MIGRATORY PASTORALISM IN WESTERN INDIA IN THE SECOND MILLENNIUM B.C.: THE EVIDENCE FROM ORIYO TIMBO (CHIRODA)

PAUL CHARLES RISSMAN

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Supervisor of Dissertation

Graduate Group Chairperson

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Introduction

The first three chapters have outlined the problem of recognizing migratory pastoralism in the archaeological record, and have introduced the environmental and cultural parameters for the study of this phenomenon within the Harappan Tradition, and specifically in Harappan Gujarat. The points receiving attention included the regional quality of Gujarat's environment, particularly the differences in agricultural production with the bulk of the greater Indus Basin, the distinctive Harappan occupation of the state and its changing nature through time, and the impact that shifts in subsistence might have had upon these changes. Shifts in subsistence centered on the relative emphasis of millet cultivation versus the migratory herding of zebu cattle.

Concern for more detailed socio-economic data from Harappan Gujarat led to the formation of the Gujarat Prehistoric Project in 1981, a joint effort of The University Museum, University of Pennsylvania and the

Gujarat State Department of Archaeology. The initial undertaking of the project was to be the excavation of a Post-urban Phase site on the peninsula of Saurashtra, within terrain that had already been systematically surveyed (Possehl 1980). The lack of familiarity with the Rangpur III phase (Lustrous Red Ware ceramic horizon) within Gujarat and the gap that separates it from the onset of history led to the choice of a site called Oriyo Timbo, near Chiroda village, Bhavnagar District (coordinates 21 54'N°; 71 32'E°), for investigation in the winter of 1981/82. This chapter will summarize the results of the work.

The chapter will begin with a description of Oriyo's immediate environment, the District of Bhavnagar, and a discussion of the site's location in relation to the natural and cultural landscapes. The site itself will be described, then the location of trenches and the stratigraphy. The inventory of ceramics will be considered in order to fix Oriyo's chronological context in the Rangpur III period. The architecture and features of the site will be described, and the subsistence data of the excavation will be examined. Finally, the evidence of other aspects of the site's economy, primarily craft production, will complete the review.

The Vicinity of Oriyo

Bhavnagar District is situated along the eastern coastline of Saurashtra, fronting the Gulf of Cambay and stretching inland nearly to the center of the peninsula. It is 35,754 square miles in area (Government of Gujarat 1969:3). In topography it resembles the rest of Saurashtra, with a coastal strip that is sandy or rocky, and an inland area of black cotton soil plains, low hills, and outcrops of Deccan trap. Two ranges of lava hills run through the district. The northwestern series vary in height from 120-300 meters, while a chain to the southeast ranges from 300-450 meters in altitude. The northwestern hills pass near the town of Gadhada and nearly reach the Kalubhar River a short distance from Oriyo. The district is drained from northwest to southeast; streams flow into the Gulf of Cambay. Few of the rivers are perennial.

The district is lightly wooded in the south but devoid of tree cover further to the north. The northwestern hills are partly barren, otherwise thinly covered with low scrub and brushwood. The southeastern hills are more verdant, some with abundant grass. Marshes lie along the coast and penetrate up to 12 miles inland along the rivers. Land under cultivation comprises 65 to 70% of the district but

only 9.6% was irrigated in 1960-61 (Government of Gujarat 1969:176, 182), an amount that has increased with new well construction and the distribution of diesel pumps. To supplement the wells, most villages have a small tank or pond in which water rarely lasts beyond early April (Watson 1878:6). Bajra and jowar are the main food crops, while some wheat is grown in the rabi season.

Rainfall at the town of Songad, 20 miles southeast of Oriyo, averaged 57.8 cm per year from 1901-1950 (India Meteorological Department 1970:215). This figure does not reflect the truly erratic pattern of rainfall, however. Gadhada Taluka, which includes Oriyo, is listed as one of the District sub-units which experiences scarcity due to crop failure at least once in six years on average (Government of Gujarat 1969:212).

