DIRING YURIAKH: AN EARLY PALAEOLITHIC SITE ON THE LENA RIVER, EASTERN SIBERIA

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ABSTRACT

Controversy has surrounded the Siberian Palaeolithic site of Diring Yuriakh since it was first reported by its excavator, Yuri Mochanov. However, much of this controversy is misplaced because it has centered on the artefactual nature of the assemblage rather than on the dating and geomorphology of the site. Whereas the lithic remains from Diring are unequivocally of human origin, there is great variation in the dates on the cultural layer and in the interpretation of the stratification.

The Diring site is situated on the Tabagan terrace, the highest terrace on the right bank of the Lena River, at 61° 12' N latitude and 128° 28' E longitude, 140 km up-river from Yakutsk. The site was excavated over a 15-year period by Yuri Mochanov of the Soviet Academy of Science. Robert Ackerman, Maureen Carlson and I examined the site and the collections in 1990 (Ackerman and Carlson 1991).

The early assemblage at Diring was discovered accidentally during the course of excavation of a burial complex belonging to the Neolithic Ymyiakhtakh culture. The lithics and other artefacts associated with this Neolithic culture are very well made and quite distinctive. In a palaeosol slightly below the burials a few implements of the late Palaeolithic Diuktai culture (35,000-10,000 BP) were found, including a distinctive Gobi core. In a still earlier palaeosol a small assemblage of crude wind-abraded quartzite artefacts, distinctly different from those found in the younger layers and unlike any previously known in the region, was discovered. The latter discovery led Mochanov to explore further the deposits on the top of the terrace, back from the western edge where the initial finds were made. Test trenching and vertical coring established both the stratigraphic sequence and the eastward continuity of the layer containing this crude lower quartzite industry. Some 40 m of sterile overburden covered the cultural layer at the centre of the site. The cultural layer was exposed using heavy equipment to remove the sterile overburden, and was then mapped (Mochanov 1988; 1992a:Figures 6, 9). The cultural remains of the early Diring assemblage consist of 28 discrete clusters of lithics, including formed tools, debitage and anvil stones, which rest unconformably on a layer of red sand. One fragment of fossilized bone was found.

GEOMORPHOLOGY

The stratification at the site is quite straight-forward, although Mochanov (1992a, 1993) and Waters *et al.* (1997) offer markedly different interpretations of the events which resulted in the observed stratigraphic sequence (Figure 1). Whereas Mochanov sees the entire deposition above the bedrock as falling within the fluvial/interfluvial cycle of the Lena River, Waters sees all of the deposition subsequent to the human occupation as aeolian.

In Mochanov's profile (1992a:Figure 14), derived from both coring and excavation, the following 16 strata (I will refer to them as layers) are designated, beginning with the limestone bedrock:

Layer 1: Cambrian limestone bedrock.

Layer 2: A layer of fluvial gravels deposited as part of a braided channel of the ancestral Lena River. Both Mochanov and Waters agree as to the nature of this deposition.

Layer 3: Both Mochanov and Waters consider Layer 3, a mottled red-coloured sand with lenses of gravels and pebbles, but no cobbles, as of fluvial origin. Mochanov considers it to have been deposited during warm conditions of a "multi-year freeze", whereas Waters calls it fluvial alluvium resting conformably on Layer 2 and part of the same depositional unit as Layer 2 (Waters groups Layers 2 and 3 together as part of his depositional

