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A NOTE ON THE DETECTION OF SLIP-PLANES IN TERRACETTES

Abstract

Slippage zones at the rear of terracettes from the Malham regions of northern England have been found by soil impregnation methods. This indicates that these terracettes have formed due to some mechanical failure and are not animal tracks as popularly supposed.

INTRODUCTION

Slippage zones at the rear of terracettes from the Malham regions of northern England have been found by soil impregnation methods. This indicates that these terracettes have formed due to some mechanical failure and are not animal tracks as popularly supposed.

Terracettes are a common feature on slopes in many parts of the world and much controversy surrounds their genesis. In 1976 the authors reviewed the many theories of formation and at that time were unable to come to any firm conclusions in support of one theory rather than another (VINCENT and CLARKE, 1976).

Although most of our recent research on terracettes has sought to relate their morphology to various physical parameters (VINCENT and CLARKE, 1979), we have also tried to detect slip-planes which some authors suggest marks the junction between one terracette and its neighbour (SHARPE, 1938). Initially, we tried to detect the presence of such slip-planes with dyestuffs. This method had some success and is reported in CLARKE and VINCENT (1974). An additional method of detection which we employed was to examine impregnated soil samples from the region of supposed slippage.

In this note we report, for the first time in the literature, the presence of slip-planes at the rear of terracettes examined in exposures on the slopes of Cow-side Beck, Malham, Northern England. These findings throw serious doubt on the class of theory which suggests that terracettes are some type of animal track.

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SLIP-PLANES IN THE TERRACETTES
OF THE MALHAM REGION

Although many authors have suggested that terracettes develop as a result of rotational slippage along planes of weakness in fact very few planes have actually been observed. If they exist presumably this lack of field observation is due to the difficulty of clearly differentiating material in either side of the slippage in soil materials.

During the course of our fieldwork in the Malham region of Yorkshire, England, we had the opportunity to examine sections of terracettes which had been exposed by a landslide in Cowside Beck (O.S. NY 895695). In the field we could not convince ourselves that we could actually see slip-planes and to resolve the debate we decided to take small oriented soil monoliths back to the laboratory for further investigation. Several small monolith tubes (8 cm in diameter by 10 cm deep) were carefully pressed horizontally into the supposed region of slippage so that the long axis of the tube lay parallel with the terracette tread. The monoliths were excavated by removing the surrounding soil.

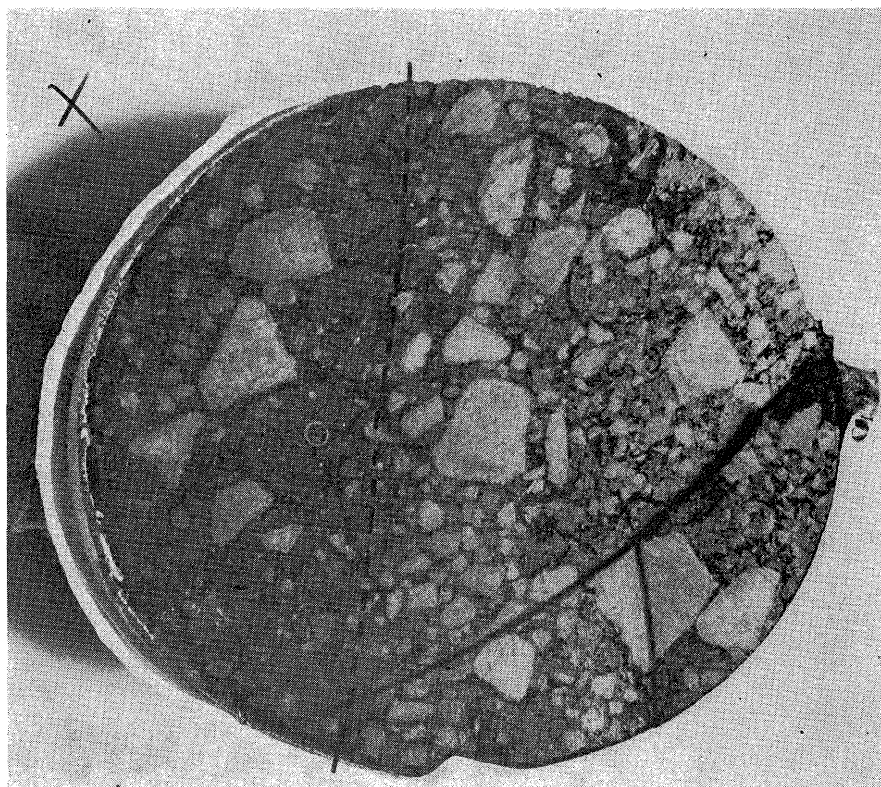
In the laboratory the monolith tubes were opened at either end and the soil samples impregnated with Araldite Epoxy Resin CY212 and Hardener HY 951 in the manner described by CATT and ROBINSON (1961). After impregnation the oriented soil block was cut and polished in vertical section.