Besides the resources of soil, moisture, and vegetation, many wild animals can now (or could formerly) be found in Bhavnagar District. Nilgai, chinkara and blackbuck are common ungulates. Spotted deer and sambhar, and wild boar, are occasionally seen in wooded areas. Panther, hyaena, jackal, fox, and wolf comprise the carnivores, and lion was present in the district until 1850 (Watson 1878:7). Finally, in the category of raw materials there are sources of fine-grained silicates for the manufacture of stone tools within 10 km of Oriyo. Pebbles of agate, chalcedony, flint, chert, and jasper are strewn along hill slopes to the north

and northeast of the site, near the village of Lakhanka (Government of Gujarat 1969:22).

Oriyo itself is located on a cultivated plain between the Ghelo and Kalubhar Rivers, which flow from west to east in parallel courses for 75 kilometers before joining near the town of Vallabhipur (Possehl 1980:37). The Ghelo passes about 8 km north of the site while the Kalubhar flows 4 km to the south (Possehl 1980:38). The site is situated on a seasonal tributary of the Kalubhar called the Naru Nadi. The location of the site between the two rivers requires some comment. Oriyo falls within the scope of Possehl's intensive surface survey along the Ghelo and Kalubhar (Possehl 1980), which mapped 57 sites of periods ranging from Harappan to late historic. Most of these sites were located on the banks of either stream. Of 36 Harappan sites discovered, all but one were situated within 200 meters of the banks of the Ghelo or Kalubhar, the one exception being Oriyo. Twelve other sites were mapped between the rivers, but all of these were of a date no earlier than the second or third century B.C. Why might Oriyo have occupied this anomalous position? Possehl (1980:52) has suggested that a location near the river bank was designed to take advantage of a strip of land kept free of dense vegetation by periodic flooding, eliminating the need to clear the land for agricultural activities. If the riverside location of most Harappan sites was actually an attempt to facilitate

cultivation, then Oriyo's unique position far from the river banks may suggest that activities other than agriculture had determined its placement. This suggestion should be kept in mind as other kinds of evidence for subsistence at the site are presented below.

The excavation of Oriyo

Oriyo is a low, flat mound, almost flush with the surrounding plain to the north, sloping gently south toward the stream that flows one or two meters below the mound's summit. The site is approximately 175 meters north/south by 250 meters east/west, a bit over four hectares in area. Its surface is littered with sherds of Lustrous Red Ware, fragments of bone, and worked stone .

The selection of areas for excavation at Oriyo was based upon two criteria. The area appearing on the site plan (fig. 4.1) as the Central Operation was chosen because the center of the site was slightly more elevated than elsewhere, indicating a maximum accumulation of cultural material. Other areas were chosen based upon the observed density of occupation. A search of Oriyo's boundaries revealed two places where occupational material could be seen eroding out of the mound in concentrations greater than other parts of the site; these are shown on the plan as the

Eastern and Western Operations.

In the Central Operation five trenches were opened, measuring five by five meters each. Excavation proceeded according to stratigraphic principles. Units of 10 cm thickness were removed until a natural stratigraphic break was noticed, after which the overlying layer was cleared off and the surface of the layer beneath was exposed. Five layers were defined, derived mainly from pedogenesis and alluvial deposition and affected by cultural refuse.

The topmost layer encountered (Layer One) was loose gray earth that had been disturbed by plowing and other agencies. Its thickness was 30-40 cm and was not always clearly marked from the stratum below it. Layer Two was lighter in color and contained more calcareous inclusions. Its loose texture and disturbed appearance again provided unreliable stratigraphic context. Layer Three was found at depths of 50-60 cm to 70-80 cm below the surface and was more compact than the overlying layers. It also contained more charcoal, but the general paucity of habitation material indicated that this stratum would not be as productive as was hoped. Layer Three rested upon a very hard stratum of dark clay, known locally as murram. Layer Four contained artifactual material in greatly reduced quantities. Layer Four was excavated in one of the trenches until it gave way to Layer Five, just as hard and more calcareous, at a depth of 140 cm, whereupon it became

completely sterile. Excavation in Layer Five was discontinued at a depth of 160 cm below the surface. It is felt that Layers Four and Five represent natural soil, and that the majority of artifacts within them were probably introduced from above, by rodent activity, via the fissuring common to black cotton soil as it dries out, or through some other natural agency.

The uppermost three layers contained a variety of fine and coarse-grained red ware ceramics augmented by a fairly typical Rangpur III/ Lustrous Red Ware assemblage and small proportions of both fine and coarse-grained Black and Red wares. Also present in these layers were the bones of cattle, sheep/goat, and pig. Both a fine-grained and a coarse-grained chipped stone industry, and the rare occurrence of ground stone artifacts, completed the assemblage. Missing from the Central Operation was any firm trace of architectural or other features, or indeed any reliable occupational deposit.