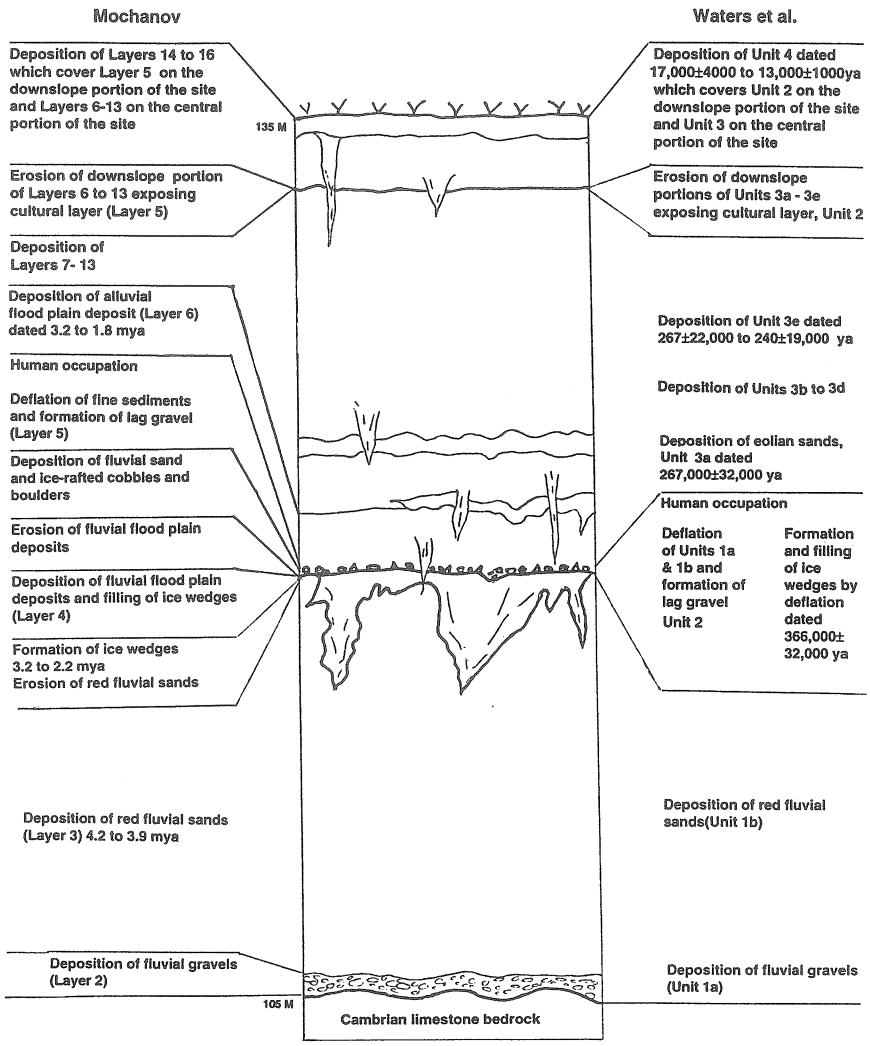

Figure 1: Schematic drawing of the stratification at the Diring site at 105-135 m above the Lena River. A. summary of Mochanov's (1992a, b) interpretation and dating of the sequence is shown at the left, and of Waters et al. *(1997) at the right.*

unit 1, and the lag gravels of Layer 5 as an eroded part of this same unit). In other words, these are fluvial sands and gravels of the ancient Lena River laid down when it was running some 105 m above its present level.

Layer 4: Polygonal sand-filled ice wedges. There are at least two sets of these wedges in the upper part of Layer 3. At this point Mochanov and Waters diverge in their interpretation of depositional events. There are no pebbles, cobbles or large gravel in the wedges. Mochanov hypothesizes that the wedges originated in the late Pliocene (as it was cooling, either 3.2-3.1 or 2.5-2.2 mya), and that the sand fill of the wedges is all that remains of fluvial flood plain deposits that subsequently disappeared through erosion. Mochanov's climatic expert calculates that the ice wedges were formed at temperatures no higher than -7° to -8° C, with average annual temperature -12° to -14° C. Waters study indicates that the fill of these wedges is aeolian sand. He considers the wedges to have been formed and filled with aeolian sand before the erosion of the upper part of his Unit 1, which formed the lag gravels of Layer 5. If so, his Unit 1 could hardly be one depositional event. It seems to me that under Waters' reconstruction the sand wedges would have had to have formed and filled with aeolian sand either during or after the formation of the lag gravels of Layer 5, but if so, the absence of pebbles and cobbles in the wedges is difficult to understand.

Layer 5: The cultural layer. Both Mochanov and Waters recognize the cultural layer as a lag gravel. In addition to artefacts it contains many cobbles and some boulders

up to one metre in size. Mochanov considers this layer to have been deposited by high-water floods and ice-rafting that brought in the larger cobbles and boulders. Deposition was followed by deflation and the formation of small gravel-filled ice wedges. Waters considers Layer 5 to be a lag gravel formed by aeolian deflation of the upper part of Layer 3 (his Unit 1), which must have contained lenses of gravel and large boulders that were deflated to a common surface and concentrated into a loose lag as the fine grained sediments were removed when the wind swept over the area. If such is the case, then the ice wedges must have formed during or after this deflation and were then filled with aeolian sand. Human occupation took place at some time after the formation of the lag gravel which provided the raw material for fashioning artefacts. In the central portion of the stratigraphic profile Layer 5 is covered by Layer 6, whereas in the western down-slope end of the profile Layer 6 is missing and Layer 5 is covered by Layer 14.

