Iowa. While the state is known for having 1,000 lakes, it is also known for harsh winters. This is a place where you want to get your crops in early and watch the weather in the fall, so that you can get your harvest done on time.

Once again, greenhouses may very well be the way to go. Actually, if the water table allows for it, you might want a partially underground greenhouse, so that it the ground around it will help protect your greenhouse from the cold. Add in some additional solar collectors and your greenhouse, which is a passive solar building anyway, should stay warm enough to keep growing late into the season.

New Richland, Minnesota

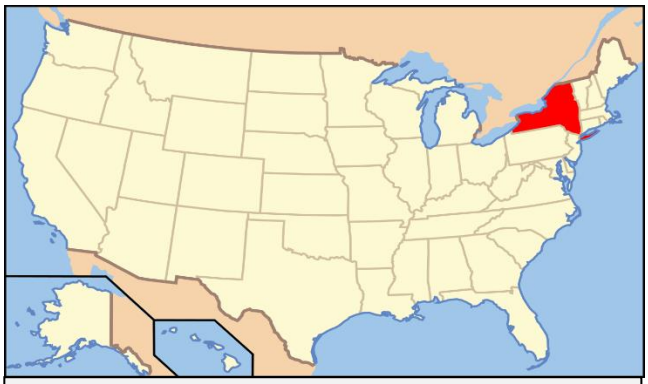
With a population of about 1,200, the city of New Richland has a free land program that requires you to build a brand new home on your free 86 ft by 133 ft lot. While the lot itself is free, you will be charged a fee to cover the development of the streets and utilities to the subdivision, the estimated cost of which is $14,000 which can be paid over several years.

Claremont, Minnesota

Claremont is open about the fact that their program is a copy of the one in New Richland. Hey, if someone has a good idea, why not copy it? They're offering free lots to those who qualify. But to qualify you must have a gross income of less than $84,200 for a family of two or $96,830 for a family of three. I don't think that will be much of a problem for most of us.

NEW YORK

Ok, I'll have to admit, New York State isn't what most of us think of, when we think of homesteading. But have you ever spent any time in upstate New York? I have and its beautiful. Don't dismiss the idea, until you take a look at it.



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Buffalo, New York

Buffalo is in the western end of the state on the eastern tip of Lake Erie. As such, they can have some really harsh winters. But you'll never have to worry about water and there are lots of woods to go hunting in. They have a slightly different program, where they are offering land for $1 as part of New York's Urban Homestead Program. Some of the land already has homes built on it, which would have to be brought up to code.

ALASKA

If there is ever a dream location for homesteading, it has to be Alaska, right? Oh, wait. It's really hard to farm in Alaska, because of all the cold and snow. Still, you could try to live by hunting and fishing, enjoying the great outdoors. Besides, if you're going to build a log cabin, doesn't Alaska seem like the place to do it?

Anderson, Alaska

If you're looking for peace and quiet, in a place where you can get away from it all, Anderson, Alaska is it. With a population of less than 300 you won't have to worry about the kids in the mall. For that matter, forget about the gas station, grocery store or public street lights too. But they do like homesteaders and you can get free homesteading land upon application. A $500 deposit is required, which is refunded once your building is complete.

CUYAHOGA NATIONAL PARK, OHIO

Of all the opportunities out there, this one might actually be the best. This is a really unique opportunity that will allow you to potentially farm a portion of the land in the Cuyahoga National Park. This program, called the Countryside Initiative, started in an effort to rehabilitate the dilapidated farms that were already located on the land and turn them into working, productive farms again.

Land for Businesses

Most free land opportunities you see advertised are for homes and homesteads. But there are actually a lot of opportunities for those who are looking to open a business. One of the big concerns for many small communities is attracting jobs.

So they are much more likely to give away land to those who bring jobs into their community, than those who are just looking to build a home. Even towns that don't advertise free land can be talked into giving land to those who start businesses and hire people.

Flagler, Colorado

The town of Flagler, Colorado has set aside 480 acres they are giving away to businesses. How much of that land you can receive for free depends on how many jobs you bring into the area.

