Penetrative calcretes and their stratigraphic implications: Comment and Reply

COMMENT

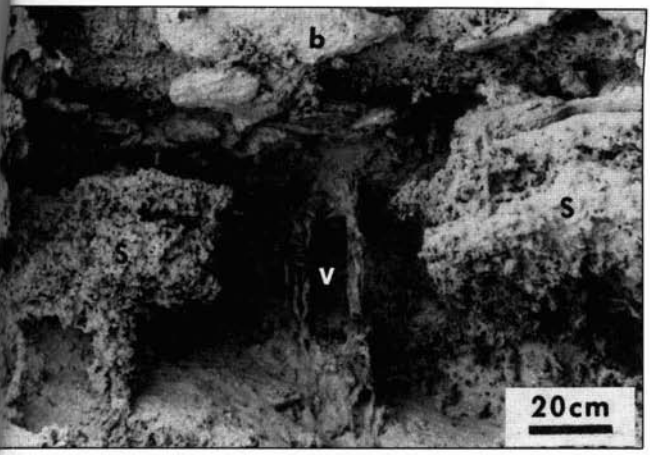
John C. Hopkins, Federico F. Krause
Department of Geology and Geophysics, University of Calgary, Calgary, Alberta T2N 1N4, Canada

Rossinsky et al. (1992) provided new and interesting information for recognition and interpretation of modern calcretes that form on the surface of subaerially exposed carbonates. They also proposed that certain types of calcretes—"penetrative calcretes"—may form at multiple horizons within ancient carbonate deposits, as much as 5 m below a single exposed subaerial surface. Evidence to support this proposition was derived from outcrops at Cooper Jack Point, on the island of Providenciales in the Turks and Caicos islands (Rossinsky et al., 1992, their Fig. 1B). We have examined this outcrop and find that outcrop relations do not unequivocally support their interpretations.

1. Rossinsky et al. (1992) stated that "calcified root mats" (penetrative calcretes) are present as much as 5 m (their Fig. 1B) below the present surface at Cooper Jack Point. In fact, the "calcified root mats" they described are a maximum of 2.8 m below the modern subaerial calcrete surface. The 5 m depth assumes that either 2.2 m of section has been removed by erosion or that the "calcified root mats" can be projected laterally beneath a hill to the west of the outcrop. Neither interpretation was discussed by Rossinsky et al.

2. Penetrative calcretes described by Rossinsky et al. (1992) include (1) vertically oriented rhizoliths, (2) subhorizontal laminated or massive micritic calcite layers, and (3) subhorizontal "calcified root mats." Microstructure of the vertical rhizoliths and laminated or massive layers is similar, and samples show pervasive micrite replacement of the host sediment typical of many carbonate calcrete deposits (cf. Klappa, 1980). In contrast, "calcified root mats" are ramose subhorizontal networks of grainstone tubes some 1–2 cm thick (Fig. 1). The networks have been differentially cemented by sparry calcite (Rossinsky et al., 1992, Fig. 4), the host grains are largely aragonite, and root tubules are not present. Although Rossinsky et al. (1992) inferred a genetic relation between rhizoliths and "calcified root mats," it is difficult to demonstrate transitions between the two in Cooper Jack Point outcrops (Fig. 1). Only a few vertical rhizoliths contain living roots, and living roots are rare in the "calcified root mat" layers. An alternate interpretation that must be considered is that the "calcified root mats" are older structures that have been penetrated by rhizoliths; a few living roots occupy these older structures.

3. "Calcified root mats" are present in a distinct lithostratigraphic unit 2.6 m thick at the locality illustrated by Rossinsky et al. (1992, their Fig. 1B) at Cooper Jack Point. The unit comprises bioturbated subtidal grainstone and packstone with cobbles and boulders of grainstone up to 40 cm across (Fig. 1 here) in the upper part. "Calcified root mats" are present at several horizons in the lower



igure 1. Outcrop photograph (taken in August 1992) of vertically ori-nted rhizoliths (v) and adjacent subhorizontal "calcified root mats" (s) om Cooper Jack Point (cf. Rossinsky et al., 1992, their Fig. 1). Boulders f grainstone (b) are present above "calcified root mat" layer.

rt of this unit. Underlying and overlying units of cross-stratified ainstone contain vertical rhizoliths but do not contain "calcified ot mats." The contact between the subtidal unit and the overlying oss-stratified grainstone unit (eolianite) is sharp and, in places, is arked by a thin, laminated, micritic calcrete layer. Rossinsky et al. 992) interpreted this calcrete layer to be a penetrative calcrete. owever, some vertically oriented rhizoliths extend only from this lcrete layer into the underlying subtidal carbonate unit. Another erpretation is that the micritic calcrete layer formed on a subaerial posure surface. If so, the "calcified root mats" lie at a maximum 2.0 m below that surface (cf. point 1, above).

In summary, the "calcified root mats" (penetrative calcretes) at ooper Jack Point described by Rossinsky et al. (1992) are confined a single lithostratigraphic unit and reach a maximum observed pth of 2.8 m below the modern surficial calcrete. In addition, they e located a maximum of 2.0 m below a micritic calcrete layer that n be interpreted as a surficial calcrete. The "calcified root mats" not greatly resemble adjacent vertically oriented rhizoliths or odern surficial calcretes, so it is unlikely that similar "calcified root its" would be mistaken for subaerial exposure surfaces in cores. e proposition that multiple calcrete surfaces can form as much as n below a single exposure surface cannot be substantiated on the sis of evidence presented by Rossinsky et al. (1992).

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