Layers 6-14: These layers are sands, sandy loams, and loams with some soil formation and ice wedges, and some disturbance by solifluction. Water's study of the well-rounded sand grains in these layers indicates they are of aeolian origin. Mochanov considers them to be mostly floodplain facies of alluvium. This difference in interpretation is significant. Aeolian sands are still being deposited on the right bank of the Lena today whereas any deposition of flood plain alluvium 105 m or more above the present level of the Lena River would have great antiquity.

DATING

Four dating methods have been attempted at the Diring site:

1. typological cross-dating of artefact assemblages by Mochanov (1992a, 1993);
2. palaeomagnetic age estimates by Pen'kov (in Mochanov 1992a, 1993);
3. TL dating of sediments overlying the cultural layer by Kulikov (in Mochanov 1992b) and of sediments both underlying and overlying the cultural layer by Waters (Waters *et al.* 1997); and
4. TL dating of a pebble from the cultural layer itself by Richards and Huntley (Richards 1994).

There is wide variation in the results of these different dating methods. The range of dates for Layer 6, overlying part of the cultural layer, is from 3.15 mya to 267,000 years ago, and on Layer 14, covering other parts of the cultural layer, 17,000 years ago. The range of dates on the cultural layer itself is from >78,000 to between 2.5 and 3.2 million years ago; and the range of dates on the deposits underlying the cultural layer is from 4.2 million years for Layer 3, the red sands, to 366,000 years for the sandy fill of the ice wedges, Layer 4. Which of these dates, if any, are we to believe ?

Pen'kov's palaeomagnetic dating is based on correlating the sequence of reversals of the magnetic pole displayed by sediments in the stratigraphic sequence at Diring with world-wide sequences. The most notable world-wide shift in the pole is the Brunhes/Matuyama, now placed at 780,000 years ago, but there are others – the Jaramillo at about 1 mya, the Olduvai even earlier, and the Gauss more than 2.5 million years ago. The sequence of reversals at Diring has been published (Mochanov 1992a:Figure 15), but it is difficult to determine which reversal is supposed to correlate with the world-wide sequence. Waters *et al.* (1997) discount the palaeomagnetic dates on the basis that cryoturbation and solifluction processes would render the palaeomagnetic reversal stratigraphy inaccurate. A more thorough explanation of Pen'kov's palaeomagnetic correlations would be useful.

Huntley and Richards (Richards 1994) experimented with a new method, actually attempting a TL date on a pebble from Layer 5 uncovered at night from below layer 6. TL works on the basis of determining when the mineral tested was last exposed to sunlight. Their result was that this occurred more than 78,000 years ago, but this is only one reading on one object, and Huntley (pers. comm. 1997) considers this far too inadequate to use as a basis for dating the cultural layer. No details on Kulikov's much earlier TL dates are available.

Waters *et al.* (1997) collected samples of sediments for TL dating from layers both overlying and underlying cultural layer 5. These dates form an internally consistent sequence and provide a mid-point date on cultural layer 5 of about 300,000 years. However, Kuzmin (1997) has questioned the relevance of this date to the artefact assemblage of cultural layer 5. He notes that layer 6, dated by Waters at 267,000 years ago, only covers artefact cluster 16 and that the other artefact clusters are covered by Layer 14, which Waters has TL dated at only 17,000 years. Kuzmin, citing Ranov, notes further that the lithics in cluster 16 are not representative and may not be artefacts. Kuzmin is possibly unaware (he doesn't reference it) of Mochanov's book in which Mochanov (1992a:Figure 49) illustrates some of the lithics from cluster 16. While no tools are illustrated, there is abundant refitted material. Mochanov (1992a:Figure 68) has also published a map of cluster 16 that shows the locations of the following artefacts: 3 tools; 37 artificially fractured cobbles, pebbles and fragments thereof; 30 fragments and flakes; and 2 hammerstones. While cluster 16 has a smaller number of objects and less diversity (no anvils) than some of the other clusters (and I am unable to discern what the 3 tools actually are), the entire configuration of the assemblage

is so similar to that of the larger clusters that I would be very hesitant to consider it as anything other than part of the same cultural deposition.