So, if you want to combine your homestead with a business opportunity, there's an ideal location for you, about 100 miles east of Denver.

Muskegon, Michigan

This is actually a large city which is giving away land. Muskegon has free land in their industrial park, which they are offering to businesses which want to come in and operate, as part of their Michigan Renaissance Zone. They are also open to tax incentives, as well as lower water and electricity rates.

Other Free Land Opportunities

There are several more opportunities for you to build a home or plant your homestead on a free plot of land in the United States, assuming you're willing to abide by the regulations set out at various sites. While you'd still have to come up with the cash of financing to build

a home or farmstead, it's maybe not as far away as you'd once imagined.

JUNK LAND

Almost all of the listings I've given above are municipalities who are giving away lots appropriate for building a house on or parking a mobile home on. They really aren't quite big enough for a true homestead, although if you plan your space carefully, you could still grow quite a bit.

But what if you want more? Land, as we all know, is extremely expensive to buy. Or is it? Is it possible to buy cheap land, which would be possible to use for a homestead?

There's a category of land known as "junk land". It's called that because it is not commercially viable for any real purpose. It's far enough out of town that it isn't practical for commercial, retail or residential use. It doesn't have utilities on it and it probably doesn't have water on it either. But... and again I say but... it's cheap. You can often buy this land, when you can find it, for less than $1,000 an acre.

The tricky part is finding the land. Most of the time, junk land isn't listed for sale. If the owner is thinking of selling it, it might have a "For Sale by Owner" sign on it, but that's about it. No real estate agent would bother listing it, because the commission on the sale isn't enough to make it worth their time.

The easiest way to find junk land is to advertise that you're looking for it. However, I'll warn you; if you advertise that you're looking for junk land, expect to get 100 phone calls from real estate agents who are going to try and sell you something for $20,000 an acre. They'll also try and convince you that what you're looking for doesn't exist, as part of their sales strategy.

But that doesn't mean that it doesn't exist. It does. Typically, it's land that someone inherited but never used. They never sold it, because it just wasn't worth the effort. But that doesn't mean that it isn't worth owning and won't work out as a homestead. Although I will say, you will have to do a lot of work to it, in order to make it a homestead; and then, when you do, it will be an off-grid homestead.

There are many things you have to consider, when looking at junk land:

- **Access** – You are going to have to make sure you have access from the roads to your land. This may mean signing a contract with some farmer or rancher, allowing you to use their private roads.
- **Water** – Your biggest need is going to be water and there probably won't be water on site. That either means drilling a well, harvesting rainwater or trucking water in. Be sure to have a plan for water, before deciding to buy any piece of junk land; and be sure to take into consideration how much water you'll need for growing your food.
- **Electricity** – There won't be electric power and to get electric power will probably require running miles of power lines, all of which you would have to pay for. It wouldn't hurt to check on that, but you will probably need to produce your own power via wind or solar.
- **Sewage** – You'll need to install a septic tank. Of all the problems you'll face, this is probably the most straight-forward. You might even be able to do it yourself, depending on the county's building code and regulations.
- **Flooding** – Make sure that you're not buying a piece of land in a 100 year flood plain. You just don't need the hassle.
- **Fencing** – If you're going to raise any sort of livestock, you're going to need to fence in your land or at least part of it. Running

a fence around a couple of acres is a lot of work and can be pretty expensive.

None of these potential problems are serious enough that you shouldn't consider buying junk land; they're just things that need to be taken into consideration before making that decision. In some cases, it will be easy to overcome these problems; but in others, it won't.

For example, there's a lot of junk land available in West Texas for an excellent price. You can buy 10 acre lots for a song. But there is very little rainfall and the water table is very low.

So, if you're going to drill a well, it's going to have to be a deep one. The only other option is to truck in the water. Not an impossibility; but rather difficult nevertheless.

Junk land in the states listed above won't have this problem, as those are all states which have a reasonable amount of rainfall. As long as rainwater collection is still legal in those states, you could harvest enough rain water off your own land to take care of your needs.

