INTERPRETATION OF CORAL-CONGLOMERATE RELATIONSHIPS ON LA LOMA, FORTUNA, SPAIN

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Introduction

Although in-place *Porites* and *Tarbellastraea* corals are not the most common constituents of La Loma, they play an important part in interpreting the depositional environments of the ridge. The corals are found almost exclusively on the tops and southern sides of the knolls, and are always associated with a terrigenous conglomerate. By studying both the macroscopic and microscopic features of the contacts between coral and conglomerate, it is possible to designate three different ways in which these boundaries were formed: 1) coral growth directly on the conglomerate clasts; 2) conglomerate deposition around and over corals in growth position; and, 3) conglomerate infilling of voids formed by the dissolution of coral reefs (filled paleokarst terrain).

Interpretation of Mechanisms

Coral Growth Directly on Conglomerate

This field relationship displays either branching corals growing directly on the conglomerate with a sharp, horizontal contact between the two, or a horizon of corals encrusting a layer of conglomerate clasts (Fig. 1a). Extensive boring and encrusting of conglomerate suggest that the conglomerate represents a rocky intertidal or shallow subtidal zone. Due to the brittle nature of the contacts and the fact that vertical exposures made collecting difficult, thin-section analysis of this contact was not possible.

Deposition of Conglomerate Over Corals

This contact is marked by clasts of conglomerate resting between the branches of coral in the field, or the horizons of encrusting coral being overlain directly by conglomerate (Fig. 1c). Microscopically, individual sediment clasts appear to be sitting among the corallites with no evident boundary between the two (Fig. 1d). This suggests that pulses of sediment were washing in over the corals during times of reef growth and development.

Fill of Karsted Surface

The filled paleokarst is perhaps the most difficult environment to recognize at La Loma, although it is the most common relationship seen in thin section. This is because paleokarst terrains possess only a few diagnostic features; many features present in paleokarst are also common in other environments (Esteban and Klappa, 1983; James and Choquette, 1988). Therefore, it is necessary to look at a group of characteristics, instead of at individual environmental indicators. This is accomplished by comparing common features of previously described paleokarsts to those found at La Loma (Fig. 2). Macroscopically, the paleokarst environment is defined by irregular contacts between the coral and conglomerate, including windows of conglomerate in corals, sinuous and vertical contacts, and pockets of conglomerate with overhanging coral (Fig. 1e).

Microscopically, filled paleokarst is represented by sediment filling of near-vertical solution features; grains typically align parallel to the surface of the solution feature. Boundaries between the coral and sediment are marked by either a sharp, iron-stained border, or a zone of micrite that generally contains some iron staining. The micrite zone displays beautiful preservation of corallites due to envelopment by micritic muds; corallites outside this zone are recrystallized or destroyed completely. Red coralline algae encrust some of these boundaries, as do encrusting foraminifers.

Conclusion

Whereas preliminary field relations pointed toward a simple interpretation of coral growth on a conglomerate, La Loma proved to be more complex. Terrigenous sediment acted as a rocky substrate for coral colonization. As the reefs grew, pulses of sediment washed over the corals, occasionally completely burying them. A drop in sea level resulted in extensive dissolution of the carbonate reefs. Sea level rose again, and with it came more pulses of sediment, filling in the karst topography. A new growth of coral may also have begun.