The Eastern Operation proved to be rather unproductive as well. One five by five meter trench was placed along the southeastern margin of the mound where artifactual material could be seen eroding from the section. Another trench was placed in the east-central area of the mound to provide stratigraphic reference. The former trench yielded only 13 cm of artifact bearing soil until weathered bedrock was encountered. Below 16 cm this was found to be devoid of

cultural material. The latter trench did not produce much useful data either. Layer One, similar to the plow disturbed topsoil of the central trenches, extended to 40 cm below the surface (layers were numbered independently for each operation; thus Layer Three, for example, designates a different stratum for each of the three operations). Layer Two was loose in texture and probably disturbed, did not extend over the entire horizontal area of the trench, and was only 10 cm thick. The next stratum, Layer Three, was nearly sterile murram that appeared at a depth of 50 cm below the surface. This trench was discontinued while in Layer Three, 66 cm deep. The artifactual content of the Eastern Operation trenches was comparable in every way to that of the Central Operation. The lack of architecture or undisturbed habitational deposit echoed conditions in the central area as well.

One five by five meter trench was placed on the western edge of the mound where dense quantities of artifactual material were again noticed. This trench yielded a potentially productive stratigraphic sequence (fig.4.2) and thus a total of eight trenches were opened in this area, shown as the Western Operation on the site plan.

The uppermost layer encountered in the Western Operation was the familiar grayish plow zone. The second layer from the top was also broadly similar to the second layer encountered in the Central Operation. Layer Three of

the Western Operation was however not comparable to the third layer in either the Central or Eastern Operations. In the Western Operation Layer Three was very hard and whitish in color and displayed vertical jointing in section. The top of this layer was located at a depth of 40-50 cm below the surface, and it varied in thickness from 10 to 20 cm. The texture of Layer Three resembles rammed earth but it does not appear to be a floor for the following reasons: a) the stratum was found to be uniformly present in every trench and thus its areal extent was at least 200 square meters, too large to be a floor given the cultural context; b) it is extremely thick for flooring; c) there were no definable edges to it or features on its surface; d) artifacts such as ceramics, bone and chipped stone were present throughout its depth.

An abrupt stratigraphic break at a depth of 50-65 cm below the surface signaled the interface between Layer Three and Layer Four. The interface yielded a series of features that will be described in full below. These features are associated with the Rangpur III occupation, and together with the compact texture of the stratum indicates that Layer Three is an undisturbed Rangpur III habitational deposit. A significant percentage of Lustrous Red Ware and other Rangpur III vessel types occur together with animal bones, botanical remains, and a chipped stone industry with coarse and fine components. Due to its lack of disturbance and its

association with features, Layer Three of the Western Operation is the most reliable context for our reconstruction of Rangpur III lifeways at Oriyo.

Layer Four was darker and less indurated and lacked the vertical jointing in section which characterized Layer Three. Layer Four can be divided into two segmemts, Four (a) and Four (b), based on cultural inclusions. The cultural component of Four (a) was similar to the layers above it but much reduced in frequency. There is some doubt as to whether the cultural material of Layer Four (a) is in situ or was introduced by natural agencies. Four (a) is 10-20 cm thick and rests upon Four (b). Layer Four (b) contains an entirely new artifactual assemblage. Microliths are found in profusion, the vast majority of which are unretouched blades. Coarse-grained chipped stone and very small quantities of bone and ceramic are also in evidence. There is no question as to the in situ character of this chipped stone industry. Four (b) was on the average 15 cm thick.

Below Four (b), beginning at a depth of 80-100 cm below the surface, was a layer of soft, brown earth, Layer Five. This also contained a microlithic assemblage with very small quantities of bone and pottery. Interestingly, the coarse-grained basaltic stone industry of the upper layers is present in Layers Four (b) and Five with undiminished frequency. Whether the ceramics of Four (b) and Five are

rightfully part of the artifactual kit of the microlithic occupation, as evidenced at sites such as Bagor and Langhnaj, or are derived from contamination from the upper strata, is an issue that is not yet resolved.

