

Heat & Water Treating



I want to keep this short and simple ... but I'm not sure how.

First I think it would be a good idea to talk about what characteristics you need to look for in the material you want to knap.

You need to have material that has glass like properties or I should say... stone with naturally occurring minerals that have glass like properties. Agate, Chalcedony, Chert & Flint (both the same to me - however, when I say Flint, I'm refering to high grade material), Jasper, Novaculite, Obsidian, Opal, Petrified Wood and Quartz Crystal to name a few. Most of these minerals are very siliceous ... just like glass. This is why they are also refered to as vitreous minerals because they have nearly the same texture and luster as glass. The reason glass is so ideal for knapping is that it has no crystal structure. Glass is technically a fluid in the sense that a force applied to it will spread out equally in all directions like ripples on water when you drop a pebble in it. It is for this ability to transfer the force that makes the vitreous minerals so good for percussion and pressure flaking.

One of the properties I spoke of is cryptocrystalline, that is, the mineral's crystal structure is so small that it practically cannot be seen, therefore, allowing the force to be transfered the same way it does in glass. It should also be elastic in nature ... having the ability to return to it's original state after being compressed by the application of force. The material must also be homogeneous in that it has the same structure throughout ... free from any impurities or inclusions that could resist the flaking process. It should also be isotropic ... having the same properties in all directions, much like the pebble in the water I mentioned earlier.

Having said all that, a lot of material is easier to work than others ... which is the purpose of heat treating. Craig Ratzat, a friend of mine, sent me an e-mail the other day giving his theory on heat treating that I would like to share. He said that there were three things needed to change the crystalline structure of rock (which is why we heat treat). Time, Temperature, and Pressure. For every silica molecule there are 4 locked on water molecules. As a rock heats up, it will first lose it's freeflowing water. As it heats up more it will then lose some of it's locked on water molecules. The thicker the rock the longer it takes for the steam pressure to escape (thereby creating greater pressure). He said that the silica molecules will always try to line themselves in a checker board pattern and with the water leaving and the pressure to move them, the more glassy the stone will become.

Not all of the above mentioned materials need to be heat treated. In measuring the hardness of a stone on the lithic scale of 1 to 10 ... 1 being the softest and 10 being the hardest ... Obsidian, Opal and Quartz Crystal would be around a 1 or 2 whereas Agate, Chalcedony, Flint, Jasper, Novaculite