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Negative reversal prints of thin sections: photographic technique and its significance

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ABSTRACT: *Thin section photographs are one of the popular methods of data presentation in scientific research. In sedimentology, where greater details of sedimentary structures, textures and fossils are sometimes required, the field of view of the petrographic microscope is not large enough to cover the desired area of the thin section for photograph. The negative reversal print of a thin section, on the other hand, can provide a print of all or selected part(s) of the thin section with considerable details. The black and white photo print obtained using this technique has a better contrast and it can be used to draw line-drawings to further elaborate particular areas of interest.*

INTRODUCTION

Thin section photographs, refered as photomicrographs, are widely used as one of the standard techniques of illustration in scientific research, particularly in the field of geology. The availability of automated camera attachments with the petrographic microscope have made this technique reasonably simple and fast, with excellent results. The advantage of taking photographs of thin sections in normal as well as under polarized light, at various magnifications like 10, 20, 40 and 100, have revolutionized black and white and colour thin section photography. The only disadvantage of this technique is that it is dependent upon the field of view (FOV) of the petrographic microscope. In cases where overall textural or microstructural details of a larger area, i.e., greater than the given FOV of the microscope, or a whole thin section is required to be photographed, this method has little significance.

In sedimentology and micropaleontology, where overall textural relationships of various components and microstructural details of a rock in a thin section are needed to be photographed, photomicrographs do not serve the purpose. The present paper deals with the outline of an alternate, cheap, simple and useful technique of thin section photography.

BACKGROUND

This technique requires taking a direct print of a thin section using standard photo-enlarger available in almost all photographic laboratories. In the photo-enlarger where normally negative of a photo is used to develop a positive print, a standard thin section is placed for developing a print directly. Since a thin section is transparent, the light passing through it creates an image on the photographic printing paper. In this image or specifically photograph the differential absorption of light by various constituents of the thin section will produce a print. The opaque or translucent features of the thin section will appear bright on the photograph, whereas the features with high transparency will be darker in tone creating the so-called nega-

tive reversal print. For example, in a thin section of a carbonate rock, the areas with sparry calcite cement anywhere in the thin section will appear black, whereas micrite which is opaque to translucent in normal light, transmits less light and hence appears bright on the photograph.

TECHNIQUE

The method outlined in this paper is for the general users of the photographic laboratories, who are familiar with the basics of photography, chemicals and regular techniques of printing black and white photographs. It is beyond the scope of this paper to provide an exhaustive account on the art of photography as a whole. The technique is an invention of a curious mind, most probably a sedimentologist who had the same difficulty as I had during my research at Sul Ross State University, U.S.A. In numerous papers published in various geological journals of international repute this method of illustration is in use for a long time but no published account of the technique is available. I procured this technique through repeated efforts and technical help from graduate students at Sul Ross and was able to develop more than 700 negative reversal prints of thin sections of sedimentary rocks with fruitful results.

The technique is quite simple and does not require any special skills or sophisticated equipment. A clean and dust-free thin section is placed in the rectangular slot of the photo-enlarger. A thin strip of white paper of known length, generally 1 cm is affixed at one of the corners of the thin section for scale of the photograph. A thin section with or without coverslip can be used. In case the thin section is without a coverslip, water- or glycerine -wet surface of the thin section will give better resolution.

EXAMPLES

The negative reversal prints shown in Fig. 1 and 2 are from the thin sections of the Capitan Formation (Permian), Glass Mountain, Texas, U.S.A. A reefal origin was proposed for the Capitan Formation based on its overall depositional fabric, biotic assemblage and submarine cements (Haneef, 1993; Haneef & Rohr, 1993). The description of various textural constituents of the rocks visible in the negative reversal prints are labelled in the line-drawings (Fig. 1B and 2B) & described in captions.

