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SMITHSONIAN INSTITUTION--BUREAU OF ETHNOLOGY.

NAVAJO SILVERSMITHS.

BY

Dr. WASHINGTON MATTHEWS, U.S.A.

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NAVAJO SILVERSMITHS.

BY WASHINGTON MATTHEWS.

Among the Navajo Indians there are many smiths, who sometimes forge iron

and brass, but who work chiefly in silver. When and how the art of

working metals was introduced among them I have not been able to

determine; but there are many reasons for supposing that they have long

possessed it; many believe that they are not indebted to the Europeans

for it. Doubtless the tools obtained from American and Mexican traders

have influenced their art. Old white residents of the Navajo country

tell me that the art has improved greatly within their recollection;

that the ornaments made fifteen years ago do not compare favorably with

those made at the present time; and they attribute this change largely

to the recent introduction of fine files and emery-paper. At the time of

the Conquest the so-called civilized tribes of Mexico had attained

considerable skill in the working of metal, and it has been inferred

that in the same period the sedentary tribes of New Mexico also wrought

at the forge. From either of these sources the first smiths among the

Navajos may have learned their trade; but those who have seen the

beautiful gold ornaments made by the rude Indians of British Columbia

and Alaska, many of whom are allied in language to the Navajos, may

doubt that the latter derived their art from a people higher in culture

than themselves.

The appliances and processes of the smith are much the same among the

Navajos as among the Pueblo Indians. But the Pueblo artisan, living in a

spacious house, builds a permanent forge on a frame at such a height

that he can work standing, while his less fortunate Navajo \_confrère\_,

dwelling in a low hut or shelter, which he may abandon any day,

constructs a temporary forge on the ground in the manner hereafter

described. Notwithstanding the greater disadvantages under which the

latter labors, the ornaments made by his hand are generally conceded to

be equal or even superior to those made by the Pueblo Indian.

A large majority of these savage smiths make only such simple articles

as buttons, rosettes, and bracelets; those who make the more elaborate

articles, such as powder-chargers, round beads (Pl. XVI), tobacco cases,

belts, and bridle ornaments are few. Tobacco cases, made in the shape of

an army canteen, such as that represented in Fig. 6, are made by only

three or four men in the tribe, and the design is of very recent origin.

Their tools and materials are few and simple; and rude as the results of

their labor may appear, it is surprising that they do so well with such

imperfect appliances, which usually consist of the following articles: A

forge, a bellows, an anvil, crucibles, molds, tongs, scissors, pliers,

files, awls, cold-chisels, matrix and die for molding buttons, wooden

implement used in grinding buttons, wooden stake, basin, charcoal, tools

and materials for soldering (blow-pipe, braid of cotton rags soaked in

grease, wire, and borax), materials for polishing (sand-paper,

emery-paper, powdered sandstone, sand, ashes, and solid stone), and

materials for whitening (a native mineral substance--almogen--salt and

water). Fig. 1, taken from a photograph, represents the complete shop of

a silversmith, which was set up temporarily in a summer lodge or

\_hogan\_, near Fort Wingate. Fragments of boards, picked up around the

fort, were used, in part, in the construction of the \_hogan\_, an old

raisin-box was made to serve as the curb or frame of the forge, and

these things detracted somewhat from the aboriginal aspect of the place.

A forge built in an outhouse on my own premises by an Indian

silversmith, whom I employed to work where I could constantly observe

him, was twenty-three inches long, sixteen inches broad, five inches in

height to the edge of the fire-place, and the latter, which was

bowl-shaped, was eight inches in diameter and three inches deep. No

other Navajo forge that I have seen differed materially in size or shape

from this. The Indian thus constructed it: In the first place, he

obtained a few straight sticks--four would have sufficed--and laid them

on the ground to form a frame or curb; then he prepared some mud, with

which he filled the frame, and which he piled up two inches above the

latter, leaving the depression for the fire-place. Before the structure

of mud was completed he laid in it the wooden nozzle of the bellows,

where it was to remain, with one end about six inches from the

fire-place, and the other end projecting about the same distance beyond

the frame; then he stuck into the nozzle a round piece of wood, which

reached from the nozzle to the fire-place, and when the mud work was

finished the stick was withdrawn, leaving an uninflammable tweer. When

the structure of mud was completed a flat rock about four inches thick

was laid on at the head of the forge--the end next to the bellows--to

form a back to the fire, and lastly the bellows was tied on to the

nozzle, which, as mentioned above, was built into the forge, with a

portion projecting to receive the bellows. The task of constructing this

forge did not occupy more than an hour.