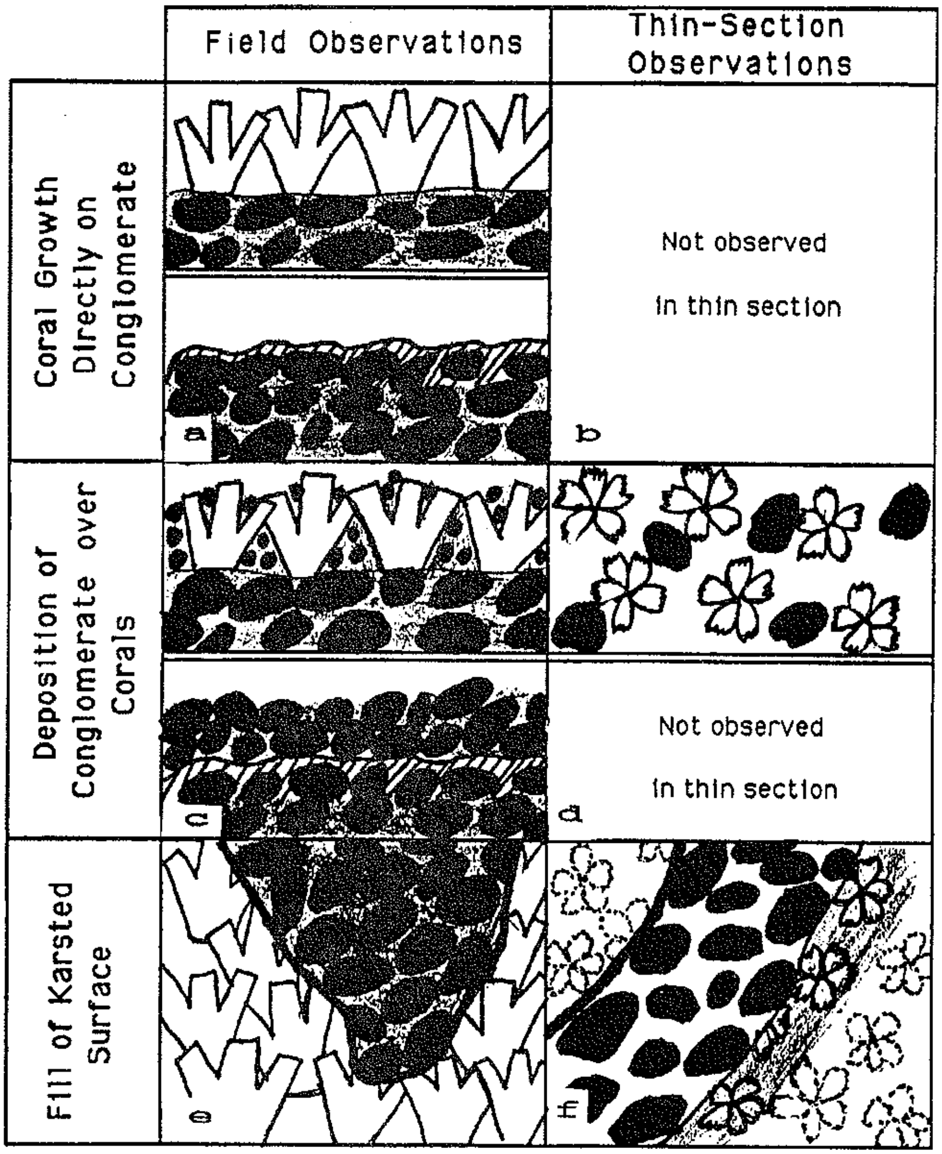

Figure 1. Schematic drawings of the various contacts at La Loma. a) branching and encrusting corals growing directly on the conglomerate; b) unobserved; c) conglomerate deposited over branching and encrusting corals; d) sediment clasts resting between corallites; e) conglomerate fill of solution void in coral reef; f) sediment fill of solution void portraying sharp, iron-stained contact (left) and micritic zone (right). Note that corallites outside the micritic zone are recrystallized. Empty space on thin-section drawings represents blocky calcite cement.

Macroscopic

Karst collapse breccias
*Unconformities of strata
Shallowing-upward cycles that end abruptly at paleokarst surface
Missing paleontological zones
*Irregular upper surfaces
*Irregular sediment bodies
*Nonselective dissolution voids and caves
*Sediment in cavities unrelated to bedding surfaces
Terra rosa and other paleosols
Chalky layers below sedimentary breaks
Black pebble limestone
Lining of solution features with secondary mineralization
Boring and encrusting organisms on karst surface
Leached fossils

Microscopic

*Eluviated soil in small pores
Etched carbonate cements
*Reddened and micritized grains
@Meniscus, pendant, and tangential needle-fiber vadose cements
@Extensive dissolution
*Fabric-selective pores
@Speleothems
Rhizoliths and lichen structures
Microborings

Figure 2. Common features of paleokarst terrains.
* Features found at La Loma
@ Features found at La Loma of uncertain age
(After Chafetz, 1982; Wright, 1982; Esteban and Klappa, 1983; Jones and Smith, 1987; James and Choquette, 1988)

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