Lageard J.G.A., Chambers F.M. & Grant M.E. 1994. Modified versions of a traditional peatcutting tool to improve field sampling of peat monoliths. *Quaternary Newsletter* 74, 10-15.

MODIFIED VERSIONS OF A TRADITIONAL PEATCUTTING TOOL TO IMPROVE FIELD SAMPLING OF PEAT MONOLITHS

J.G.A. Lageard, F.M. Chambers and M.E. Grant

Introduction

The collection of bulk field samples of peat and organic muds for palaeoecological research is usually accomplished using either peat borers (augers/corers/samplers) or monolith boxes. Although the availability of AMS dating has recently removed the obligation to sample large volumes of peat for radiocarbon dating, the relatively high costs of AMS dates, the advisability of large samples for 'wiggle-matching' (Pilcher, 1993), plus the development of 'multi-proxy' collaborative research - in which several techniques are used on the same core or monolith - mean that bulk sampling of peat will continue to be desirable.

Most small-bore coring devices (*eg* Jowsey, 1966) are swift in operation and non-destructive, whereas the collection of monoliths can be very time-consuming and destructive of surrounding sediments. Large-capacity corers are relatively heavy devices, which means that the transport of corer, cores and associated field equipment (*eg* Smith *et al*., 1968) can be no less cumbersome than monolith sampling. Despite their weight, which can assist in the penetration of unconsolidated sediments, the design of large-capacity corers (*cf* Barber, 1984; Wright *et al*., 1984) militates against the collection of the more consolidated basal layers - the mineral-peat transition - of geogenous or topogenous peat. For shallow sections of valley mires, for example, experience has shown that it can be more efficient to sample by means of digging a rectangular-section hole or short trench down to the underlying deposits and to sample the peat into monolith tins from a cleaned face on one of the trench sides. The low hydraulic conductivity of peat (Ivanov, 1981; Ingram, 1987) often means that a section can be cleaned, and a monolith extracted, before much water seepage.

Conventionally, peat monoliths have been dug out by excavating first beside, and then behind the monolith box with a spade. Although great care is needed in this procedure to ensure that the sampled section remains intact, time constraints can mean that adjacent sediments can be badly damaged. Here we detail improvements in techniques and equipment for the field sampling of peat monoliths. These improvements have facilitated more rapid sampling, significantly less damage to adjacent material (so permitting re-sampling),

aided the collection of basal samples from peat sections, and enabled clean horizontal breaks between successive monolith tins. Two new prototype peat cutters - modified versions of a traditional peat-cutting tool - are described and illustrated, in conjunction with a peat slicer and an economic design of monolith tin.

Field Methods

Two principal types of monolith tin are commonly used. Some researchers use aluminium monolith tins with enclosed ends, and these are effective for sampling fresh *Sphagnum* peats (Barber, pers. comm.), but the enclosed ends tend to be resisted by sedge mats, or by stiff sediments. The more common sampling method is for a three-sided, open-ended monolith tin to be pushed into a vertical face of peat or soft sediment. The method can work well, although on stiff sediments the sides of the tin tend to splay, and the back of the tin can become battered during insertion. Lids for such tins, when fitted, need to be wider than the tin, in order to enclose the splayed sides. We now show how this commonly applied method can be improved.

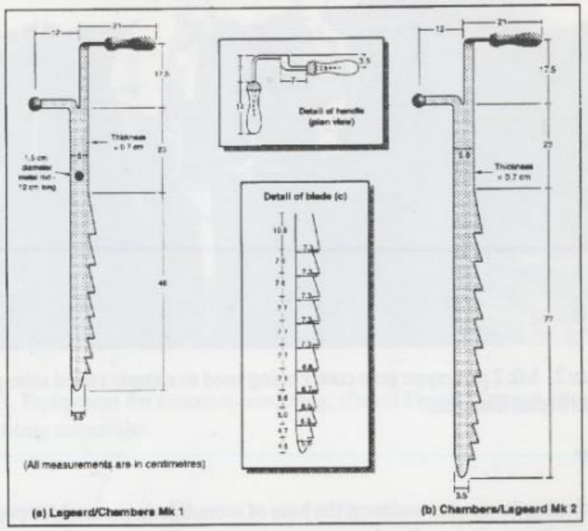

Figure 1. (a) Mk 1 prototype peat cutter, with foot bar, used for cutting through sedge peats, and for sampling fine-grained channel-fill sediments or dried-out peats; (b) Mk 2, used for sampling peat monoliths up to 1 metre in length.

Peat Cutter

Based on a traditional peat cutter discovered at Lindow Moss, a prototype stainless steel peat cutter (Figure 1a) was designed and manufactured at Keele University. This prototype was originally designed for cutting away large areas of peat (36 m^2) capped by thick mats of *Eriophorum*, to reach buried layers of subfossil tree stumps at White Moss, Alsager (Chambers *et al.*, 1992; Lageard, 1992; Lageard *et al.*, 1992). In this it was very effective. It has a foot bar for extra leverage and will cut through stiff peats and related sediments. It has been used elsewhere to cut through alluvial clay, marl and organic muds.

The height of the foot bar at 70 cm on the prototype means that the length of saw blade is insufficient for cutting behind monolith tins of 1 metre length. After further field trials, a second stainless steel peat cutter was designed (Figure 1b) with an unobstructed blade length of just over a metre. This can be used to cut out a 1-metre column of sediment, enclosed on three sides by an open-ended monolith tin (Figure 2).