[Illustration: PL. XVI. OBJECTS IN SILVER.]

A bellows, of the kind most commonly used, consists of a tube or bag of

goatskin, about twelve inches in length and about ten inches in

diameter, tied at one end to its nozzle and nailed at the other to a

circular disk of wood, in which is the valve. This disk has two arms:

one above for a handle and the other below for a support. Two or more

rings or hoops of wood are placed in the skin-tube to keep it distended,

while the tube is constricted between the hoops with buckskin thongs,

and thus divided into a number of compartments, as shown in Pl. XVII.

The nozzle is made of four pieces of wood tied together and rounded on

the outside so as to form a cylinder about ten inches long and three

inches in diameter, with a quadrangular hole in the center about one

inch square. The bellows is worked by horizontal movements of the arm. I

have seen among the Navajos one double-chambered bellows with a

sheet-iron tweer. This bellows was about the same size as the single

chambered one described above. It was also moved horizontally, and by

means of an iron rod passing from one end to the other and attached to

the disks, one chamber was opened at the same time that the other was

closed, and \_vice versa\_. This gave a more constant current of air than

the single-chambered implement, but not as steady a blast as the bellows

of our blacksmiths. Such a bellows, too, I have seen in the Pueblo of

Zuñi.

For an anvil they usually use any suitable piece of iron they may happen

to pick up, as for instance an old wedge or a large bolt, such as the

king-bolt of a wagon. A wedge or other large fragment of iron may be

stuck in the ground to steady it. A bolt is maintained in position by

being driven into a log. Hard stones are still sometimes used for anvils

and perhaps they were, at one time, the only anvils they possessed.

Crucibles are made by the more careful smiths of clay, baked hard, and

they are nearly the same shape as those used by our metallurgists,

having three-cornered edges and rounded bottoms. They are usually about

two inches in every dimension.

Fig. 1, Pl. XVIII represents one of ordinary shape and size, which I

have in my collection. The Navajos are not good potters; their

earthenware being limited to these crucibles and a few unornamented

water-jars; and it is probably in consequence of their inexperience in

the ceramic art that their crucibles are not durable. After being put in

the fire two or three times they swell and become very porous, and when

used for a longer time they often crack and fall to pieces. Some smiths,

instead of making crucibles, melt their metal in suitable fragments of

Pueblo pottery, which may be picked up around ruins in many localities

throughout the Navajo country or purchased from the Pueblo Indians.

The moulds in which they cast their ingots, cut in soft sandstone with a

home-made chisel, are so easily formed that the smith leaves them behind

when he moves his residence. Each mould is cut approximately in the

shape of the article which is to be wrought out of the ingot cast in it,

and it is greased with suet before the metal is poured in. In Figs. 2

and 3, Pl. XVIII, are represented pieces of sand-stone, graven for

molds, now in my possession. The figures are one-third the dimensions of

the subjects. In the middle cavity or mould shown in Fig. 2, Pl. XVIII,

was cast the ingot from which was wrought the arrow-shaped handle of

the powder-charger shown in Pl. XIX; in the lower cavity depicted in the

same figure was moulded the piece from which the bowl of this charger

was formed. The circular depression, delineated in the lower right

corner of Fig. 3, Pl. XVIII, gave form to the ingot from which the sides

of the canteen-shaped tobacco-case (Fig. 6) was made.

Tongs are often made by the Navajo silversmiths. One of these which I

saw had a U-shaped spring joint, and the ends were bent at right angles

downwards, so as more effectually to grasp the flat-sided crucible.