The Three-Year Shelf Life Viking Survival Food (With Pictures)

A prepper's way of life is to plan for any type of situation that might occur throughout life. One area that's a concern for many is food. It's easy to grab the non-perishables because they… well, don't perish. However, while it's easy, it also can get monotonous to dine on canned goods after a while.

So, if you are like most humans, you probably would like a wider selection to choose from, whether you are enjoying dinner at home or out on an excursion somewhere. There are limits to the preserving methods most of us know, though. Vegetables and fruits can be canned, but certain meat, poultry and fish are often difficult to keep on hand for any decent length of time. However, have you heard of salt cod or bacalao? It's a way to store fish for longer, years even, without it going bad. Whether you purchase your fish at a local market or catch your own, you will no longer have to use it all up in a day or two before throwing it out.

Bacalao is fish which has been cured through a dry-salting method. Drying of foods is the oldest method of preservation in the world. Dry fish was being made, about 500 years ago, by the Vikings and is still popular in Norway today. Basque fishermen were seen by explorer, Jacques Cartier, when he discovered the mouth of the St. Lawrence River and gave it to France, in what is now Canada.

The explorer noted that they were cod fishing. The basque fisherman would bring cod home across the Atlantic from the rich fishing grounds off the Grand Banks. Within a couple of centuries the technique had been picked up in Portugal, Spain, France and the UK. Atlantic cod had become a staple food in those countries. Salt cod become a vital item in trade between the new world and the old thus making it a portion of the so-called triangular trade.

For hundreds of years fishing villages in Norway produced dried and salted cod from cod fisheries. These villages were centered around the area that is now occupied by the village of Reine. Prior to the

collapse of the Grand Banks and other stocks due to overfishing, salt cod was exclusively from Atlantic Cod. Since the overfishing bacalao can be derived from other white fish. Some of the more common white fish that you can use to make bacalao are flounder, pollok, haddock, swordfish, tilapia, halibut, and of course cod. In the English-speaking world bacalao is often called salt cod, because that's the fish it's most associated with, but it can be made from almost any non-oily white fish

Someone found that adding salt made the drying process more effective. Drying preserves many nutrients and the process of salting and drying fish is said to make it tastier. Salting became more affordable during the 17th century when cheap salt from southern Europe became available to the northern Europe nations.

Salting could be done by the fisherman or his family. The bacalao can be sold whole or in portions, and with or without bones. Then the finished salt cod could be transported to market where it then became a major part of the diet. It even became a staple item for the catholic nations for Lent or meatless Fridays.

Traditionally, the fish was dried on clean rocks or cliffs or on wooden frames. It was dried by the wind and the sun near the seaside. Today modern production of the salt cod is mainly done indoors and with electricity. If you are going to dry your fish the traditional method it may be a good idea to wrap it with a screen or fine mesh to prevent insects and flies off of it. Although, it should be too salty for insects to do it much damage anyway.

There used to be different qualities of grade of the bacalao for purchase. The best grade was called the superior extra then to superior, imperial, universal, and then popular. There are still some products made of the superior quality. If you are obtaining the superior quality of bacalao then the fish has been line caught so you

know it was still alive where if it was caught with a net then it may have already been dead when cleaned to be salted.

The superior extra grade will be bled while alive and then beheaded. then it is cleaned, filleted, and then salted. The superior extra will sometimes be salted twice with a rest period between to increase the flavor. The lesser grades of bacalao may be frozen before salting or even injected with a salt water solution.

Even today bacalao is used around the world to create popular dishes, such as in France and Spain where they use it to make brandade, which is a creamy spread created with salt cod and olive oil and then it is served with bread or potatoes. In Portugal they use bacalao to make savory stews. In Europe the salt cod is served in a variety of ways such as in casseroles, croquettes, or even breaded and then deep fried.

Some parts of the world serve salt cod for breakfast as part of a casserole with eggs. In Bermuda, it is served with avocados, potatoes, bananas, and boiled eggs in the traditional codfish and potato breakfast. In many of the European celebrations it is served as a part of the celebration of the Christmas Vigil. In some parts of Mexico it is served for Christmas dinner by frying it with egg batter and then simmering it in a red sauce. There are all kinds of options to prepare this Viking dish to your taste. You can even cut the fillets to be prepared in various sizes such as leave them whole or even cut them into strips or chunks.