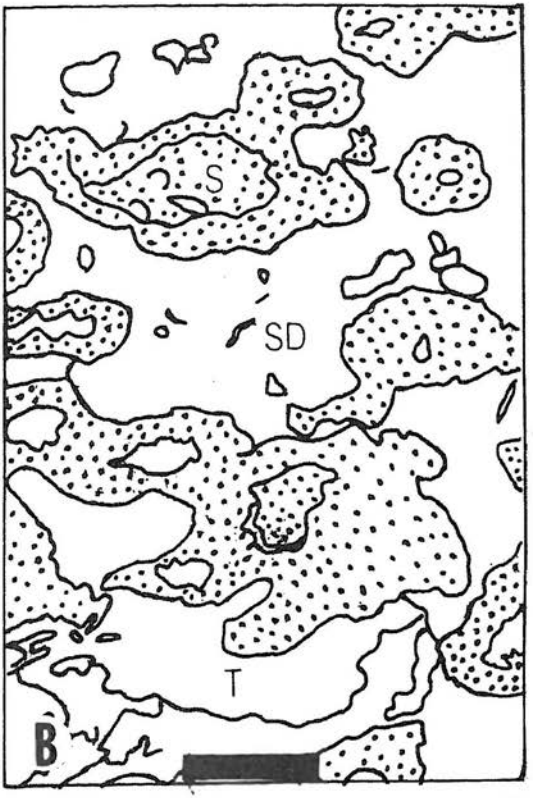
PROS AND CONS

The negative reversal printing technique of a black and white thin section photography is a cheap and fast method of getting a print, because it does not involve a negative film. Unlike a photomicrograph, the enlargement of a negative reversal print to any desired degree can be adjusted easily. Knowing the length and width of a standard thin section, the scale of

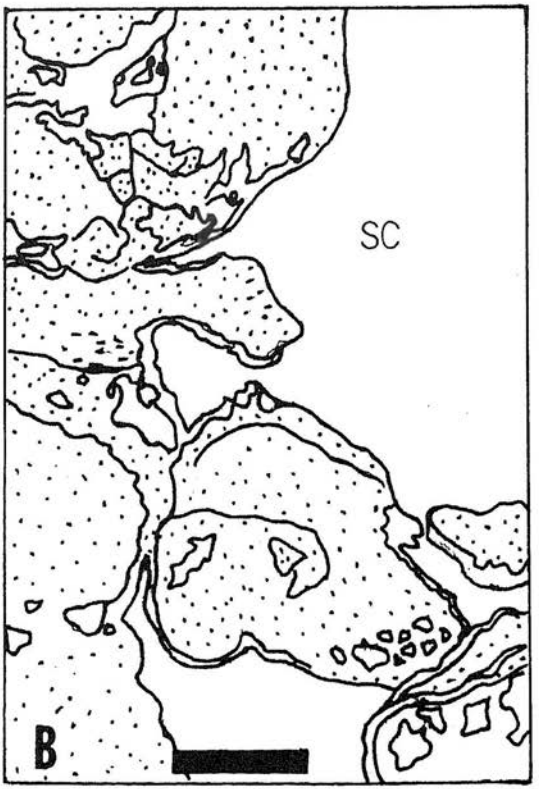
Fig. 1 (A,B; top). Thin section negative reversal print and line- drawings of *Tubiphyte*-sponge boundstone of the Capitan Formation (Permian), Glass Mountains, Texas. The rock shows an encrusting algae *Tubiphyte* (T), calcareous sponge (S) and shell debris (SD) of bivalves and other fossils. Note the boundstone fabric clearly visible in the negative reversal. The bar scale is 1 cm.

Fig. 2 (A,B; bottom). Thin section reversal print and line-drawings of algal-sponge boundstone in the Capitan reef rock, Glass Mountains, Texas. Note thin rim of radial, fibrous calcite crystals (darker tone) perpendicular to grain boundaries. The dotted areas (Fig. 2B) represent biotic elements, while the blank space represent mosaic of sparry calcite (S). Bar scale is 1 mm.