Figure 2. Mk 2 prototype peat cutter being used to sample raised mire peats at White Moss, Cheshire.

Slicer

Addressing the need to undercut the base of monolith tin precisely, a peat slicer (Figure 3) was designed and constructed. A chamfered semi-circular leading edge ensures that the slicer remains in contact with the base of the monolith tin. A durable haft, capable of withstanding blows from a wooden mallet, further aids insertion.

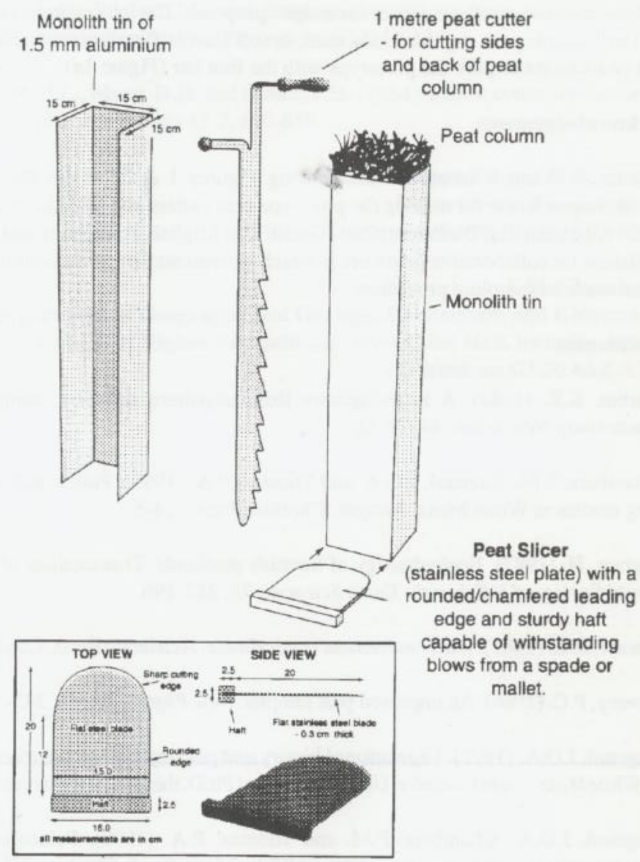

Figure 3. Equipment for monolith sampling. (Inset) Detail of a peat slicer for undercutting monoliths.

Applications

For peat hags or excavated sections (*cf* Figure 3), the peat cutter can be used to take monolith samples cleanly and efficiently from cleaned vertical faces. Multiple (*ie* adjacent) monoliths can be taken from the same face for other palaeoenvironmental analyses or for archive purposes. The long cutter (Figure 1b) will sample peat, organic muds, marl, or soft clay; stiff sediments or dried-out peats might require the prototype with the foot bar (Figure 1a).

Acknowledgements

Thanks to Andrew Lawrence for drawing Figures 1 & 2; to the Physics Workshop at Keele for making the prototype peat cutters and peat slicer; and to Ed Cloutman, Jeff Blackford, Carol Green, Tim Mighall, Alan Smith and Ian Wilshaw for collaborative fieldwork in which incremental improvements have been made in sampling procedure.

References

Barber, K.E. (1984). A large-capacity Russian-pattern sediment sampler. *Quaternary Newsletter,* 44, 28-31.

Chambers, F.M., Lageard, J.G.A. and Thomas, P.A. (1992). Pollen and tree-ring studies at White Moss, Alsager. *Cheshire Past,* 1, 4-5.

Ingram, H. (1987). Ecohydrology of Scottish peatlands. *Transactions of the Royal Society of Edinburgh: Earth Sciences,* 78, 287-296.

Ivanov, K.E. (1981). *Water movement in mirelands*. Academic Press, London.

Jowsey, P.C. (1966). An improved peat sampler. *New Phytologist,* 65, 245-249.

Lageard, J.G.A. (1992). *Vegetational history and palaeoforest reconstruction at White Moss, South Cheshire, UK.* Unpublished Ph.D. thesis, Keele University.

Lageard, J.G.A., Chambers, F.M. and Thomas, P.A. (1992). Palaeoforest reconstruction from peat exhumations at White Moss, South Cheshire, UK. In Bartholin, T.S., Eckstein, D., Berglund, B.E. and Schweingruber, F.H. (eds.) *Tree-rings and environment: proceedings of the International Dendrochronological Symposium, Ystad, Sweden.* Department of Quaternary Geology, Lund University,Lund, 172-176.

Pilcher, J.R. (1993). Radiocarbon dating and the palynologist: a realistic approach to precision and accuracy. In Chambers, F.M. (ed.) *Climate change and human impact on the landscape.* Chapman and Hall, London, pp. 23-32.

Smith, A.G., Pilcher, J.R. and Singh, G. (1968). A large-capacity hand-operated peat sampler. *New Phytologist,* 67, 119-124.

Wright, H.E., Mann, D.H. and Glaser, P.H. (1984). Piston corers for peat and lake sediments. *Ecology* 65.2, 657-659.

J.G.A. Lageard and M.E. Grant
Department of Geography,
Keele University, Keele, Staffs, ST5 5BG

F.M. Chambers
Department of Geography and Geology, Cheltenham and Gloucester College of Higher Education, Francis Close Hall, Swindon Road Cheltenham GL50 4AZ, UK