Fortunately, the process of making the bacalao is quite easy. It is a bit time consuming though, because it takes a week or two. The good news is that most of that time is simply waiting for it to dry out. The actual process takes very little time in prep work. If you use your own fresh catch then you will need to behead and eviscerate, or gut, the fish. You can even do this step while still on the water. Then you will need to cut it into the desired fillets that you want.

First Stage of Making Salt Cod

We used cod for this article, but as mentioned above there are other types of fish you can use. So, when you see “cod”, feel free to insert the fish of your choice.

Make sure you have the supplies on hand, which are minimal. For the first stage, they include:

- Fish fillets
- Kosher or sea salt, medium to coarse grain
- Paper towels or dish towel
- Glass or stainless-steel container
- Refrigerator

The first step is to prepare the fish by rinsing it thoroughly with cold water. Then, pat the fillets dry with paper towels or a clean dish towel.

Next, pour a ½" layer of the sea or kosher salt into the bottom of the container. Place the fish on top of the salt, in a single layer, and make sure the pieces are not touching each other or the side of the container – you want each piece to be completely surrounded by salt. Pour an additional ½" of salt on and around the fish. Make sure that the fish is totally covered.

If you have more than one layer, repeat the steps above, making sure the fish is not touching each other and that each layer is well covered. It doesn't matter how many layers you put in; just bury them in salt!

Cover the fish and store it in a cold (but not freezing) place, such as your refrigerator, for 48 hours.

Drying the Fish

After it's been "salting" for 48 hours, wipe the excess salt off the fillets with paper towels or a clean dish towel.

Wrap the fillets after it has been wiped off the excess salt in cheesecloth.Similar to how a butcher wraps a roast at the meat counter, by tucking the sides in as you roll it up.

Place it on an overturned baking dish or on a rack on a plate, and then put it back into the refrigerator uncovered. Now, simply let it dry out in the refrigerator for 1-2 weeks. When it's ready, it will be dry and stiff.

Once the bacalao is ready, wrap it in paper or fine cloth and store it in boxes. Traditionally wooden boxes were always used, and they are

still the best option. The wooden boxes let the fish dry out even more. Of course, the opposite is also true – if you store it in a humid place the salt will soak up any moisture from the air, and pass it on to the fish, therefore rehydrating it and possibly causing it to spoil. So it is important to keep it somewhere dry. If you do that it will last for at least two to three years without refrigeration. Most people now keep it frozen or refrigerated, but if it's been properly dried that is not necessary.

If in a SHTF situation and you don't have power to keep the refrigerator running that will be no problem. Remember, this stuff was originally made to be piled up in a hut on some Newfoundland beach until fall, then carried across the Atlantic in an unrefrigerated boat. It is dry and salty enough to last for a *long* time.

The result is a well-preserved fish for you to use whenever you are ready, and that will last up to three years if well stored.

Using Your Bacalao

When you are ready to use your bacalao, the first step is to rehydrate and desalinate it. You will need to soak it in water for two to three days, changing the water at least twice a day. This will rehydrate the fillets, as well as remove most of the salt. After this, it is ready to cook and enjoy in whatever dish you have prepared!

How to Make Portable Soup

First off, you're probably wondering what in the world portable soup is. It's essentially a broth that has been dried and solidified for easier storage, preservation and portability. It has a ton of flavor packed into a very small package.

It has been called by many names, including pocket soup or veal glue. It's kind of like a homemade, old-fashioned version of the bouillon cubes you can buy in the supermarket today.

WHAT IS PORTABLE SOUP USED FOR?

Portable soup has a long history, with the first recipes for it being found in the 17thcentury.

It was quite popular in the 18th century due to the fact that it didn't require any preservation and it was light and easy to pack. It was used as a portable food source for traveling, even on large and famous expeditions.

Lewis and Clark packed portable soup in their food stores on their famous expedition to chart the U.S.

