Stone-carving with flint: experiments with a Magdalenian lamp

M.H. Newcomer

This paper describes some experiments in the making and use of a stone lamp of palaeolithic type. Along with torches, stone lamps are the earliest form of portable fire, and as PERLÈS (1977: 62) has pointed out, their invention in the Upper Palaeolithic indicates an increasing sophistication in man's use of his environment and in his manipulation of fire.

Most of the palaeolithic lamps known come from early excavations, and unfortunately we cannot say much about their exact cultural context or chronology. However, the earliest examples are Upper Palaeolithic in date, and the more elaborate carved lamps with handles - of which only about a dozen are known - all come from the Magdalenian, or just possibly Solutreans of France (ROUSSOT 1974: 259).

I began my experiments in order to see in the first place how easily stone could be worked with flint tools, and also to investigate the efficiency of palaeolithic lamps.

The Model

As a model for this project I chose one of the lamps from the cave of La Mouthe in the Dordogne, which is essentially complete and has recently been re-published with full-sized drawings by ROUSSOT (1969-70). This lamp was discovered during RIVIÈRE'S excavations in August of 1899, and most probably dates from the Magdalenian (fig. 1).

Materials and tools

Like this lamp, most palaeolithic lamps are made of sandstone, but as limestone was also widely used both for palaeolithic low-relief sculpting and lamp-making, I chose a block of English limestone from the Cotswolds as raw material for the lamp. The flint used came from the chalk at Brandon, in Suffolk, and a kit of tools, all copies of Magdalenian types, was made, including large flakes, a pick, a chopping tool, as well as burins and end-scrapers (fig. 2).

Making the lamp

The lamp was made in four stages: the first involved scratching the lamp's shape in plan onto the surface of the limestone, and then chopping away the unwanted material with the flint chopping tool. The limestone was soft enough to chop easily with flint, providing that the tool was heavy enough and had a fairly obtuse working edge that would not break down easily.

In the second stage, the under surface of the lamp was shaped using both the chopping tool and a large flake with an edge angle of about 70°, which was used in a planing motion. The rough work of these first two stages took almost two hours, including the few minutes needed to make the flint tools.

In the third stage, the lamp's bowl was hollowed out to a depth of about two and a half centimetres, using a variety of flint tools: the pick was used to peck the limestone, heavy burins used to score deep grooves, and finally an end-scraper served to smooth bowl's inner surface. This work took just over two hours.

