THE OBSIDIAN RAZOR OF THE AZTECS

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In the Thirteenth Annual Report of the Bureau of Ethnology, page 59, the following statement is to be found: "The obsidian flakes of the Aztecs resemble the flint flakes of our ancestors, not so much because the ancient Briton resembled the Aztec, as because the *fracture of flint is like that of obsidian.*" The fracture of flint is like that of obsidian in that both break with what is called conchoidal fracture. But there are different degrees of conchoidal fracture, that of obsidian being finer and possessing an accompaniment which that of flint does not have. The aim of this paper is to describe the distinguishing features of obsidian fracture, to seek an explanation for the same, and to show that to them is due, in a measure at least, the excellence of obsidian as a material for knife- and razor-making.

To compare flakes and nuclei or cores only, the curves in obsidian are more delicate and graceful than those in flint. Flints differ in quality among themselves; so do obsidians, depending especially upon their homogeneity. There seems to be a stiffness in the flint flake; it resembles the arc of a more or less rude circle. On the other hand, the curve in the obsidian flake (figure 49), beginning with the percussion end or base, is first sharp, then, for the greater part of its course, very gentle indeed, and lastly, sharp again—somewhat sharper than the initial one. Corresponding phenomena are observed in the cores.

In addition, the obsidian fracture possesses a feature not found in that of flint. If the edges of an obsidian flake on its nuclear or inner surface be examined carefully with a pocket lens, or even with the naked eye, several series of parallel lines or markings of varying length and remarkable for their regularity are easily distinguishable (figure 50). All end in one direction, uniformly at the edge, which they meet at an angle of about 45°. They point toward the percussion end or base, curving gracefully in their courses until the longest series comes to take a direction almost parallel with the edges of the implement. The longest lines are distributed regularly at intervals of about one-fifth of a millimeter. Other sets of lines of varying length fall in between with astonishing regularity until, at the edges, a space between two lines measures not more than one-fortieth of a millimeter.

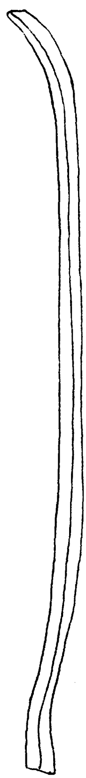

FIG. 49—Obsidian flake, edge view. Mexico. (Cat. No. *154*.11, Yale University Museum.) ¾ nat. size.

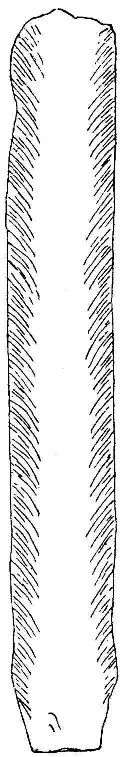

FIG. 50—Obsidian flake, view of inner surface. Mexico. (Cat. No. *154*.11, Yale University Museum.) ¾ nat. size.

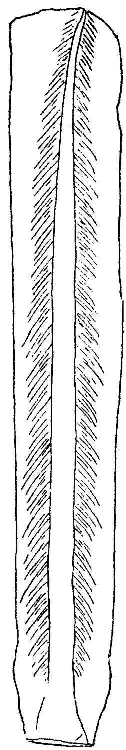

FIG. 51—Obsidian flake, view of outer surface. Mexico. (Cat. No. *154*.11, Yale University Museum.) ¾ nat. size.

The same phenomenon may be seen on the outer or raised surface of the obsidian flake; not along the cutting edges, however, but along both sides of the median ridge as seen in another view of the same instrument (figure 51). The back of this flake is composed of three surfaces of fracture, each formed by the removal of an earlier flake from the parent core (figure 52). Surface *a* fits the median portion of the inner surface of the eldest flake represented here, and does not show the minute parallel lines of fracture. The surfaces *a′ a′* fit a portion of the inner surface of the two next eldest flakes of this group, and have the lines of fracture corresponding to those which marked the inner surface of the latter along their edges. The life-history of a nucleus may be read in these minute markings, the presence and disposition of which reveal the relative ages of the flake-scars (figure 53, Nos. 1 to 5), that marked 5 in figure 53 being the youngest.

The phenomenon of these delicate markings is due to what seem to be multitudinous planes of fracture parallel to one an-

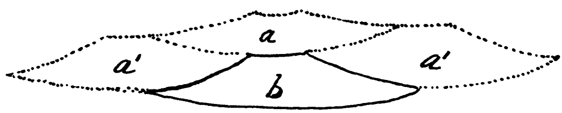

FIG. 52—Obsidian flake, cross section. Mexico. (Cat. No. *154.11*, Yale University Museum.)

other, penetrating, on the one hand, the core and, on the other, the flake, probably at right angles to their common surface of fracture.