It was also used as a food for invalids or others who had to be on a liquid diet, since at that time there were a lot less options for keeping those people nourished.

Because it had to be cooked over an open fire, a much less precise application of heat than we have available to us today, portable soup was not simple to make

before the advent of electricity. This meant that it had to be constantly watched, to keep the heat steady and prevent burning or scorching. Today, a slow cooker means that the temperature of the broth can be easily controlled.

How Do You Make It?

If you'd like to make some portable soup of your own, here's how you can do it with a more modern twist. Note that you could replace the beef shank roast with another high-collagen cut of meat like the neck, or you could even opt to make chicken portable soup by using a whole chicken.

What You'll Need

Here's what you'll need to cook this recipe up in your kitchen.

- 5 lb. beef shank roast
- Water
- Medium slow cooker
- Cheesecloth

- Large bowl for short-term storage of broth
- Cooling rack
- Small electric fan

PORTABLE SOUP DIRECTIONS

Make a bone broth – Place the roast in slow cooker and fill the slow cooker with water. Turn it on low and cook for eight to ten hours with the lid on.

Mostly, you'll want to leave it alone to cook, but make sure that the meat stays covered with water. Add more if the water level starts to get low.

Remove the solids – Pull the meat and bone out of the slow cooker and set aside. The bone should probably be trashed, but the meat can be used in another dish.

Let the cooker cool – Let the slow cooker cool completely. This will allow the fat to set on top of the top of the broth for easy removal.

Strain the broth – Pour the cooled broth from the slow cooker through a piece of fine grade cheesecloth into another container. A large bowl will do nicely.

Clean the slow cooker – Give the slow cooker a good wash to make sure none of the fat and solids you've, up until now, worked so hard to get rid of, don't make it into the final broth. Those things could make the portable soup susceptible to going bad.

Reduce broth – Pour the broth back into the slow cooker and turn it on low for 24-72 hours with the broth uncovered. This will reduce the liquid from the broth, until there's about ½ inch left in the bottom of the slow cooker.

When it's finished, it should look like a lot like prepared gelatin. Towards the end of this time period, be sure you keep a close eye on your portable soup to prevent burning. Burnt portable soup is disgusting enough to not be edible, apparently.

Let cooker cool again – Once again, let the cooker cool completely.

Dry gelatinous soup – Peel the gelatinous reduced broth out of the bottom of the cooled slow cooker. Place it on an ordinary kitchen cooling rack and place an electric fan in front of the jellied broth on high. Leave it until it's completely dried out.

This should take a few days, but could take up to a week depending on the moisture level in your home. You'll want to carry out the drying in a place that will be relatively undisturbed where dust and debris are unlikely to land on the broth.

It would be tempting to toss this gelatin-like blob into the oven to dry it out, but that will absolutely burn it. Many dehydrators are even out of the question since they utilize low heat to remove the moisture from food. If you don't desire to use a fan, you can place the reduced

broth on a clean, tightly woven cloth and turn it several times a day xfor a week or so until it's completely dry.

Break into pieces – You'll want to cut the portable soup into chunks that measure about one square inch. Regular (clean) scissors work great for this. Store it by wrapping it in parchment paper or cheesecloth, placing it an airtight container, or keeping it in the fridge in a plastic bag. It can keep for up six months under favourable conditions.

WHAT DO YOU DO WITH PORTABLE SOUP?

It's important to note that this is a very basic portable soup recipe and it will act more like a soup base than a meal in and of itself.

You'll likely want to add herbs, spices, greens, vegetables, or at the absolute very least, a little salt to make it palatable.

In an emergency where you needed an energy boost post haste, you could just place a small piece of portable soup in your mouth and allow it to melt, but that would be pretty gross.

Instead, boil a piece of the soup in water with whatever other soup ingredients are handy until it's fully dissolved.

THE FINAL WORD ON PORTABLE SOUP FOR SURVIVAL

You might consider whipping up a couple batches of portable soup to add to your survival stores. In a SHTF situation, this could provide you with nourishment that is compact and lightweight, which would make it perfect for bolstering your stores without taking up much room or for adding to your bug out bag.