Layer Five is about 30 cm thick and rests upon Layer Six, which is hard, yellow-brown and, except for artifactual material seemingly brought down by burrowing rodents, is sterile. The Western Operation was discontinued in Layer Six at a level of about 140 cm below the surface.

A final depositional context in both the Western and Central Operations comprised a series of irregular pits which were generally cut down through Layers Three to Five from above. Pits were recognized by their loose texture and dense quantities of well preserved bone and ceramics. High frequencies of microliths in one of the pits seem to indicate that the Harappan inhabitants of Oriyo excavated into Layers Four (b) and Five and then redeposited the material mixed with their own refuse.

Chronological considerations at Oriyo

Surface material from Oriyo was assigned a Rangpur III date by Possehl (Possehl 1980:209) based upon a series of vessel form parallels with the type site. Much ambiguity exists as to the criteria for differentiating the Post-urban

estimated at no more than 60 cm. The lack of permanent architecture in conjunction with the thinness of deposit may imply a temporary quality for the settlement, with important implications for the subsistence economy of the site and the region. To begin to explore the subsistence economy at Oriyo more fully, attention will now be turned toward the faunal assemblage as it was recovered in the excavation.

The Faunal Remains

A total of 14,992 animal bones were recovered from the Oriyo excavation, of which 1555 were identifiable to anatomical part alone and 1201 were identifiable to both anatomical part and genus. The bones were recovered from each non-sterile layer in all operations, but only the bones from the Rangpur III habitation will be considered further. Table 4.9 illustrates the layer by layer tabulations of identified and unidentifiable bones for each operation.

The bones were in general poorly preserved and in a highly fragmented condition. Bones from pit contexts were usually better preserved. In addition, most bones were covered with thick calcium carbonate deposits which cemented one bone to another and bones to sherds, stones, etc. Removal of this deposit was necessary for any progress in identification. Bones were soaked in dilute acetic acid and

the deposit was then scrubbed off with wire brushes or scraped off with sharp instruments. Even after this process much of the deposit remained intact on the bones. The presence of this deposit vitiates the accuracy of measures of relative importance of species that rely on the weighing of bones (Uerpmann 1973:400-01). Also, the physical traces left by the mechanical removal of the deposit precluded any attempt to analyze butchery marks on the bones.

Unfortunately, the faunal material was too fragmentary to permit an estimate of the gender of the Oriyo animals. The pelves, horn cores and metapodia that are required to perform such an analysis (Higham 1969; Armitage and Clutton-Brock 1976:332; Grigson 1982:8-12) were too poorly preserved to provide an adequate sample.

Due to these limitations in the data, the stresses of this section will comprise the species present, and their relative numerical importance in the death assemblage. The age profiles of the remains have also been calculated, but the discussion of age data will be saved for Chapter Six.

The bones of the skeleton that were identified to genus or species level include parts of the cranium, the horn core, teeth and jaws, the first and second cervical vertebrae, the sacrum and innominate, the scapula and all of the limb but carpals and tarsals. The remaining vertebrae, ribs, and tooth fragments were identified only as coming from a large, medium, or small mammal.

The results of this analysis indicate that the faunal assemblage was comprised almost entirely of Bos sp., sheep (Ovis aries), goat (Capra hircus), pig (Sus scrofa), and a category of sheep/ goat/ gazelle/ antelope (lack of access to an adequate comparative collection precluded more precise identifications). The cattle remains are presumed to be of zebu (Bos indicus) in view of the positive identifications of this animal from Mehrgarh (Meadow 1984a:37), Balakot (Meadow 1979:306), Daimabad (Badam 1984:343), and Inamgaon (Clason 1984:342), and the lack of firm evidence for Bos taurus in Sub-continental faunal assemblages (Grigson 1984:168; humpless cattle are however portrayed on Harappan seals). The Bos category probably includes a few mis-identified examples of water buffalo, Bubalus bubalis. However, an examination of diagnostic elements such as horn cores, second phalanges (Meadow 1981:164), and the coronoid process of the mandible (Badam, personal communication) revealed only one phalanx that could be assigned to the species. Of 169 bones classed as sheep/ goat/ gazelle/ antelope, nine were identified as goat and six as sheep following Boessneck, Muller and Teichert 1964; the remainder were too fragmentary for positive identification. It is nevertheless assumed that most of this category is comprised of sheep or goat, in light of the general paucity of wild animals in the collection, the lack of a positive identification of gazelle or antelope, the consistency of

