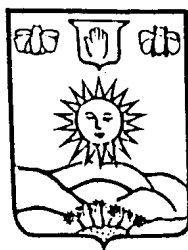


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ROBERT BRUCE FOOTE AND THE FORMATION PROCESSES OF THE ARCHAEOLOGICAL RECORD

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This article seeks to draw the attention of archaeologists to Robert Bruce Foote's contribution to a topic which has become one of the most important themes in modern archaeology, viz. the recognition and interpretation of the diverse processes leading to the formation of the archaeological record. In particular, it is proposed to highlight the debate between Foote and his colleague William King regarding natural and cultural factors influencing the distribution of artifacts in the Kortallayar and Arani basins in Tamil Nadu; the principles for the recognition of inter-site variability, and the implications drawn from these about hominid behaviour. Though the work of Foote has been duly acknowledged (see Chakrabarti 1979), the author would like to emphasize that he should be remembered not merely as an explorer or collector and as a brilliant synthesizer, but equally well for his perception of where problems in archaeology lie and the means by which they can be tackled.

The development of the concept of site formation processes in the history of archaeology has been dealt with extensively by several writers (Binford 1983, 1986; Grayson 1983, 1986; Schiffer 1985, 1986; Schick 1974; Nash and Petraglia 1987; Paddayya 1978, 1987, *in press*). Schick (1974: 11) points out that possibly the earliest published consideration of site 'context' was in the communicate sent by

John Frere (1740-1807) to the Antiquarian Society of London in 1797. Grayson too traced the development of the concept in the context of eoliths and coexistence of hominids and extinct mammals (Grayson 1983, 1986).

In the Indian context, the first explicit attempt to identify primary sites arose with the work of T.D. McCown in the Narmada Valley in the year 1960. Jerome Jacobsen (1970, 1974, 1978, 1980) adopted it as his main research perspective in his well-known work on the Acheulian culture of the Raisen district in Madhya Pradesh. He was followed by a number of other scholars (Corvinus 1981, Mishra 1985, Murty 1968, 1970, 1979 and Paddayya 1982).

Foote's writings show a full awareness of contemporary research in Europe, particularly the Somme valley discoveries of Boucher de Perthe and the writings of Charles Darwin and Charles Lyell. It is, therefore, hardly surprising that soon after his appointment in the Geological Survey of India, that he began to look for the vestiges of prehistoric man on the Indian soil and indeed heralded prehistoric research in this part of the world by his famous discovery of the Palaeolithic implements at Pallaveram near Madras in 1863. What is even more remarkable is that very soon he began to formulate ideas which can now be viewed as forming part of the story of site formation processes.

Foote's ideas on site formation processes can be traced back to an article which he published in 1866 on his Stone Age findings in the Kortallayar and Arani basins. This included an appendix in which his colleague William King contradicted these views. Foote subsequently defended his ideas in various other papers till a major revision of thought came about, as put forward in his famous book *'The Foote Collection of Prehistoric and Protohistoric Antiquities. Notes on Their Ages and Distribution'* published posthumously in 1916.

The whole story started with the discovery made jointly by Foote and King of *in situ* stone artifacts in the sediments of the Ātrambakkam nullah in September 1863. Foote's own impression was: "To account for this immensely numerous collection of implements in a small space is a question more easily proposed than solved" (Foote 1868: 234). Two aspects of this discovery influenced him deeply, *viz.* the occurrence of implements at depths ranging from three to ten feet below the surface and often found tightly embedded in the lateritic gravel and, secondly, their high density. These features called for an explanation and Foote was quick to put forward one. Backed by a knowledge of similar implements in Europe and by his grounding in geology, Foote approached the problem from two perspectives. Initially, examining their geomorphological significance, he was able to firmly place the artifact-bearing laterites in the Quarternary or Recent (Holocene) period (Foote 1866: 1). He considered these laterites to have been deposited under a sea, with strong currents flowing between elevated mountainous islands of which the Sattyavedu, Allikulli and Nagari hills concern us here. The next step for him was to explain the distribution of artifacts and the processes of their deposition against the geomorphological setting he had visualized.