How to make Frontier Penicillin

The frontier penicillin can be taken year long as an anti-inflammatory, anti-oxidant, antibacterial and immune-boosting supplement. It can also be used during a cold to reduce symptoms. Other benefits may include: a decrease in congestion, increased circulation, lower blood sugar, and fewer digestive flare-ups for those with gut health issues.

What exactly is this cure-all drink? This herbal tincture is a spicy sweet vinegar drink that is flavored with root vegetables, citrus, spices, hot peppers, and honey.

Raw, unfiltered apple cider vinegar is used as the base. It is meant to be taken in one tablespoon increments, two to three times per day when needed. Due to the potency of the drink it is not recommended to drink straight. Instead, add to smoothies, juice, seltzer, tea, or simply water in down.

You may also reap the benefits by making it into a marinade for meats, salad dressings, or anywhere vinegar would typically be used in cooking.

For such a versatile and complex health drink, the frontier penicillin can easily be made at home with readily available ingredients.

HERE'S WHAT YOU WILL NEED:

- One-quart sized glass jar
- Raw, unfiltered apple cider vinegar
- Raw honey, to taste
- ½ cup horseradish root, peeled and diced
- 2 jalapeno peppers, sliced
- 1 cup ginger root, peeled and diced
- ½ cup onion, chopped
- Juice and zest of two lemons

- ¼ cup crushed garlic cloves

The first step in making fire cider is to prep the ingredients. Be sure to wash hands thoroughly after handling hot peppers.

Next, add the lemon zest and juice (extract zest using a peeler), peppers, and garlic to the bottom of the jar. Then place the heavier root vegetables on top, which is the remaining ginger, onion, and horseradish.


Pour the apple cider vinegar on top until all contents in the jar are covered. This will ensure that none of the ingredients will spoil in the following step.

Line the lid with wax paper so the metal does not corrode.

Seal the jar and place in a cool dark place (such as a kitchen cabinet) for 2-4 weeks to mature before consumption, allowing the ingredients to fully infuse into the vinegar.

When ready, shake well and then strain the roots out with a sieve. Add honey to sweeten.

For other variations, you can swap out half of the ginger with turmeric to receive more gut health benefits. For added flavor, whole peppercorns may be included along with fresh herbs like thyme or rosemary.

My Grandpa's Secret Pemmican Recipe

My family has a very real old, very real connection with the Old West. Somewhere in my dad's family tree, we find Kit Carson, one of the original mountain men. My dad himself said that he should have been born back then and I can see how he would have fit in. After all, how many people do you know who hunt with a black powder flintlock that they built themselves (and it wasn't a kit)?

Growing up in Colorado, I was very aware of this heritage. So it really comes as no surprise that my family had a number of secret recipes and ways of doing things. You could just say that it was in our blood.

One of those recipes was for pemmican, the American Indian survival food, used by a number of tribes. Mostly a meat dish, it combines meat with fat and fruit (or sometimes nuts) to give a fairly good amount of energy and protein, either for times on the warpath or for surviving the harsh winters.

Fat is an important part of a survival diet, especially in the wintertime. For the Indians, it was one of the hardest parts of their diet to find.

Knowing the value of pemmican, I decided to dig out my grandpa's recipe and make some myself.

INGREDIENTS:

Pemmican can vary considerably, but the basic recipe is meat, fat and fruit. For a batch, you'll need:

- 6 pounds lean meat (preferably beef, but venison can be used as well)
- 2 pounds tallow or clarified meat fat
- ½ to 1 cup fruit and/or nuts, berries work well (I used blueberries)

You have to use clarified fat or tallow, as normal fat will turn rancid, destroying your pemmican. If you can't find these, you can render your own fat in a Crockpot, or on the stove.

Heat fat, cut from meat, to the point where the liquid fat comes out of the fat cells. If you stir it occasionally, while heating it, it will help speed up this process and keep the fat from sticking.