If that be so they would bear a striking analogy to the marginal crevasses of a glacier (figure 54), however inappropriate may seem the comparison of objects in the sizes of which there is such great disparity. The resistance at the sides ($g\ g'$) of a glacier and the more rapid flow at the center together make crevasses ($c\ c'$) pointing obliquely up-stream at angles of about 45°. The direction of the pull ($p\ p'$), or greatest tension, tending to produce the fractures is oblique toward the center, down-stream. Hopkins has shown that this pull is strongest theoretically when it makes an angle of 45° with the sides of the glacier, and therefore the crevasses are at 45° with the sides up-stream.[1]

The force in the glacier is gravitation, that in the obsidian flake is percussion. By the percussion the particles of the mass of the flake would be set in motion. The movement in line with the direction of the applied force, that is to say, along the axis of the flake, would be most rapid. The sides tending to lag behind

[1] Dana, *Manual of Geology*, fourth ed., p. 245.

would produce a tension to be relieved only by fractures at right angles to the direction of that tension. Here again the direction of the tension is oblique toward the center, "down-stream," and is strongest when it makes an angle of 45° with the sides of the flake, which it does apparently near the margin, for there the transverse fractures are most numerous, as might be expected — make angles of 45° with the edges and point obliquely "up-stream," to use the glacial terminology.

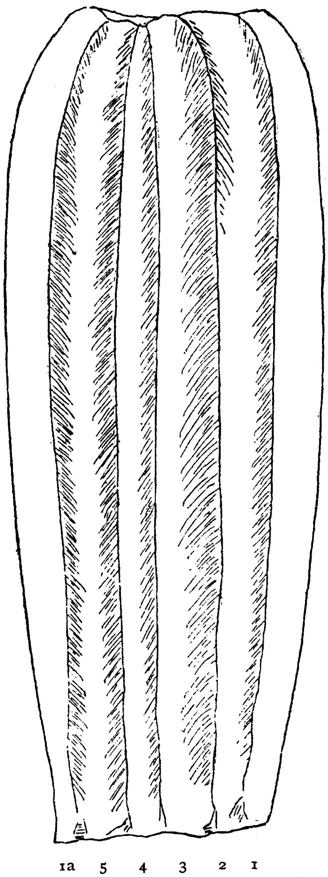

FIG. 53 — Obsidian core, Mexico. (Cat. No. *1211*.81, Yale University Museum.) ¾ nat. size.

The obsidian flake represented in figures 49–51 is an Aztec razor from the anthropological collections of Yale University Museum. The parallel lines of fracture give it a feather-edge — an edge similar to that produced on a steel razor by grinding and one almost as straight as that of a razor for the greater part of its length. With such an edge the obsidian flake was by far the most efficient tool throughout the Stone Age for the uses to which our modern scissors, knives, and razors are put. It is doubtful if the Bronze Age or the early Iron Age even furnished an instrument that could compare with it in point of sharpness. The principal advantage possessed by razors of bronze and iron was that they could be resharpened indefinitely. An obsidian razor, on the contrary, is easily dulled, and the edge once gone is lost forever. This disadvantage was more apparent than real in Mexico, at least, where obsidian of excellent quality was plentiful and the natives, according to Clavigero, were so skilful in the manufacture of obsidian knives and razors that a single workman could produce a hundred per hour. So much has already been written concerning the methods of producing flakes that a description in this connection would be mere repetition.

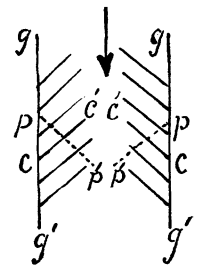

FIG. 54—Plan of marginal crevasses of a glacier (after Dana).

The Aztec razor mentioned above was tried by the writer upon linen, woolen, and cotton cloth, paper, parchment, the hair, and the beard with very satisfactory results. It cut cloth, for instance, in any direction without tearing and with the expenditure of a minimum of force, and was equally serviceable when employed as a knife or a razor. Scissors were unknown in Mexico before the advent of the Spaniards, hence obsidian flakes must have been freely used by tailors and bookmakers as well as by barbers.

Cortés, in describing the grand bazar of the City of Mexico, speaks of barber-shops where barbers shaved the head with obsidian razors. The Mexican word for obsidian is *itztli*, which means "barber's razor." The Mexicans as a race did not have heavy beards, but the masses among the male population shaved their heads with the exception of a small tuft near the crown. In a land where the clergy, the nobility, and the army alone had the right to wear the hair long[1] (and this was true of both Mexico and Peru), the demand for obsidian razors must have been great. According to Solis, the Mexicans also made use of razors of bronze, but they seem to have been rare in comparison with those of obsidian. It would not require a great stretch of imagination to picture the ancient Aztec with his obsidian razor taking a morning shave before a mirror of obsidian, as mirrors made of polished slabs of that substance are not infrequently found.

[1] Spire Blondel, "L'Art capillaire chez les peuples primitifs." *Revue d'Ethnographie*, t. VI, p. 420.