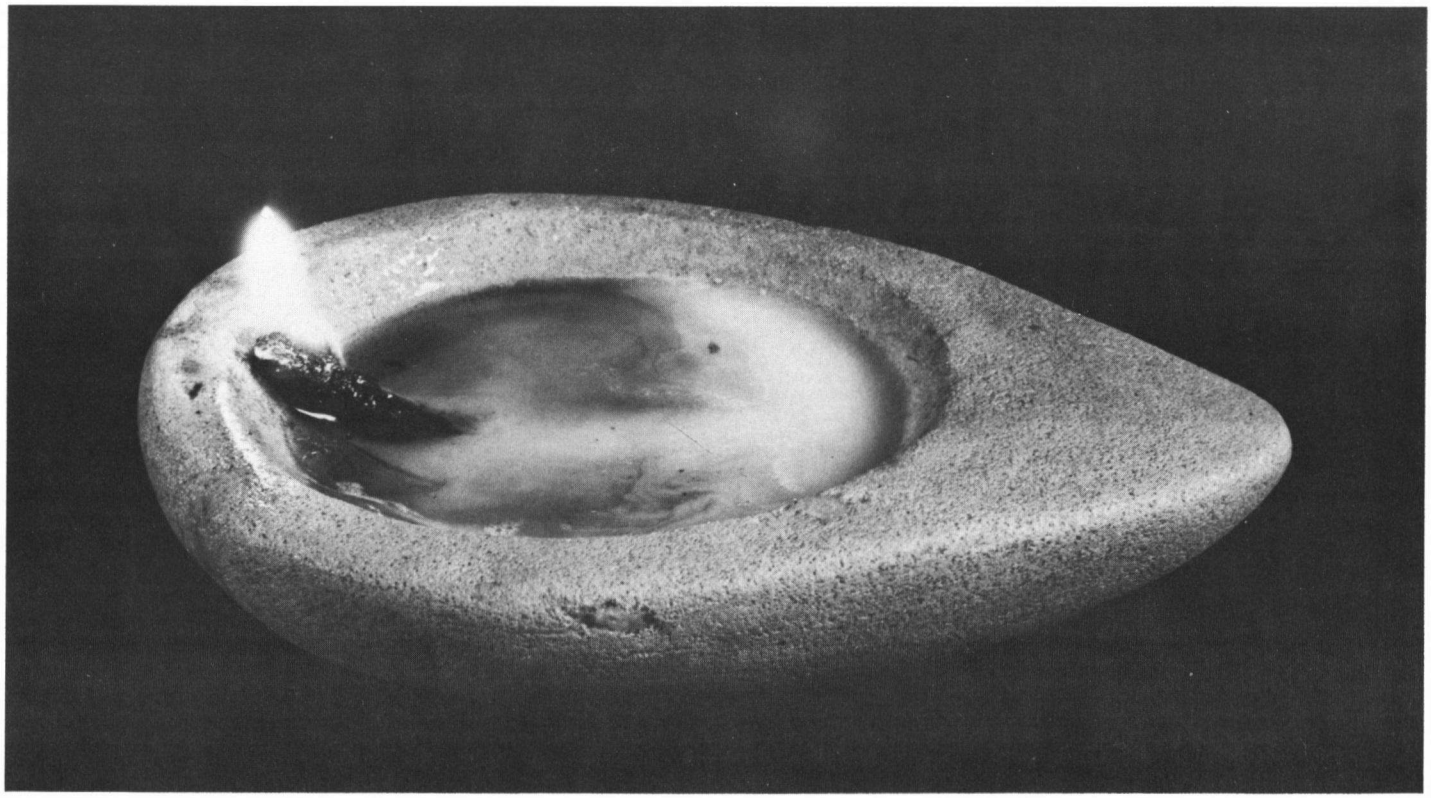
The fourth and final stage in making the lamp was really a cleaning-up operation, using a small block of sandstone as a rubber to obliterate the pits, cuts and grooves left by the flint tools, and bring the surface finish up to the standard of the La Mouthe original. The hour spent on this stage brought the total time taken to make the lamp to about five hours. As with times quoted elsewhere for parallel technical studies (NEWCOMER 1977), the times required for the various stages of lamp making are offered only as a rough guide to how long such work takes, as variables like the maker's experience and work habits and of course the hardness of the stone itself have not been taken into account.

Microwear

The flint tools tested in this project worked surprisingly well, and if not used too violently could be used for a considerable time without sharpening. Heavier tools like the pick and chopping tool constantly suffered from edge damage, but this damage could be tolerated for some time as it exposed fresh cutting edges to the work.

Discovering which tools might have been used by the Magdalenians for lamp making and other sculpting could be done by examining the wear traces on experimental tools and then searching collections of prehistoric tools for similar traces. Of the possible methods of studying traces of wear on flint tools, the high magnification method developed by LAWRENCE KEELEY and reported at the last Flint Symposium in Maastricht (KEELEY 1975; KEELEY and NEWCOMER 1977) seems to be providing the most interesting results, as it allows the identifi-

Fig. 1 Experimental copy of La Mouthe lamp with muton fat fuel and single wick of rolled mullen (Verbascum sp.) leaf. Overal length of the lamp is about 17.5 cm.