Often nippers or scissors are used as tongs.

Ordinary scissors, purchased from the whites, are used for cutting:

their metal after it is wrought into thin plates. The metal saw and

metal shears do not seem as yet to have been imported for their benefit.

Some of the more poorly provided smiths use their scissors also for

tongs, regardless or ignorant of consequences, and when the shears lose

their temper and become loose-jointed and blunt, the efforts of the

Indian to cut a rather thick plate of silver are curious to see. Often,

then, one or two bystanders are called to hold the plate in a horizontal

position, and perhaps another will be asked to hold the points of the

scissors to keep them from spreading. Scissors are sometimes used as

dividers, by being spread to the desired distance and held in position

by being grasped in the hand. By this means I have seen them attempt to

find centers, but not to describe circles. It is probable that had they

trusted to the eye they might have found their centers as well.

Their iron pliers, hammers, and files they purchase from the whites.

Pliers, both flat-pointed and round-pointed, are used as with us. Of

files they usually employ only small sizes, and the varieties they

prefer are the flat, triangular, and rat-tail. Files are used not only

for their legitimate purposes, as with us, but the shanks serve for

punches and the points for gravers, with which figures are engraved on

silver.

The Indians usually make their own cold-chisels. These are not used

where the scissors and file can be conveniently and economically

employed. The re-entrant rectangles on the bracelet represented in Fig.

4, Pl. XIX, were cut with a cold-chisel and finished with a file.

Awls are used to mark figures on the silver. Often they cut out of paper

a pattern, which they lay on the silver, tracing the outline with an

awl. These tools are sometimes purchased and sometimes made by the

Indians. I have seen one made from a broken knife which had been picked

up around the fort. The blade had been ground down to a point.

Metallic hemispheres for beads and buttons are made in a concave matrix

by means of a round-pointed bolt which I will call a die. These tools

are always made by the Indians. On one bar of iron there may be many

matrices of different sizes, only one die fitting the smallest

concavity, is required to work the metal in all. In the picture of the

smithy (Pl. XVII, in the right lower corner beside the tin-plate), a

piece of an old horse-shoe may be seen in which a few matrices have been

worked, and, beside it, the die used in connection with the matrices.

[Illustration: PL. XVIII. CRUCIBLE, AND SANDSTONE MOLDS FOR

SHAPING SILVER OBJECTS.]

[Illustration: PL. XVII. WORKSHOP OF NAVAJO SILVERSMITH.]

A little instrument employed in levelling the edges of the metallic

hemispheres, is rude but effective. In one end of a cylinder of wood,

about three or four inches long, is cut a small roundish cavity of such

a size that it will hold the hemisphere tightly, but allow the uneven

edges to project. The hemisphere is placed in this, and then rubbed on a

flat piece of sandstone until the edges are worn level with the base of

the wooden cylinder. The uses of the basin and the wooden stake are

described further on.

Their method of preparing charcoal is much more expeditious than that

usually employed by our charcoal-burners, but more wasteful; wood,

however, need not yet be economized on the juniper-covered \_mesas\_ of

New Mexico. They build a large fire of dry juniper, and when it has

ceased to flame and is reduced to a mass of glowing coals, they smother

it well with earth and leave it to cool. If the fire is kindled at

sunset, the charcoal is ready for use next morning.

The smith makes his own blow-pipe, out of brass, usually by beating a

piece of thick brass wire into a flat strip, and then bending this into

a tube. The pipe is about a foot long, slightly tapering and curved at

one end; there is no arrangement for retaining the moisture proceeding

from the mouth. These Indians do not understand our method of making an

air chamber of the mouth; they blow with undistended cheeks, hence the

current of air directed on the flame is intermitting. The flame used in

soldering with the blow-pipe is derived from a thick braid of cotton

rags soaked in mutton suet or other grease. Their borax is purchased

from the whites, and from the same source is derived the fine wire with

which they bind together the parts to be soldered. I have been told by

reliable persons that it is not many years since the Navajos employed a

flux mined by themselves in their own country; but, finding the pure

borax introduced by the traders to be much better, they gradually

abandoned the use of the former substance.

