due to the relatively low density of the organic matter and its tendency to flatten out onto the filter and impede the flow. This correlation underscores the importance of collecting large amounts of suspensate when the inorganic fraction is of primary interest. The large amount of material collected by the pump and filtering apparatus also serves to diminish the potential problem of contamination associated with pumps (Drake, 1976) by dilution.

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A NEW TECHNIQUE FOR MAKING THIN SECTIONS OF CLAYEY SEDIMENTS[1]

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Abstract: A rapid method is described for thin sectioning clayey sediments. It incorporates an epoxy impregnation procedure without the use of high vacuum followed by dry grinding. Sample distortion and extended preparation time, characteristic of other methods, are avoided. The method is most successful when applied to dry or semi-dry samples.

INTRODUCTION

Methods of sample preparation of clays and clay-rich sediments for thin-section study described in the literature generally employ some type of impregnating procedure at elevated temperatures and/or pressures (Ashley, 1971; Altemüller, 1962; Gillott, 1970; Mitchell, 1956; Stanley, 1971). For example, Stanley (1971) describes techniques for both wet and dry clay impregnation. For wet impregnation he refers to work by Tourtelot (1962) who used a high molecular weight polyethelene glycol compound soluble in water which diffuses through the natural moisture of the sample. However, the sample

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must be soaked for three days in melted wax at 60° C before being sawed and ground in kerosene. A petroleum solvent is used to remove kerosene from the blank before mounting on the glass slide. Stanley (1971) recommends dried clays be impregnated with a liquid-coating resin and hardener under vacuum for 1/2 to 1 hour, then allowed to cure in an oven for 16 days.

These and other similar techniques have the distinct disadvantage of requiring large amounts of preparation time and, thus, tend to restrict the number of samples that can effectively be handled in many types of studies. Moreover, some vacuum impregnation processes result in disturbed fabric or structure which further inhibits their usefulness. The technique we describe overcomes both these drawbacks. It is a rapid method and is capable of producing high quality thin sections without disturbing internal particle arrangement. It is most successful when used on dry to semi-dry clays.

PROCEDURE

A chip is cut from the dry clayey sediment sample with a hacksaw and then trimmed to the size of 34.9 mm (1-3/8 in.) by 22.2 mm (7/8 in.) by 12.7 mm (1/2 in.). This is then mounted on a temporary slide (Fig. 1A) using Lakeside Epoxy at 176.7° C (350° F). After mounting, the surface of the chip is ground on an ordinary type 400 grit carbide wheel mounted on an Ingram 303 Thin Section cut-off machine. *NO COOLANT WHATEVER SHOULD BE USED DURING THIS GRINDING STAGE.* Excess dirt from the grinding is removed from the ground surface using compressed air. The chip is then placed upon a hot plate and heated at 80° C (175° F) until the chip is warm. An application of HB Fuller's BC-226 Epoxy is then placed on the warmed chip for surface impregnation. After approximately three minutes, a second petrographic slide is adhered to the chip (temporary slide 2) (Fig. 1B). After curing 1–2 hours at 80° C (175° F), the mounted slide chip is sawed to a 5.08 mm (.020 in.) thick specimen on the previously mounted slide. Excess non-impregnated clayey material is removed under warm water by lightly scrubbing the surface with a soft bristled brush, such as a fingernail brush. The cleaned temporary slide 2 is then

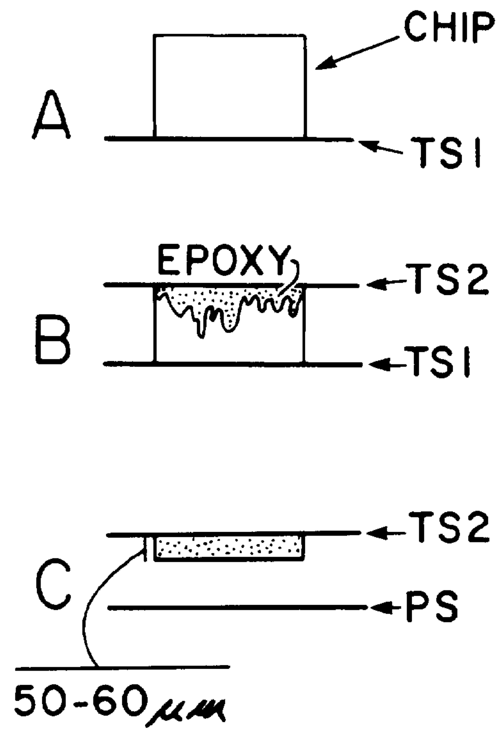

FIG. 1.—A) Temporary Slide 1—chip on temporary slide (TS1); B) Ground surface with Temporary Slide 2 (TS2) and impregnation; C) Cut off Temporary Slide 2; then applied to Permanent Slide (PS).

placed on the thin section grinder using a 320 grit diamond wheel, and the temporary slide is slowly ground down until a uniform impregnation surface is achieved at about 50–60 micrometers. Following this, temporary slide 2 is dried on a hot plate at 80° C (175° F). A permanent slide for the final thin section is now prepared by placing a blank slide on the grinder and frosting it to achieve a perfect parallelism between the surface of the slide and the grinding wheel face. Using a thin sectioning epoxy, such as Hillquist Thin Sectioning Epoxy, Petropoxy 154, etc., mount the permanent slide onto the prepared surface of temporary slide 2 (Fig. 1C) and cure for 1–2 hours at 80° C (175° F). With the completion of the second curing, the permanent slide is placed on the chuck face of the Ingram grinding machine, and the temporary slide 2 ground off. Grinding continues through the specimen until a uniform 30 micrometer thickness is achieved. The thin section is then finished. If desired, a cover glass may be placed over the permanent slide.

This process has several practical aspects to it. First, the method permits an exact duplication of the original clay surfaces as selected from field or core samples. Second, it reveals structures and mineralogical features that would normally be undetected or that might otherwise be disturbed during preparation. Third, the method works for a variety of clayey materials, ranging from "pure" clays to clays mixed with coarse silts and sands. Fourth, the time involved is considerably reduced compared to other methods, and finally, the method produces thin sections that are clean and sharp from a sediment material normally regarded as difficult to work with and unthinsectionable.

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NOTES ON THE DESIGN OF AN OSCILLATING TROLLEY WAVE-SIMULATOR FOR INSTALLATION IN UNIDIRECTIONAL FLOW FLUMES[1]

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INTRODUCTION

Laboratory flumes have been used extensively to investigate the behaviour of both cohesive and non-cohesive sediments to unidirectional flow (e.g., Graf, 1971). In comparison, the definitive sources of data on the response of sediment grains to oscillatory (wave-induced) currents appear to be the investigations of Bagnold (1946) and Manohar (1955). These data can be compared, in isolation, to the results of sedimentological investigations on continental shelves (cf. Channon and Hamilton, 1977); however, comparative data representative of sediment response to the combined (oscillatory and unidirectional) energy inputs is not readily available. This paper describes the design and construction of a simple and inexpensive oscillating horizontal bed mechanism for installation in laboratory flumes, which has been used successfully in a study of the threshold of transport of non-cohesive sediment under the combined influence of unidirectional and oscillatory flow (Hammond and Collins, 1978a).

DESCRIPTION AND OPERATION

A narrow recirculating (electrically-pumped) and commercially available flume (3.6 m long, 0.3 m wide and 0.3 m deep) was used to generate the unidirectional flow component. Oscillatory motion was provided by an oscillating carriage. Various methods of simulating naturally occurring wave motion in the laboratory have recently been reviewed (Davies and Wilkinson, 1977); inaccuracies produced by acceleration of the

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