Typological dating of simple lithic assemblages is at best a risky business. For example, pebble tool assemblages on high terraces above the Fraser River in British Columbia that were once considered very ancient and possibly preceding the final glaciation, are now known to be as young as 6000 years (Haley 1996) and to be from special purpose sites. There is a difference, however, in that in British Columbia the pebble tools are also found in assemblages containing more advanced tool types, whereas this is not the case in Yakutia. While Mochanov feels that his Diring assemblage is more comparable to the African Oldowan than to anything else, he also acknowledges that many artefact types of that industry are absent at Diring: multifaceted spheroids, bifacial discs, bifacial chopping tools, proto-axes, well-retouched small tools on chunks and flakes, and prepared cores (Mochanov 1993:45). Current research in China (Wei 2001) is uncovering pebble tool assemblages somewhat similar to that at Diring, and when fully described and dated may provide a basis for closer comparisons than the Oldowan.

ARTEFACTS

Both Don Dumond (1994) and Richard Klein (cited in Holden 1997 and Slayman 1997) have expressed the view that the lithics from Diring may not be artefacts. Neither of these archaeologists has been to the site although they have seen some of the specimens. Had they been to the site and examined the full assemblage, I doubt that either would have expressed this skepticism. North American archaeologists are unusually sensitive about the identification of geofacts as artefacts in view of the media publicity given to a small number of New World sites such as Calico Hills in California, Pedra Furada in Brazil and the Varsity Estates site in Canada, where ancient geofacts have been interpreted as artefacts. The lithics from Diring are neither geofacts nor do they fall in an intermediate category where they could be either natural or man-made – they are artefacts fabricated by human beings.

The Diring lithics are almost entirely made from coarse-grained quartzites. The basic flaking technique is block-on-block in which a nodule is placed on an anvil and struck with a hammerstone. Impact scars from unsuccessful attempts at fracturing are present on some cobbles, and many flakes and chunks can be refitted to core remnants. Formed tools are rare and consist almost entirely of artefacts classifiable as unifacial pebble choppers made on cobbles (Figure 2). The suggestion that such forms were made by

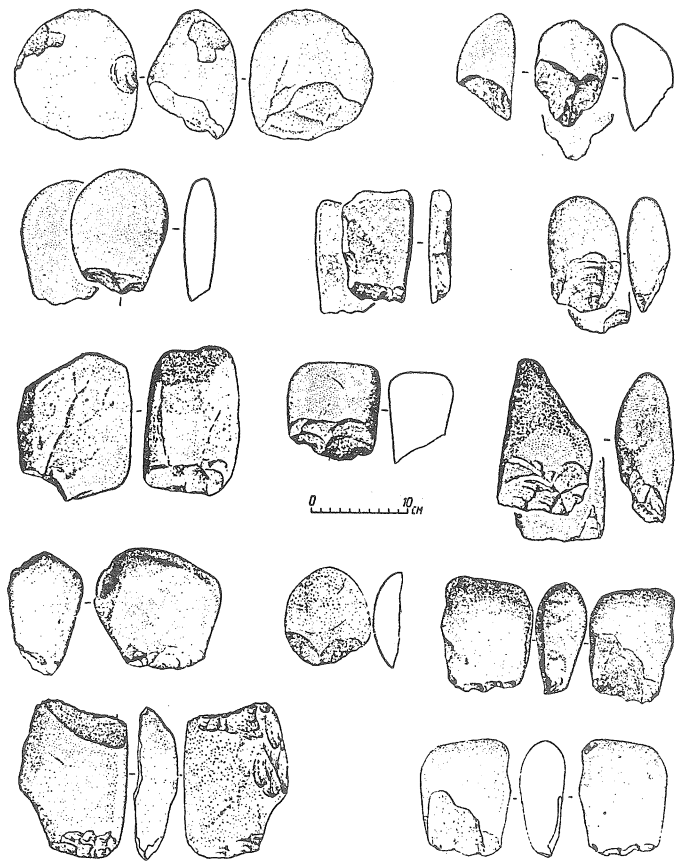

Figure 2: Pebble choppers from the Diring site. Adapted from Mochanov 1992a.

