

The Ancient and Arduous Art of Brain Tanning Buffalo Hides

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Few tasks performed by Plains Indians were more labor intensive — or more necessary — than processing the skins of buffalo and other animals into tanned leather and then using it to produce all manner of essential products including clothing, tipi covers, moccasins, storage bags and many other items. It was a time-consuming endeavor performed almost exclusively by women. Along with tons of meat, buffalo hides were a main goal of communal hunts at the Vore Site and elsewhere. In the 1800's when the tribes had acquired horses, they also came

to desire more and more of the metal and other manufactured goods available at trading posts. The Indians' principle "currency" in that trade was buffalo robes, which increased the demand for and labor required for tanned hides even further.

A Primeval Process

Nobody can say for certain when hide-tanning processes were discovered, but certainly most of the hunting cultures of the earth have employed some form of it for many thousands of years. There are many variations that may have developed independently at different times and places. Some steps in the process may have been discovered accidentally and surely there was a great deal of trial and error as it was refined. It is also certain that "how-to" knowledge was passed on to other groups and generations. In any case, in the period of Vore Site use, all of the regional tribes were using some variant of the so-called "brain tanning" process to produce the leather they required.

Essential "How-to" Knowledge

The goal of tanning hides is to prevent spoilage, increase durability, keep leather flexible, and make it more water-resistant. Without treatment hides will quickly become rancid and start to decompose. The over-all

process removes water from the skin. Ironically, dehydration requires thoroughly soaking the hide many times.

After a buffalo jump that killed dozens, sometimes hundreds, of animals, the first priority was to process the tons of meat that were going to spoil very quickly. Hides were usually tied in bundles and set aside and/or soaked in water for a time while the meat was dried to produce jerky or converted into pemmican (sausage).

Soak and Scrape...Soak and Scrape!

After soaking and cleaning, the first critical step in hide tanning was to thoroughly scrape the flesh side of hide to remove all residual fat, muscle and connective tissue. A variety of tools were used for this purpose including sharp-edged stones, antlers, other animal bones and wood.



**Stone, bone and
wood scraping tools**

It is necessary to stretch hides during the scraping process and while they are still damp. Wooden frames were sometimes constructed for scraping hides, especially of smaller animals such as deer. Given the size and weight of buffalo hides and the paucity of suitable wood on the prairies, however, women of Plains tribes usually spread hides on the ground and used wooden stakes to stretch them. Stretching made it easier to remove the flesh from the hide and increased the size of the finished product. The tedious scraping was done on hands and knees.



George Catlin's 1830's painting of hide scraping



During the scraping process, women had to decide how the hide was to be used. If it was to become a sleeping robe or a winter garment, the hair would be left on the outside and the rawhide would be left to dry, stretched and taut. However, most hides were destined for other purposes that required removal of the hair.

To accomplish removal of the hair, the hide was soaked again, sometimes for weeks or months. Sloughing of the hair was facilitated if the hide was in early stages of putrefaction or if it was soaked in mildly acidic or alkaline solutions. For these reasons, hides were sometimes soaked in urine or in water containing wood ashes.

It should be noted that many plants contain tannic acid and/or a complex of related compounds collectively called "tannins" that are sometimes added to the soaking solutions in this phase of the process. In fact, the term "tanning" refers to the use of tannins and the darker hide color that results from their use. Leaves of oaks and sumac, for example, are good sources of tannins. This so-called "vegetable tanning" process was common world-wide in forested regions, including the industrial eastern US, into the 20th Century. Plains Indians apparently did not often use tannins, probably because they lacked abundant sources of them.

After prolonged soaking, it was necessary to remove most of the water from the hide. Sometimes the water was literally wrung out of the skin by repeatedly twisting it as tightly as possible, then scraping again. The hide needed to be damp, but not wet, for the next critical stage.