RESULTS

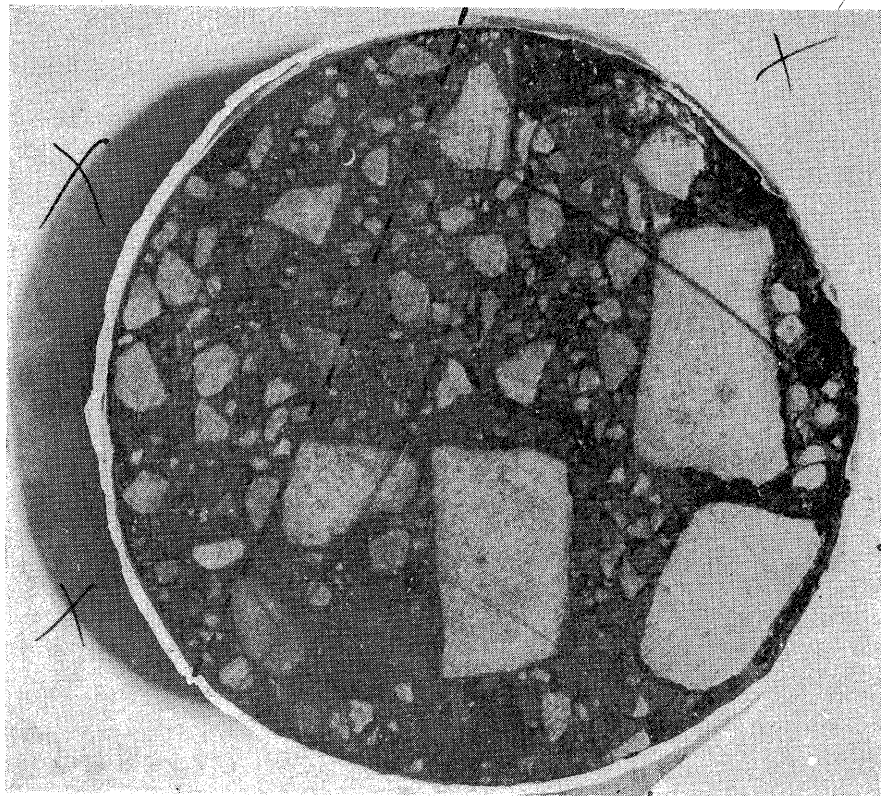
Plates 1 and 2 illustrate the vertical faces of two of the soil monoliths. It is immediately apparent that there is a clear distinction between the left and right side of each monolith. The right hand side of each section is stonier and towards the centre of the sections there is a slight indication that the stones are oriented downwards. We interpret this boundary as a zone of slippage with the material to the left of the zone having been lowered relative to the coarse material on the right of each section. The effect of such lowering in terms of a column of soil is to bring the relatively finer mixed mineral organic horizon into juxtaposition with the much coarser parent materials which in this case is a soliflucted limestone till. In addition, some of the fine matrix shown in Plate 2 is loessic silt which can be seen overlying head and till in several fresh sections recently exposed by the Cowside Beck.

CONCLUSIONS

In the Malham area our evidence indicates that terracettes are indeed associated with small slips and are not merely the tracks of animals.



Pl. 1. Polished section through end of soil monolith across zone of slippage. The coarser material to the right lies in the basal material of the next terracette upslope. The junction marking the slip zone is indicated by the dashed line



Pl. 2. Polished section of vertical face of monolith situated 15 cm below the monolith illustrated in Plate 1. The zone of slippage is still detectable but now lies further to the left indicating its possible curvature

References

- CATT, J. A. and ROBINSON, P. C., 1961 — The preparation of thin sections of clays. *Geol. Magazine*, 98; p. 511—514.
- CLARKE, J. V. and VINCENT, P. J., 1974 — A new technique using insoluble dyestuffs for the study of water movement in soil. *Jour. Biogr.*, 1; p. 247—252.
- SHARPE, C. F. S., 1938 — Landslides and related phenomena. Columbia Univ., New York.
- VINCENT, P. J. and CLARKE, J. V., 1976 — The terracette enigma — a review. *Biul. Peryglacjalny*, 25; p. 65—77.
- VINCENT, P. J. and CLARKE, J. V., 1979 — Terracette morphology and soil properties: a note on a canonical correlation study. *Earth Surface Processes*. (in press).