the Oriyo sheep/goat percentages with those from other Harappan sites, and the evidence of osteological measurements (see Table 4.10; measurements were taken with vernier type sliding calipers to an accuracy of .05 mm). For example, dimensions of the humerus and radius of the Oriyo sheep/ goat/ gazelle/ antelope are large for gazelle but compare favorably with those reported for sheep and goat from neolithic Mehrgarh (Meadow 1979:172-9). A small number of bones of pig were recovered, and are tentatively regarded as domestic based upon measurements of the only complete lower third molar (maximum length: 31.5 mm; maximum breadth: 14.3 mm; c.f. Clutton-Brock 1965:12; Hole, Flannery, and Neeley 1969:309).

Additionally, a very few bones indicate the presence of wild animals on the site. These include a charred mandibular fragment from a hare that was found in a refuse pit, a possible cervid third phalanx, two tibiae which may represent nilgai (Boselaphus tragocamelus), and a very large first phalanx which may be from a rhinoceros.

The only animals definitely represented by more than one individual, however, are cattle, sheep/goat, and pig. Table 4.11 lists the relative importance of these animals as measured by total number of fragments, relative frequency (Perkins 1973; Hesse and Perkins 1974), and minimum number of individuals, following Chaplin 1971 (bones were matched to age but not to size). As seen from this table, Bos

predominates numerically in every measure, in each layer and in all operations. Generally Bos accounts for 75-85% of the Oriyo faunal remains by each measurement. Sheep/goat comprise 10-25% of the faunal material in most instances, with pig never forming more than 7% of the assemblage. The close agreement of different measures reinforces the importance of cattle in the subsistence system. The only source of uncertainty arises in the recovery procedures used at Oriyo, dry sieving or, in badly disturbed contexts, manual sorting without sieving. Payne (1975) has shown that these techniques can seriously underestimate the percentage of small mammals in a faunal assemblage, so that for the Oriyo material it might be expected that sheep/goat and pig are underrepresented. This possibility may be illustrated by a comparison of the two Minimum Number of Individuals (MNI) charts in Table 4.11. One set of figures excludes the disproportionately high number of sheep/goat mandibles found in the faunal material, the other does not. Mandibles are easily spotted and recovered, and are one of the most durable bones in the body; thus they reduce the chances of misrepresenting the frequency of sheep/goat. When mandibles are considered for the MNI measure, the total proportion of cattle to sheep/goat for the entire Western Operation drops to 64:36. In fairness, it must be added that the MNI measure itself tends to overrepresent animals that appear in the faunal sample with a low frequency (Uerpmann 1973:311;

Casteel 1976/77:147). What is clear in any case is that despite the method of quantification used and the assumptions carried with each, no species at Oriyo is nearly as frequent as cattle.

There is no evidence of change through time in the faunal assemblage. Within the Rangpur III levels the proportions of species are remarkably constant across the different strata. It is clear that the pattern of refuse of the pastoral economy exhibited no major changes in regard to the frequency of species during the Harappan occupation of Oriyo. Nor is there firm evidence of any functionally segregated area of the site from the standpoint of faunal refuse. Ratios of cattle to sheep/goat are slightly lower in the Central Operation than in the Western; however, this is not a statistically significant difference (chi square= 4.766, df=1; .10 > p > .05).

The preponderance of cattle remains among the fauna compares favorably with percentages reported from Post-urban sites scattered across Gujarat (see Table 3.2). These figures strongly indicate that cattle pastoralism was an integral part of the Harappan economy. Cattle remains are abundant relative to other species; a further point is their abundance in total numbers at Oriyo. The high density of bones argues against the occasional death of an animal at intermittent periods during the occupation of the site. The Harappan levels of the Western Operation produced 896

identifiable cattle bones representing a minimum of 25 individuals. This figure reflects an excavated volume of about 80 cubic meters. If the density of cattle in the Western Operation were extrapolated to the entire site area of four hectares, assuming an average 60 cm of Rangpur III deposit, over 8000 head of cattle would be projected, albeit over an unknown time span. From the Central Operation, badly disturbed and poorer in artifacts, 110 cattle bones yielding three individuals were excavated from 60 cubic meters. If this density were extended over the site, 1200 individuals would be represented at Oriyo. These numbers cannot be taken too literally, since a random sampling procedure was not utilized during the fieldwork. Either figure strongly suggests, however, that an impressive number of animals died or were slaughtered at the site, and that Oriyo was the location of a sustained and committed, rather than casual, pastoral effort.