For polishing, they have sand-paper and emery-paper purchased from the

whites; but as these are expensive, they are usually required only for

the finishing touches, the first part of the work being done with

powdered sandstone, sand, or ashes, all of which are used with or

without water. At certain stages in the progress of the work, some

articles are rubbed on a piece of sandstone to reduce the surfaces to

smoothness; but the stone, in this instance, is more a substitute for

the file than for the sand-paper. Perhaps I should say that the file is

a substitute for the stone, for there is little doubt that stone, sand,

and ashes preceded file and paper in the shop of the Indian smith.

For blanching the silver, when the forging is done, they use a mineral

substance found in various parts of their country, which, I am informed

by Mr. Taylor, of the Smithsonian Institution, is a "hydrous sulphate of

alumina," called almogen. This they dissolve in water, in a metal basin,

with the addition, sometimes, of salt. The silver, being first slightly

heated in the forge, is boiled in this solution and in a short time

becomes very white.

The processes of the Navajo silversmith may be best understood from

descriptions of the ways in which he makes some of his silver ornament.

I once engaged two of the best workmen in the tribe to come to Fort

Wingate and work under my observation for a week. They put up their

forge in a small outbuilding at night, and early next morning they were

at work. Their labor was almost all performed while they were sitting or

crouching on the ground in very constrained positions; yet I never saw

men who worked harder or more steadily. They often labored from twelve

to fifteen hours a day, eating their meals with dispatch and returning

to their toil the moment they had done. Occasionally they stopped to

roll a cigarette or consult about their work, but they lost very few

moments in this way. They worked by the job and their prices were such

that they earned about two dollars a day each.

The first thing they made was a powder charger with a handle in the

shape of a dart (Fig. 2, Pl. XIX). Having cut in sandstone rock (Fig. 2,

Pl. XVIII) the necessary grooves for molds and greased the same, they

melted two Mexican dollars--one for the bowl or receptacle, and one for

the handle--and poured each one into its appropriate mold. Then each

smith went to work on a separate part; but they helped one another when

necessary. The ingot cast for the receptacle was beaten into a plate

(triangular in shape, with obtuse corners), of a size which the smith

guessed would be large enough for his purpose. Before the process of

bending was quite completed the margins that were to form the seam were

straightened by clipping and filing so as to assume a pretty accurate

contact, and when the bending was done, a small gap still left in the

seam was filled with a shred of silver beaten in. The cone, at this

stage, being indented and irregular, the workman thrust into it a

conical stake or mandrel, which he had formed carefully out of hard

wood, and with gentle taps of the hammer soon made the cone even and

shapely. Next, withdrawing the stake, he laid on the seam a mixture of

borax and minute clippings of silver moistened with saliva, put the

article into the fire, seam up, blew with the bellows until the silver

was at a dull red-heat, and then applied the blow-pipe and flame until

the soldering was completed. In the meantime the other smith had, with

hammer and file, wrought the handle until it was sufficiently formed to

be joined to the receptacle, the base of the handle being filed down for

a length of about a quarter of an inch so that it would fit tightly into

the orifice at the apex of the receptacle. The two parts were then

adjusted and bound firmly together with a fine wire passing in various

directions, over the base of the cone, across the protuberances on the

dart-shaped handle, and around both. This done, the parts were soldered

together in the manner already described, the ring by which it is

suspended was fastened on, the edge of the receptacle was clipped and

filed, and the whole was brought into good shape with file, sand,

emery-paper, &c.

[Illustration: PL. XIX. OBJECTS IN SILVER.]

The chasing was the next process. To make the round indentations on

the handle, one smith held the article on the anvil while the other

applied the point of the shank of a file--previously rounded--and struck

the file with a hammer. The other figures were made with the sharpened

point of a file, pushed forward with a zigzag motion of the hand. When

the chasing was done the silver was blanched by the process before

referred to, being occasionally taken from the boiling solution of

almogen to be rubbed with ashes and sand. For about five hours both of

the smiths worked together on this powder-charger; subsequently, for

about three hours' more, there was only one man engaged on it; so that,

in all, thirteen hours labor was spent in constructing it. Of this time,

about ten hours were consumed in forging, about one and one-half hours

in filing and rubbing, and about the same time in ornamenting and

cleaning.