cation of the material contacted by the flint. The worked material is inferred from what KEELEY terms 'microwear polishes' on the surface of the flint, which are linked to one type of material only, and which remain fairly constant whether the tool is used to cut, scrape, bore holes, etc.
Using a high magnification approach and a microscope similar to KEELEY's, EMILY MOSS of the Institute of Archaeology in London kindly offered to examine some of the experimental flint tools used to make the limestone lamp. She reports that the polish left by working limestone is broadly similar to that left, in smaller quantities, by a quartzite hammerstone when it brushes over the edge of a flint tool in debitage or retouching. At 280 magnifications this polish is mainly dull, may be smooth or rough, and bears no relation to other features of the micro-topography of the flint's surface, appearing to be smeared across the flint. Striations are very numerous, and the edge damage is extensive, as one would expect from working a material as hard as limestone (fig. 3).
As long ago as 1920 (PEYRONY, KIDDER and NOONE 1949) prehistorians noticed heavy wear on flint tools like picks at upper palaeolithic sites where limestone was being worked, but so far as I know, no one has systematically examined such tools using modern methods; this would prove a rewarding study.

The Lamp in Use

A simple open bowl lamp needs three things to work: a wick, some fuel and a flame.
Fuels available to palaeolithic man in glacial Europe would have included animal fats, and perhaps the more efficient seal oil. In testing the experimental lamp, several kinds of dripping were tried, including mutton fat, beef fat and chicken fat and combinations of these. Wicks can be made of any material which will dry thoroughly and deliver fuel to the flame by capillarity, and good wicks can be made from sphagnum moss, dried and rolled leaves from plants with furry leaves (e.g. *Verbascum* or *Stachys species)* or bracket fungus cut into strips. Lighting the lamp is easily done using a burning spill from an ordinary fire.
Perhaps the biggest surprise in these experiments was just how easy to use, efficient and unfussy a primitive lamp can be. Every kind of fuel tested produced little or no smoke or smell, and burned slowly and quite steadily. A liquid fuel, peanut oil, was also tried and while it burned well, it tended to slop over the edges of the lamp when carrying it about. Animal fat has the advantage of returning to its solid state when the lamp is not burning, and is therefore more satisfactory for a portable light.
Wicks also proved uncritical, but positioning was important as this influenced the amount of light and heat produced. None of the wick materials would float, and as there is no evidence for wick supports in the centres of palaeolithic lamps, wicks were simply rested on the rim of the lamp's bowl, with one end in the fuel. The rate of fuel consumption as well as the output of heat and light can be varied considerably by exposing more or less of a single wick or by using several wicks at once, and for this reason no attempt was made to measure these aspects of the lamp's performance. There is clear evidence that some upper palaeolithic caves were illuminated by torches rather than, or in addition to, lamps (PERLÈS 1977: 66-67), and if light, not heat, was the main thing desired, then a single torch could easily produce much more light than any known palaeolithic lamp.
To get a rough idea of how long a palaeolithic lamp might burn, the experimental lamp was filled about three-quarters full with some 80 ml. of mutton fat, and with a single wick which was shifted around the bowl periodically to consume all the fat, the lamp burned continuously for over five hours. If placed in a draft-free spot, it could be left unattended for well over an hour before adjusting the wick.

Signs of Use

The experimental lamp acquired only three signs of use which would enable one to deduce its use as a lamp: a slight blackening under the wick, a reddening of the limestone near the wick (caused by allowing the lamp to burn in a slight breeze which intensified the heat of the flame), and the presence of fat inside

Fig. 2 Finished lamp with some of the flint tools used to make it, inclusing chopping tool (top left), end-scraper (top right), pick (bottom left) and large burin (bottom right.) Scale = 10 cm.

the lamp itself. The last sign did not become apparent until the lamp had been used for about fifteen hours, when traces of fat began to appear through the porous stone. This also occurs with unglazed pottery lamps (NANDRIS 1973), and has no effect on the lamp's function apart from making it messy to handle, although it might prove interesting archaeologically should remains of fuels be preserved inside ancient lamps.

The function of Palaolithic Lamps.