Foote (1866: 23), felt that these 'islands'

were visited by the people who made the quartzite implements "... which are at present the only record of their existence." In delineating the processes responsible for the tremendous distribution of implements over the area, he postulated that this appeared to depend, not so much on the distance from the mainland but, "... upon the direction of the currents or whatever else might have been the distributing agency" (*Ibid*). The reasons for putting forward this hypothesis are two. First, he considered the distribution of artifacts and noted that they decreased in frequency south and southeast of the Allikulli and Sattyavedu hills, where possibly the influence of the easterly flowing current was not felt. Secondly, he comes down to the level of the artifacts and argues that the marks of attrition on the tools which were in some cases "... reconverted into water worn pebbles" indicated the power of water (Foote 1866: 24).

This reasoning, however, was not enough to satisfy him. The presence of extremely fresh implements had to be accounted for. The first explanation that he put forward was based on the degree and nature of transportation of the artifacts by fluvial processes which determined their degree of abrasion. In this early stage of research, he simply attributed the freshness of artifacts to the small degree of fluvial action thereby inferring that the tools had evidently drifted very short distances or not at all. However, we find him struggling to reconcile this with the contradictory evidence of their being so far from the 'terra firma' of the time (Foote 1873a: 56). He tried to attribute it to the effect of strong currents (Foote 1866: 56) and thus seemed to be travelling round in circles. This problem raised two further questions. The first being the prime question of whether the laterite beds in which the tools were found were submerged beneath the sea, or whether they formed a part of the tidal zone, periodically exposed and

covered. Secondly, he believed that marine conditions would not have affected tools at heights more than 600 feet above sea level. This would, in turn, direct attention to other agencies. "With regard to such implements it appears more reasonable to ascribe their presence to other agencies" (Foote 1866: 24-25). By other agencies he meant human action.

Foote (*ibid*: 25) goes on to note that "The next step in the hypothesis is to explain how human agency may reasonably be supposed to have been instrumental". Assuming that modern deep water conditions prevailed, he employed ethnographic analogies drawn from natives along the Coromandel Coast to come to certain conclusions. The 'palaeolithians' could under these circumstances have foraged widely in catamarans and as a result the implements discovered are those "... lost or embedded in the mud banks" (Foote 1866: 26). The presence of these "axes and adzes" presumably lost at such distances from what he considered to be the ancient shore line are used as a supporting argument to imply the presence of some form of water transport (Murthy 1981). This is augmented by his firm belief that as the seas retreated the 'palaeolithians' would have ranged over the exposed area, following the retreating waters and would have navigated them as far as they could.

If we take into consideration the ideas that Foote was employing here, one could detect in them the first sincere efforts towards the identification of what Schiffer (1986) has called natural and cultural formation processes of the archaeological record. There is also an attempt to understand the patterning in the archaeological record produced by the various forces involved. He relates these arguments directly to the nature of the sediments, for instance, the continued deposition of the sediments "... after the deposition *in loco* of the unworn implements

which underly the water worn ones". Thus, the archaeological record is viewed not as a piece of frozen time but rather as an entity involving continuous flux and change. It is obvious that his training as a geologist allowed him to realize the possibilities of natural forces acting on the artifacts and sediments first and from there proceed to establish what he considered the palaeo-environment to be and how man had adapted to these conditions. Thus, in the early stages of Foote's research, artifacts were viewed as sedimentary particles (Schackley 1978; Isaac 1989). Judging his views within the framework of reasoning drawn up by Schick, we find all the stages of inference represented in his work – the initial recognition of multiple reasons that involve cultural and non-cultural agencies, the separation of these discrete processes, the regular process-product relations, and inferring processes from the products (Schick 1974:6-7).