Some degree of diversity in the pastoral strategy is evidenced by the small percentage of pig remains in the faunal assemblage, presumably of domesticated individuals. Cattle, sheep and goats are typically grazed in pastures outside of settlements unless they are stall fed, a laborious practice for which there is no evidence in traditional South Asian husbandry. Pigs are easily raised within settlements on occupational refuse, and cannot generally be herded over long distances (Krader 1955:315).

The pig remains, if in fact representative of domestic animals, therefore provide some indication of a more sedentary type of stock raising at the site.

Bones were one major class of subsistence data; botanical remains were the other. Gail Wagner, the project paleobotanist, designed a flotation system for the Oriyo excavation and was successful in recovering seed remains (Wagner 1983). Results of her analysis indicate the presence of 59 carbonized seeds of the finger millet, ragi (Eleusine coracana), 17% of the total seed assemblage (Wagner 1983:4). This is a cultivated millet that has also been recovered from the late levels of Surkotada in Kutch (above, p.99). In addition, grains of foxtail millet (Setaria spp.) were preserved along with a large number of impressions in the soil matrix. In Gujarat today one species of this genus is cultivated (S. italica) while three others are wild. The possibility exists that the cultivated species is represented by at least some of the grains (Wagner 1983:7).

The discovery of cultivated grain at Oriyo introduces another major facet to the subsistence system of its Harappan inhabitants. The Oriyo evidence is consistent with data on millet cultivation from Surkotada and Rangpur in reinforcing the mixed farming and herding character of the regional economy of Gujarat. The next question refers to the relationship of the Harappan subsistence system, emphasizing millet agriculture and cattle pastoralism, to

the degree of mobility in the settlement pattern of the region. At Surkotada and Rangpur, as at other town sites of the Harappan Tradition, it is reasonable to assume that a mixed farming regime was conducted by sedentary small-scale agriculturalists. Such a subsistence-settlement system characterizes sedentary villages in Gujarat today, a successful association that may have had its roots in neolithic Mehrgarh (Jarrige 1984a:24 reports a substantial complex of multi-roomed buildings and a monumental funerary platform which point to permanent occupation, but see Meadow 1984c:314). Lest one rely too strongly on this association, it should be noted that mixed farming is a very flexible kind of subsistence regime that can be accommodated to a pattern of seasonal residence. Oriyo, given its peculiar location, ephemeral architecture and habitation deposit, and density of cattle remains, seems to represent the more mobile range of the mixed farming spectrum. It may also be noted that the presence of cultivated grain in the botanical remains does not necessarily mark Oriyo as an agricultural settlement. The ragi from Oriyo may have been cultivated elsewhere and brought to the site, either by the Oriyo inhabitants themselves or through exchange with neighboring agricultural villages.

This review of the major aspects of Oriyo's material inventory and economy will conclude with a summary of the evidence for crafts manufacture. This will complete the

artifactual picture as well as shedding additional light on economic activities at the site. Crafts manufacture will be discussed in terms of chipped and ground stone industries, and briefly in relation to pyrotechnology.

Lithic manufacture at Oriyo

The chipped stone from Oriyo may be divided for analytical purposes into four categories. There are coarse-grained basaltic flake industries in both the Rangpur III and microlithic layers, and fine grained silicate flake and blade industries in each period as well. As the relationship of the microlithic occupation to the Harappan Tradition is unknown, only the Rangpur III chipped stone will be discussed here.

The raw material for the coarse-grained chipped stone consisted of locally abundant Deccan trap rock. The fine-grained component was produced mainly on brown or gray flint, with lower frequencies of chalcedony, jasper, chert, agate, and quartz. The nearest source of raw material for the fine-grained industry is in the hills to the west of Lakhanka village, less than 10 km away.

Each lithic artifact was coded for general typology (core or core fragment, blade or blade fragment, flake, broken raw material, or specific tool type such as lunate),