In concluding these notes, we may consider the possible uses of lamps in the Palaeolithic. Open bowl lamps very similar tot the palaeolithic examples were until recently in wide use among the Eskimos where they were considered primarily as sources of heat and only secondary as sources of light (HOUGH 1971). The Eskimo lamp is ideal for heating the snow house which will not tolerate a hotter fire, and PARRY (1822: 501-2) recorded a temperature as high as 3°C. inside a snow house heated only by lamps, plus human and canine body warmth - the temperature out of doors being −32°C.! Eskomo lamps often took the place of the ordinary domestic campfire, and were used for cooking, lighting, melting snow drying clothes, and even in craft work, to bend wood, bone, antler and ivory. Lamps were also used by the Korak of Siberia, where they served to heat skin tents of the type often inferred for the Upper Palaeolithic (KENNAN 1881: 175).

Now it has been generally assumed that palaeolithic lamps were used mainly as sources of light, specifically to illuminate caves, and it is worth considering this idea in view of the Eskimo and Siberian evidence. In the first place, we must examine the context of the lamps: some, like those from La Mouth or Lascaux (GLORY 1961) were found deep in decorated caves, where they almost certainly served to illuminate cave art, either for the artists themselves or subsequent visitors. Others, like the recently excavated example from La Faurèlie II in the Dordogne are from well-lit rock shelters, but as these lamps may have been on their way to or from deeper caves, they do not upset the idea of lamps as light sources. The relative rarity of palaeolithic lamps does, I think, argue against their use as heat sources. So far as I am aware, no recently published inventory of known palaeolithic lamps exists, and indeed, such an inventory would be difficult to compile as it is often ebatable whether a geode or naturally shaped stone might have been used as a lamp. However, we have seen that the number of elaborately shaped lamps with handless is very small, perhaps a dozen in all, while on the other hand every Eskimo house had at least one lamp, and lamps are fairly common finds on Eskimo sites.

Another point is that while many Eskomo lamps are virtually identical to the palaeolithic examples, there is a class of much larger, multiwicked domestic lamps which might be up to a metre or more across and weigh thirty kilogrammes (STEFÁNSSON 1914: 68). These sometimes served as the main heating sources, and are without parallel in the palaeolithic world. Known palaeolithic lamps are all small and portable and several, like the La Mouthe lamp, have what seem to be handles projecting form the bowl: these lamps are closer to the types used by Eskimo hunters on the move, for illumination and to light their pipes. A third point which argues against seeing palaeolithic lamps as heat sources is that lamps are only efficient as space heaters when used in artificially enclosed areas, and the evidence available from modern excavations of upper palaeolithic caves and rock shelters seems to suggest that huts or tents were not common on the sites. Open air sites, which sometimes produce convincing evidence for the use of tents, have not to my knowledge yielded lamps of the type considered in this paper (SKLENÁR 1976).

For the moment then, it seems safe to conclude that palaeolithic lamps were mainly sources of light, and this explanation is supported by looking at the general rôle played by the fire in the Upper Palaeolithic: virtually every excavation of a living site has yielded evidence for various types of hearth. These hearths are the remains of different types of fire which served to cook, heat and provide light, and probably also formed the focus of social life after dark, as do the fires of present-day hunter-gatherers. It follows therefore that lamps were reserved for some other, special, uses, and that their unique attributes of smokelessness and portability made them particularly suitable for exploring and working in caves deep underground. The lamp's actual rôle in cave art or this possible ritual uses (GLORY 1961) are, I think beyond the reach of reasonable archaeological inference, but is is intriguing that among most Eskimo groups the lamp is the property and special responsibility of women: perhaps the cave artists were not men after all.