The Brain Treatment

During the butchering process, the brains of animals were usually removed and set aside for use in the tanning process. The brain was boiled in water and then chopped and mashed into a fine emulsion or slurry. If

the hair was to be removed from the hide, the brain concoction was vigorously rubbed into both sides of the hide. If the hair was to be retained, it is applied only to the flesh side.

The hide was then rolled up with the brain emulsion and allowed to sit for a day or more. Oils and other compounds from the brain tissue permeate the hide during this time.

The brain treatment was followed by more soaking, more scraping and more stretching. The hide was sometimes pulled back and forth over a smooth (without bark) tree branch or log. It was



Nearly all skulls at the VBJ have been bashed open to remove the brain for hide tanning purposes.

pulled and stretched again. This repeated scraping and stretching removed all of the moisture from the skin and changed its fibrous nature, leaving the hide flexible and cream-colored.

Tanned leather that gets wet can still become hard again, so Indians learned to treat hides with a smoke residue. Smoke smudge makes the leather more water-repellent and darkens the color somewhat.

Sometimes hides (especially small ones) were formed into cones and suspended over smoky embers and both sides were smoke-treated. The ever-practical Plains tribes sometimes incorporated new hides into tipi covers. Over time, smoke from the small fires inside and outside the tipi, would deposit the desired residue. After a year or more as part of a tipi cover, the leather might be cut up and used to make moccasins or other items that needed to be water-repellent.

Some Chemistry of Brain Tanning

Brain tissue contains a fairly high fat and oil content that helps explain why it softens leather, keeps it flexible and protects it from water. Another of the active ingredients relevant to brain tanning is a compound called “lecithin,” which probably helps the fats and oils in the thick gravy derived from cooking and mashing brain tissue interact with the non-oily components of the leather.

The biochemistry is still not perfectly understood, but in brain tanning, Indians certainly made use of it. Lecithin, for example, is one of a type of molecules called phospholipids. Lipid is a general term for organic substances, such as fats, oils and waxes, that are not water soluble. These compounds are essential in the biological processes of all cells.

Biological systems require both water solutions and lipids, but, as the observation goes, “oil and water don’t mix.” For this reason it is necessary to have “tweener” molecules that share some properties of, and the ability to interact with, both water solutions and lipids. As the name implies, phospholipids incorporate an electrically-charged phosphate group on one end of the molecule and two electrically-neutral fatty acid (lipid) chains on the other. Phospholipids function as tweeners because the charged phosphate end of the molecule is “hydrophilic” - attracted to water - and the neutral lipid end is “hydrophobic” - repelled by water. Among other vital functions, phospholipids form the primary structure of all membranes in living cells. The lipid portions of the molecules swing away from water and naturally form a double layer of fat that becomes the inside of membranes that separate the water solutions found both inside and outside of cells. The phosphate portion is attracted to the water solutions and forms the outside of the membrane.

Here are some other interested and somewhat related facts: Mashed up brain tissue forms an emulsion, a mixture of two liquids in which larger particles disperse but do not actually dissolve. In this case, the two liquids are water and a variety of oils found in the brain. Tiny droplets of oil are the larger particles that don’t dissolve.

Emulsions are not stable. They will separate unless some emulsifying agent, usually a phospholipid, is present to stabilize them. A familiar example of a stabilized emulsion is mayonnaise - an emulsion of vinegar mixed with vegetable oil. The stabilizing agent is the phospholipid lecithin contained in the third ingredient, egg yolks.

Because brain tissue is so rich in lecithin, it is still used as a source of lecithin in commercial products. Common emulsions stabilized by lecithin include cosmetic creams, conditioners and lipstick, and foods like margarine and chocolate. Soy beans and egg yolks are the source of most food and drug lecithin. Phospholipids are precursors to neurotransmitters and are used in pharmaceuticals to improve memory and treat dementia. Lecithin also enhances breakdown of cholesterol so it is used in drugs intended to lower cholesterol and slow or prevent hardening of arteries. Lecithin may even improve our biological defenses by activating parts of the immune system.