In making the hollow silver beads they did not melt the silver, but beat

out a Mexican dollar until it was of the proper tenuity--frequently

annealing it in the forge as the work advanced. When the plate was ready

they carefully described on it, with an awl, a figure (which, by

courtesy, we will call a circle) that they conjectured would include a

disk large enough to make half a bead of the required size. The disk was

then cut out with scissors, trimmed, and used as a pattern to cut other

circular pieces by. One of the smiths proceeded to cut out the rest of

the planchets, while his partner formed them into hollow hemispheres

with his matrix and die. He did not put them at once into the cavity

from which they were to get their final shape, but first worked them a

little in one or more larger cavities, so as to bring them gradually to

the desired form. Next the hemispheres were leveled at the edges by a

method already described, and subsequently perforated by holding them,

convex surface downwards, on a piece of wood, and driving through them

the shank of a file with blows of a hammer. By this means of boring, a

neck was left projecting from the hole, which was not filed off until

the soldering was done. The hemispheres were now strung or, I may say,

spitted on a stout wire in pairs forming globes. The wire or spit

referred to was bent at one end and supplied with a washer to keep the

heads from slipping off, and all the pieces being pressed closely

together were secured in position by many wraps of finer wire at the

other end of the spit. The mixture of borax, saliva, and silver was next

applied to the seams of all the beads; they were put into the fire and

all soldered at one operation. When taken from the fire they were

finished by filing, polishing and blanching.

These Indians are quite fertile in design. In Pl. XIX are shown two

powder-chargers, which I consider very graceful in form. I have seen

many of these powder-chargers, all very graceful, but no two alike

except in cases where duplicates had been specially ordered. Their

designs upon bracelets and rings are of great variety. Ornaments for

bridles, consisting of broad bands of silver, sufficient in size and

number to almost entirely conceal the leather, are not particularly

handsome, but are greatly in demand among the Navajos and are

extensively manufactured by them. Leather belts studded with large

plates of silver are favorite articles of apparel, and often contain

metal to the value of forty or fifty dollars. Pl. XX represents an

Indian wearing such a belt, in which only three of the plates are shown.

Single and double crosses of silver are represented attached to his

necklace. The cross is much worn by the Navajos, among whom, I

understand, it is not intended to represent the "Cross of Christ," but

is a symbol of the morning star. The lengthening of the lower limb,

however, is probably copied from the usual form of the Christian emblem.

These savage smiths also display much ingenuity in working from models

and from drawings of objects entirely new to them.

They are very wasteful of material. They usually preserve the clippings

and melt them in the crucible, or use them in soldering; but they make

no attempt to save the metal carried off in filing, polishing, and by

oxidizing in the forge, all of which is considerable. In one article of

silver, for which, allowing for clippings saved, 836 grains were given

to the smith, and the work on which I watched so closely throughout that

I am certain none of the material was stolen, there was a loss of 120

grains, or over 14 per cent.

The smiths whom I have seen working had no dividers, square, measure, or

any instrument of precision. As before stated, I have seen scissors used

as compasses, but as a rule they find approximate centers with the eye,

and cut all shapes and engrave all figures by the unaided guidance of

this unreliable organ. Often they cut out their designs in paper first

and from them mark off patterns on the metal. Even in the matter of

cutting patterns they do not seem to know the simple device of doubling

the paper in order to secure lateral uniformity.

Here ends my description of the smithcraft of a rude but docile and

progressive people. I trust that it may serve not only to illustrate

some aspects of their mental condition, their inventive and imitative

talents, but possibly to shed some light on the condition and diffusion

of the art of the metalist in the prehistoric days of our continent,

notwithstanding the fact that some elements of their craft are of recent

introduction and others of doubtful origin.

[Illustration: Pl. XX. NAVAJO INDIAN WITH SILVER ORNAMENTS.]

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