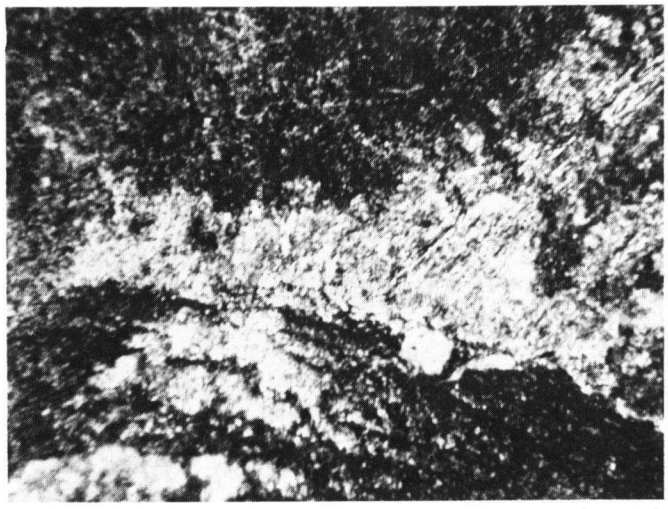


Fig. 3 Microwear on surface of experimental flint scraper used to work limestone. Polish and striations are especially clear in the centre of the photograph. Area covered is about 1.5 mm x 8 mm. Photo by E.H. Moss.

Note added in press:

Since this paper was written, an interesting study of the Lascaux lamps has been published by B. and G. DELLUC (1979), which includes some independent experiments on the use of lamps. Their results seem very similar to those reported in the present paper, except for their uses of two types of wick, one for 'l'allumage' and another for 'l'éclairage': my experiments, plus the ethnographic evidence, suggest that only one type of wick is necessary.

REFERENCES:

DELLUC, B. and G. 1979 - L'éclairage. In Lascaux Inconnu, *eds. A. Leroi-Gourhan and J. Allain. Paris, Éditions du Centre National de la Recherche Scientifique; pp. 121-142.*

GLORY, A., 1961 - Le Brûloir de Lascaux. Gallia Préhistoire, *IV; pp. 174-183.*

HOUGH, W., 1971 - The Lamp of the Eskimo. *The Shorey Book Store, Seattle, Washington.*

KEELEY, L.H., 1975 - Micorwear on flint: some experimental results. In Second International Symposium on Flint, *F.H.G. Engelen, ed. Maastricht, Nederlandse Geologische Vereniging; pp. 49-51.*

KEELEY, L.H. and NEWCOMER, M.H., 1977 - Microwear analysis of experimental flint tools: a test case. Journal of Archaeological Science *4; p. 29-62.*

KENNAN, G. 1881 - Tent Life in Siberia. *New York.*

NANDRIS, J.G., 1973 - Some light on prehistoric Europe. In Archaeological Theory and Practice, *D.E. Strong, ed. London, Seminar Press: pp. 151-161.*

NEWCOMER, M.H., 1977 - Experiments in upper palaeolithic bone work. In Méthodologie appliquée à l'industrie de l'os préhistorique, *H. Camps-Fabrer, ed. Paris, Éditons du Centre National de la Recherche Scientifique; p. 293-301.*

PARRY, W.E., 1822 - Second Voyage. *London.*

PERLÈS, C., 1977 - Prehistoire du Feu. *Paris, Masson.*

PEYRONY, D., KIDDER, H.H. and NOONE H.V.V., 1949 - Outils en silex émoussés du Paléolithique supérieur. Bulletin de la Société Préhistorique Française, *46; pp. 298-301.*

ROUSSOT, A., 1969-70 - La lámpara decorada de La Mouthe (Dordona). Ampurias, *31-32; p. 91-103.*

ROUSSOT, A., 1974 - Lampes sculptées paéolithiques de Laugerie Basse et de Laugerie Haute. Bulletin de la Société Historique et Archéologique du Périgord, *CL; pp. 252-260.*

SKLENÁR, K., 1976 - Palaeolithic and Mesolithic Dwellings; An Essay in Classification. Památky Archeologické, *67; pp. 249-340.*

STEFÁNSSON, V., 1914 - The Stefánsson-Anderson Arctic Expediton of the American Museum: Preliminary Ethnological Report. *Anthropological Papers of the American Museum of Natural History, XIV, XIV; 1: New York.*

Dr. M.H. Newcomer
Institute of Archaeology
University of London