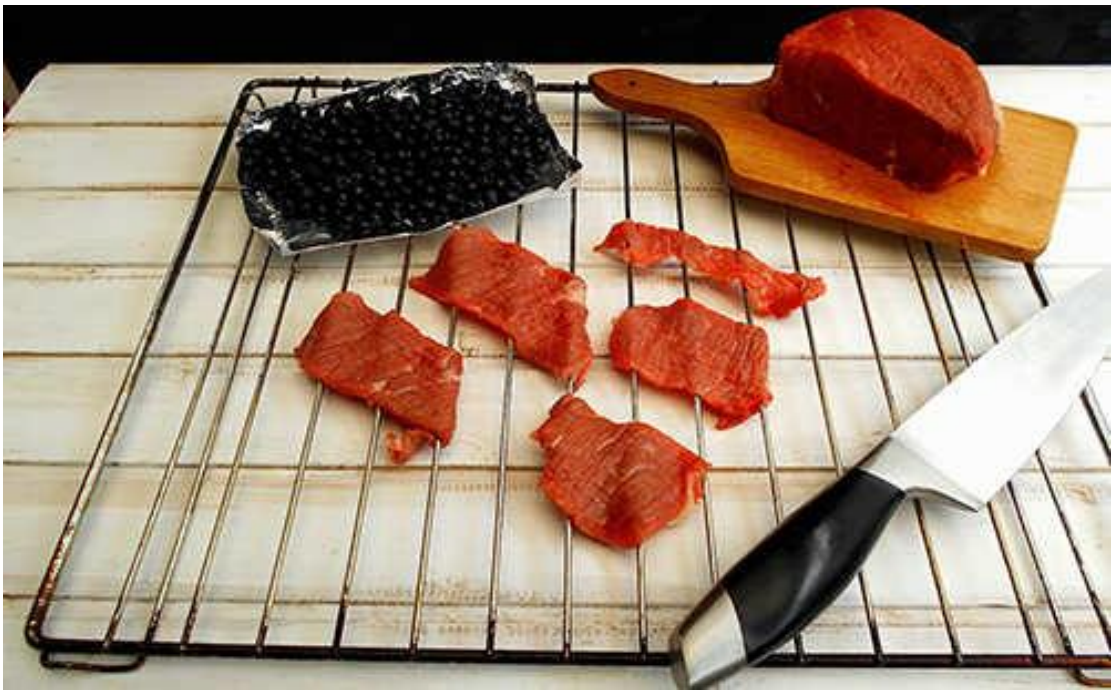
Continue heating the fat for several hours, until it stops bubbling. Once it reaches this point, you will know that all of the fat has come out of the fat cells. Pour it through a fine mesh strainer, while it is still hot, to filter out any solid pieces.

MAKING THE PEMMICAN

You need very lean meat to make the pemmican, as the fat on the meat is not clarified. So trim the fat off the meat before using it. Slice it very thin. To make it easier to get thin slices of meat off of a roast, put it in the freezer for about two hours. This won't fully freeze it, but it will be more solid, making it possible to cut it thin and even.

If you live in an area with a large Hispanic population, you can make your meat cutting process easier, by buying the meat at a Mexican "carneceria" (meat store).

Just ask for meat sliced for milinesa, a Mexican meat dish. It will be less than ¼" thick, ideal for your needs. All you'll have to do is trim off the fat.



Spread out the meat pieces on the wire rack for your oven or your dehydrator and dehydrate fully. You aren't looking for chewy dry, like jerky, but fully dry. The meat should break and crumble when you

crush it in your hand. This will take about 15 hours in an oven at 130 degrees or 8 hours in a dehydrator with a fan, at 165 degrees.

Repeat the dehydrating process with whatever berries or fruit you are going to use. Once again, you want them hard, not chewy.

Crush or break up the meat into a powder. This was traditionally done with a stone mortar and pestle. I use a Mexican “mocajete” for this, as the coarse texture of the stone breaks up the meat fibers well. You can also use a food processor or blender, if you want to modernize your process.

Now all your ingredients are ready and you can start actually making the pemmican. Cut the tallow into cubes. If your clarified fat is still hot, that's ideal. Melt the tallow over medium-high heat. Don't raise the heat any more, as you might destroy the fatty acids, resulting in poorly made pemmican.