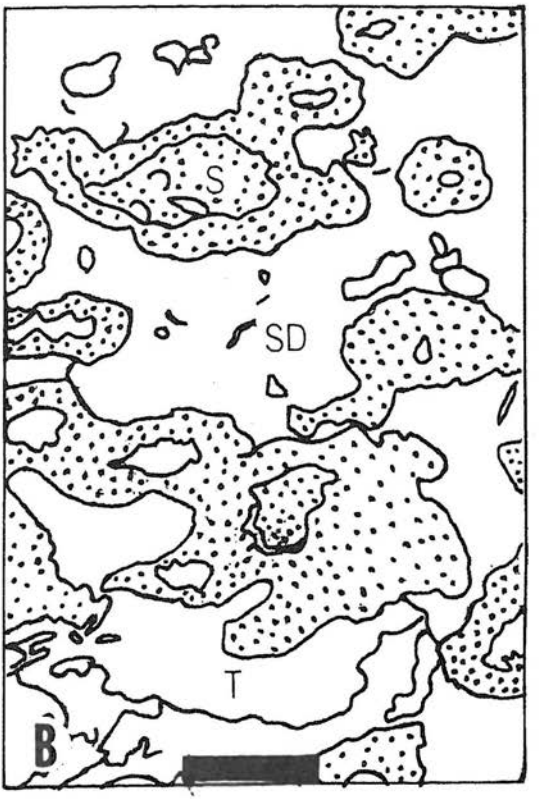

A

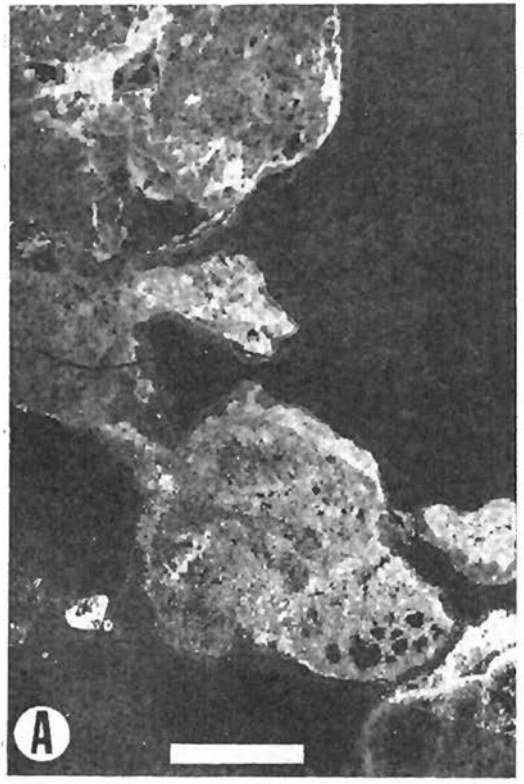

S
SD
T
B

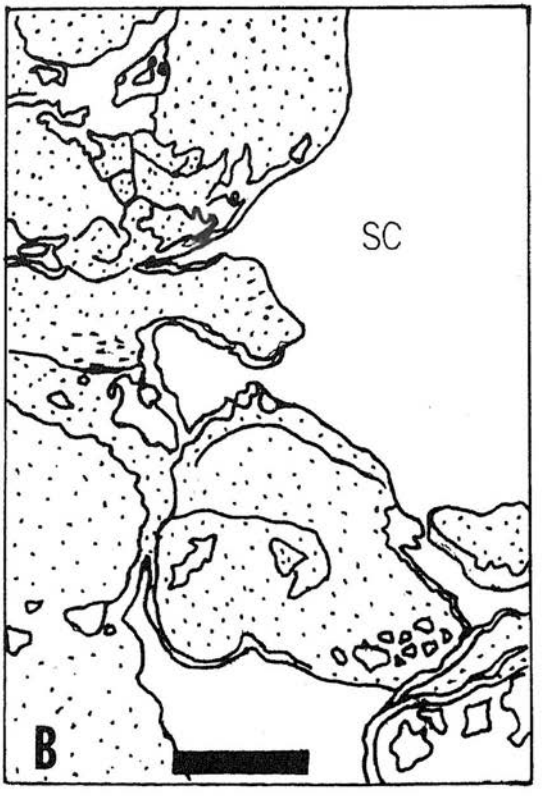

A


SC
B


A


S
SD
T
B


A


SC
B

the photograph is easy to determine even if a strip of paper for scale is not affixed before printing. The reversal of the image, i.e., black appearing bright and white appearing black, produces excellent contrast of features on the photograph for comparison. Since this technique does not involve a petrographic microscope, it does not provide any subsitute for polarized light photography. The negative reversal technique is not applicable for colour photography.

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