It is quite another matter to note that the entire hypothesis was based on a theory of the marine origin of laterite beds. The wider field experience as put forth in his comprehensive book (1916), made him uncomfortable with this view and it was eventually replaced by the concept of a great pluvial period connected with the Pleistocene Ice Age in the north. Even so, Foote was able to infer the new processes involved (Foote 1916: 181); he brought into the picture what one may call today the processes of sheet floods and also did not leave out of consideration other such possible sources of fluvial disturbance. In particular, the tropical storms one experiences in India strengthened his views of their role in the weathering and transportation of the quartzite regolith (Foote 1916: 183).

As one traces the development of Foote's thought, one does not fail to note a growth

in precision. Not only does he now, rely more on the artifact attributes, he begins to consider the nature of the assemblage as a whole and its relationship to the geographical landscape. As has been noted earlier, the problem of the extreme freshness of some implements plagued him in the early years. In later years one sees a broadening of his ideas and a realization of the complexity of the processes involved. In particular, his identification of the presence of what he called high level gravels (Foote 1876, 1880, 1916) and the implication this had in influencing artifact distributions is notable. It is on the basis of his work that later workers could use these gravels for reconstructing palaeoenvironment and Stone Age chronology (Korisetter 1979; Paddayya 1971; Joshi et al. 1980; Ghosh 1980)

It is, however, in his response to King who had put forward views different from those of Foote expressed in 1866 that we find one of the early and noteworthy debates on the concept of site formation in the history of archaeology.

Foote acknowledged that it was in fact King who had discovered the first implements at Ātrambakkam. It was also King who with much greater force, debated on the problems of identifying 'manufacturing sites'. The best exemplification of King's process of reasoning is provided when he deals with the area now forming north-eastern Tamil Nadu and parts of Chittoor District of Andhra Pradesh. In describing Locality 3 in the Namaveram area (modern Arani), he says that it "... is a most interesting one in so far as it seems to be a place of manufacture" (Appendix by King in Foote 1866:37). His reasons for citing this are the presence of flakes and a number of finished and unfinished and broken and imperfect specimens. "The specimens referred to as imperfect suggest the idea that they had

been discarded or left unfinished" (Appendix by King in Foote 1866: 38). He noted the presence of the more frequent distribution of chips around some of the low gneiss hummocks. In his observations, he attributed their presence to moving water. One then comes across a realization of the systematic patterning of the artifacts resulting in a change in the hypothesis proposed. He says: "I must confess, moreover that at the time of examination a very different reason for the occurrence of the fragments at these spots was apparent in my mind As I sat there on the knobs of gneiss ... I could not help thinking that the Implements might have been manufactured beside the groups of rocks" (Appendix by King in Foote 1866: 39).

This approach to the problem was, thus, quite different from that of Foote. Unlike Foote, who had had deftly woven together natural and cultural formation processes by invoking the hypothesis of the loss of tools by seafaring 'palaeolithians', King proceeded more systematically. He first took into consideration the general spatial distribution of the artifacts at the site. Avoiding the problem of primary or secondary context which has so plagued modern archaeologists (Paddayya *in press*), he views, on the one hand, the current action which may have brought the 'weapons' around the gneiss hummocks and on the other hand firmly believed that the great density of artifacts in such a small area surely indicated a place of manufacture.

Based on observations of the patterning found at different sites regarding artifact density, distribution, altitude and sedimentary context, King came as close to putting forward a general model of site formation processes in this region as one could do with the resources prevalent at that period. He notes, for example the lack of any evidence of artifact distributions and patterns produced by current action at high

elevations. He was also able to distinguish individual stones that had drifted away from their sedimentary context from places of manufacture, where in his view, no fluvial patterning could be detected.

King went on to relate the observations in this area to Ātrambakkam and Kirkumbaddy. He did not contribute to the view of much fluvial action having disturbed the artifacts here. "There must, of course, have been some drifting but it would be very local ...", hence they were, to him, places of manufacture (Appendix by King in Foote 1866). Further he believed that the Ātrambakkam beds were younger than the laterites elsewhere and were a reconsolidated formation (Foote 1873).