"frost heaving" or "river flow" is absurd. The technology is simple and primitive, but clearly of human origin.

Use wear on these tools is obscured by desert varnish and sand-abrasion from the aeolian environment in which they were found. These pebble tools exhibit multiple flake removals with the same patina, and some show step fractures. Some of the flakes show distinct bulbs of percussion and impact scars, although use of the block-on-block technique on quartzite does not always produce distinctive attributes of human flaking. As of 1992 (Mochanov 1992a), some 4033 artefacts had been catalogued, of which 500 were classified as tools. The most representative are various types of choppers, of which some with steep worked edges can be classified as core scrapers. There are few identifiable tools on flakes, although flakes could have been used as cutting tools without retouch.

There is no natural agency in the local environment that could have fractured the quartzites to make these objects. In addition, the tools and re-fittable debitage occur in

discrete clusters (Mochanov 1992:Figure 6) around the anvils. The characteristics of the artefacts, the low energy environment in which they are found, and the clustering all indicate human manufacture.

Diring is only one of 14 sites with this type of assemblage situated on the Tabagan terrace. I also visited the excavations at Ust Buotoma and observed the same configuration of anvil stones and artefacts there.

HISTORICAL SIGNIFICANCE

On the basis of the Diring material, Mochanov (1992a, b, 1993) has challenged the current ruling theory that the genus *Homo* evolved from some earlier genus of primates in Africa. He presents this challenge as a "possibility of nontropical human origins" in which response to the sharp cooling of the late Pliocene is seen as the trigger which sent some early primate on its adaptational path toward humanity. He considers the middle Siberian Plateau, where there was no glacial cover, as a suitable area, and acknowledges his debt to the 19th century scholar Moritz Wagner who in 1871 put forward the idea of human origins in the high latitudes of Europe and Asia. Given the data from Diring at Mochanov's disposal – the similarities with the Oldowan industry, the palaeomagnetic calendar and TL estimates determined by his colleagues, and the interpretation of the geomorphology of the site as alluvial river terraces formed by the Lena River when it was running some 105-135 m above its present level, a circumstance which places the site in the 3.2-1.8 million years BP time period – his hypothesis is not unreasonable. Mochanov is to be admired for challenging the current ruling theory that mankind originated in Africa. However, I know of no scholars who have taken his model seriously, probably because of their awareness of the non-archaeological genetic and biological indicators that place humans as closer to the African than the Asian primates.

Waters *et al.* (1997) research has resulted in challenges to both the dating and the geochronological interpretation of the stratification at Diring. His dates place the Diring assemblage at between 370,000 and 260,000 years ago during the Holstein interglacial, at a time when, even though no evidence has been found at Diring, fire was known to the south at Zhoukoudian in northern China (Weiner *et al.* 1998) and there is some evidence that world-wide temperatures were higher than at any other time during the Pleistocene (Fagan 1992:Table 3.2). Both of these factors – warmer temperatures and knowledge of fire – could have permitted the penetration and exploitation of this region by a *Homo erectus* group on the cultural level of *Sinanthropus* bringing with them a simple chopper technology. It is unlikely that such a movement would have been feasible without both warmer temperatures than at present, and knowledge of fire.

It is doubtful, however, without further verification, that this early date will find acceptance by many researchers any more than have Mochanov's even earlier dates. Arguments have now appeared that the cultural layer could be older than the 370,000-260,000 year TL estimate (Huntley and Richards 1997), to which Waters (1997) has replied, and there is also Kuzmin's (1997) argument that the assemblage could be considerably younger. Waters *et al.* (1999a) have just published a more detailed account of the stratification at Diring without significantly changing their interpretation, and the debates have continued (Waters *et al.* 1999b; Kuzmin and Krivonogov 1999) without resolution.

CONCLUSION

The Diring assemblage contains real artefacts even though its exact dates are still controversial. Current research in China (Wei 2001) is uncovering undated pebble chopper assemblages which offer a comparative base for the Diring assemblage that is much closer geographically than the Oldowan. Let us hope that further information concerning the palaeomagnetic sequence and TL dates obtained by Mochanov's research team will be forthcoming, and that continuing studies by Mochanov and other independent researchers will fully resolve the different interpretations of the dating and stratification at this important archaeological site.

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