sometimes passing into flint. This mineral is often called chert by the English mineralogists. No specimens have, however, been observed where the substance is gunflint. This hornstone is less hard than common quartz, and can readily be broken by contact with the latter. Experience has taught the Indian that some varieties of hornstone are less easily and regularly fractured than others, and that the tendency to a conchoidal fracture is to be relied on in the softer varieties. It has also shown him that the weathered or surface fragments are harder and less manageable than those quarried from the rocks and mountains.

To break them, he seats himself on the ground, and holds the lump on one of his thighs, interposing some hard substance below it. When the blow is given, there is a sufficient yielding in the piece to be fractured not to endanger its being shivered into fragments. Many are, however, lost. After the lump has been broken transversely it requires great skill and patience to chip the edges. Such is the art required in this business, both in selecting and fracturing the stones, that it is found to be the employment of particular men, generally old men, who are laid aside from hunting, to make arrow and spear heads.

The modern manufacture of obsidian arrowpoints by the Indians of California is thus described by an eyewitness:[1]

The Indian seated himself on the floor and, laying the stone anvil upon his knee, with one blow of his agate chisel he separated the obsidian pebble into two parts; then giving a blow to the fractured side he split off a slab a quarter of an inch in thickness. Holding the piece against his anvil with the thumb and finger of his left hand, he commenced a series of continuous blows, every one of which chipped off fragments of the brittle substance. It gradually seemed to acquire shape. After finishing the base of the arrowhead (the whole being little over an inch in length) he began by striking gentle blows, every one of which I expected would break it into pieces. Yet such was his adroit application, his skill, and dexterity, that in little over an hour he produced a perfect obsidian arrowhead.

I then requested him to carve one from the remains of a broken bottle, which, after two failures, he succeeded in doing. He gave as a reason for his ill success that he did not understand the grain of the glass. No sculptor ever handled a chisel with greater precision, or more carefully measured the weight and effect of every blow, than did this ingenious Indian; for even among them arrow making is a distinct profession, in which few attain excellence. In a moment all I had read of the hardening of copper for the working of flint axes, etc., vanished before the simplest mechanical process.

Mr. T. R. Peale of the scientific corps of the United States Exploring Expedition, witnessed the making of arrowpoints among the Shasta and northern California Indians. He says that the flakes were struck off from the mass of jasper, agate, or chalcedony, by a blow with a round-faced stone, and that the edges were chipped by the application of a notch in a piece of horn, as a glazier chips glass. The notches in the horn tool were of different size and depths, in order to suit the work to be done.[2]

Every American collector, as well as archæologist, has read John Smith's description of the making of arrowpoints by the Virginia Indians.[3]

His arrowhead he quickly maketh with a little bone, which he ever weareth at his bracer, of a splint of a stone or glasse in the form of a heart, and these they glew to the end of their arrowes.

[1] Stevens, Flint Chips, pp. 77, 78. [2] Idem., p. 78. [3] Sixth Voyage, 1606.