Stir it constantly for 10 minutes, so that it will not scald. After that, you can leave it to melt, stirring it only occasionally. Lower the heat to medium-low after 30 minutes, until the tallow is fully melted. Strain it through a fine mesh sieve to remove any solids.

At this point, your melted fat and solid ingredients should work out to being the same volume. If needed, remove some of the fat, so that there won't be too much.

Mix the meat into the fat, followed by the berries. Stir until it is well blended, with the fat coating all of the meat and fruit.

Set the mixture aside and allow it to cool to room temperature. Then divide it up into plastic bags, forming it into loaves. Press out as much air as possible before sealing the bags or use a vacuum sealer to get the air out.

Store your pemmican in a cool, dry place. It will solidify as the fat cools further. Packed and stores in this manner, it should keep for years. No wonder it became a favorite survival food of explorers.

TESTING THE PEMMICAN AFTER 1 YEAR

After having my pemmican stashed away for a year, I decided to open it up and see how it fared. My initial observations are:

- After removing the protective wrap, you will naturally pick up the scent. The pemmican has a gentle scent of dried beef mixed with sweet berry scent and a deep, complex scent coming from the lard. If using other types of meat, the pemmican can develop other scents. For the comparison, this pemmican tastes like pot roast strands that have browned a bit. Not bad at all.
- After picking up the scents, the next thing to notice is the texture. We have used partially chopped blueberries, and our pemmican has some chunks. If you completely grind the blueberries, the texture will be much smoother. Still, our pemmican is quite smooth and fatty and melts in the mouth. Those berry chunks are there just to create some fun, and we suggest you do the same. Because the pemmican is made of ground ingredients, the texture is smooth and kind of pasty in the mouth.
- When it comes to taste, the pemmican does not have a flavor that would satisfy gourmets, but since this is a survival food, we will not worry too much about the flavor. The flavor itself is not terrible but

instead is kind of bland because of the large amount of fat. That fat is necessary, however, as it preserves the pemmican. Luckily, the blueberries bring a hint of sweetness, and the beef flavor cannot be completely neglected. After a few bites, your palate will adjust, and some of the beef flavor will be picked up.

Overall, this pemmican is great! The initial aromas are not too heavy, it is kind of sweet and fatty, the texture is fine with some berry chunks, and when it comes to the taste, it tastes like fatty beef with a hint of sweetness. After unwrapping, some chunks may fall off, but you can prevent that by completely grinding your ingredients. Still, pemmican with chunks has a much better texture.

MY GRANDFATHER'S SECRET

The pemmican as I described it above is the basic recipe. But I didn't stop there. I actually made two batches, not just one. I wanted to be able to compare the basic recipe to my grandfather's recipe and see what a difference it made.

So, what's my grandfather's secret?

He seasoned his pemmican, adding necessary nutrients and making it much more flavorful. The difference amounts to mixing in:

- 1/3 cup honey
- 1/2 cup chopped jalapeños

Honey is an amazing food; one of those that qualifies as being able to keep forever. Adding it to the recipe provides an energy boost. This works well with the fat, creating a one-two punch. The honey provides instant energy, while waiting for our bodies to digest the fat and break it down to sugars for energy. But honey does more than that, as it has been shown to have a number of valuable medicinal properties.

The jalapeños come from our family's connection to the Old West, although more in Texas than in Colorado. They have to be dried and crushed, just like the meat and berries. After dicing them (and cleaning out the seeds), I dried them at the same time I was drying the berries, saving myself from the wait time associated with another run of the dehydrator.

Food in Texas has a lot of influence from Mexico, where everything is picante (spicy hot). But there's a good reason for the food to be that way. The acids in spicy foods are great for killing parasites in the gastrointestinal system. This can be a serious problem in places where there is no refrigeration, especially if it is hot.

Eating peppers helps keep your system clean, so that you don't end up with dysentery, another way of getting dehydrated. That's great for survival, providing what turns out to be doses of medicine on a preventative basis, to protect you from dehydration.