In this particular case, King argued vehemently against Foote's objection that the low intelligence level of the hominids would have prevented them from creating organized centers of manufacture. "... if a man wanted a stone weapon he looked about for a suitable stone and made the weapon then and there" as opposed to preconceived manufacture and barter (Foote 1866: 40). While accepting this as one of the many general possibilities, King, on the other hand, argued that the presence of implements away from areas in which the quartzite was available easily, implied preconceived prior movement to places to procure the raw material (Foote 1866).

These are fundamental observations and not only imply a consideration of functional adaptations in relation to 'economic zonation' and 'environmental geography' (Binford 1982: 358) of the region, but also anticipate ideas emphasized in recent literature, pertaining to the concept of 'expedient and curated technologies' (Binford 1983, 1989, Isaac 1989, Ebert 1986) and the various models of hunter-gatherer adaptations (see Bettinger 1991).

Foote's counter-arguments rested on geological and archaeological observations. He first considered the objections that the implements were deposited after the formation of the lateritic gravel beds and those found embedded within, were a result of the subsequent consolidation of the entire bed (Foote 1873: 48). He questioned this hypothesis on three main grounds. Firstly, that no tools had been found in the deposits younger than the laterite like the alluvium; secondly, that the implements and the quartzite gravel in the laterite matrix showed similarities in patination thereby implying contemporaneity, and lastly that the implements were deeply embedded in the lateritic shingle. In Foote's opinion the absence of flakes and chips indicated that no manufacturing activities had taken place at Ātrambakkam. Considering the phase of Stone Age research when debitage study merited little or no attention, this observation is notable.

Another argument he advanced is that the small size of the gravels in these localities could not possibly account for the occurrence of large tools, but this last argument, however, is rather shaky and in fact he contradicts himself later (Foote 1887: 70-71).

In addition to the foregoing observations about the processes leading to the formation of tool-bearing deposits in the Kortallayar and Arani basins, Foote also extended his inferences to sites found in other areas and other site situations. He considered the assemblages from the Malaprabha beds as undisturbed or even put them under the category of manufacturing places. In his own words "... they show little or no signs of attrition, but they were accompanied by the numbers of imperfect specimens, flakes and chips, which characterize sites of manufacture" (Foote 1913: 35). Likewise, he assigned some of the site situations in the Bijapur District under the category of living

sites, because these showed the presence of a large number of "axes, spearheads and scrapers" (Foote 1916: 132) but lacked chipping debris. A similar interpretation was offered by him for sites occurring in the Orsang Valley in Gujarat.

Foote's observations about the implements from Chachai in Kathiawar in a way anticipate present-day research on artifact reuse and recycling. At this site the implement makers occasionally took recourse to "... making secondary and tertiary sets of flakes off the same selected stone" (Foote 1916: 152). Noteworthy too are his observations about the accidental production of flakes due to trampling by cattle in the Nellore area and he uses this as a warning to those who use the presence of bulbs of percussion as a clear indication of human agency, with special reference to the controversy raging over eoliths (Foote 1916: 189-190). In the field of bone taphonomy too, Foote made pertinent observations. One must in particular refer to his recognition of the extensive gnawing of bones into different shapes by porcupines of the Billa Surgam caves in Kurnool District (Foote 1916: 119).

Scattered in his publications are also

references to other features like caching, sand blast polish on chert cores at Kappadwanj (Gujarat) (Foote 1916: 144); the development of aetonic tinting (Foote 1916: 13) and the identification of the action of termites. He was able to identify on a piece of wood, "... the peculiar surface left by the action of the termite's jaws, a surface quite characteristic of their work" (*ibid* 1916: 195).

To conclude our study, one sees in Bruce Foote a unique person who, while laying the foundations of prehistoric research in India by his numerous and widespread discoveries, simultaneously also gave careful thought to the recognition of various factors (natural and cultural) responsible for the formation of the archaeological record. It is only in recent years that the latter aspect of Stone Age research has been recognised by Indian workers as a major theme inviting comprehensive study. The author's doctoral research in the Kortallayar and Arani basins where prehistory in India was born, seeks to revisit the basic problems raised by Foote and King in the light of modern advances made in the study of site formation processes.

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