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FACTORS CONTROLLING BOUNDSTONE DEPOSITION IN LATE PERMIAN CALCISPONGE REEFS IN THE SHITOUZAI SECTION, ZIYUN COUNTY, GUIZHOU PROVINCE, CHINA

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Organic reefs with calcareous sponges as main constituents were characteristic of the tropics during Middle and Late Permian time. These reefs were restricted in the Late Permian to regions such as South China. Detailed examination of constructors has been completed in the Middle Permian Capitan Reef (see Saller et al. eds., 1999 for references), but only a few such works and reports of microbial contribution in boundstones are known from Late Permian reefs. Late Permian calcisponge reefs are well develped at Shitouzai, Guizhou Province, China. Here, boundstones usually include both bindstones and framestones, the latter both as botryoidal cement-filled framestones and isopachous cement-filled framestones.

Bindstones are characterized by '*Archaeolithoporella*' forming dense crusts on calcisponges and bryozoans to make rigid frameworks. Micritic caps, consisting of peloids, filamentous microbes and dense micrites, are locally developed on skeletal organisms before the heavy coating of '*Archaeolithoporella*'. Matrix comprises lime muds and peloids that occasionally are laminated and include filamentous microbes. Remaining open spaces were filled by mosaic and isopachous cements which in part grade into '*Archaeolithoporella*'. In botryoidal cement-filled framestone, large cylindrical calcisponges themselves commonly construct framework, producing irregular cryptic spaces to various degrees. '*Archaeolithoporella*' also encrusts skeletal organisms, though thinly so here compared with bindstones. Fan-shaped, originally aragonite botryoidal cements are most characteristic within intraframework spaces, along with subordinate isopachous and infilling calcitic cements. '*Archaeolithoporella*' is sharply bounded with botryoidal cement. Matrix is composed of lime muds with faint lamination-forming peloids. Elsewhere, isopachous cement-filled framestone show irregular and thin cylindrical calcisponges and bryozoans, which are intermingled in a complex manner to form three-dimensional frameworks. These skeletal organisms are encrusted by thick micritic caps that include laminated peloids, and are further surrounded by '*Archaeolithoporella*'. '*Archaeolithoporella*' grades into isopachous cement layers where characteristic peloids with diffuse margins are frequent. Matrix here consists of bioclasts, lime muds, and peloids including filamentous microbes in interstices, whereas cements comprise only isopachous and infilling mosaic calcite.

The characteristics of boundstones are primarily determined by the nature of skeletal organisms themselves, such as calcisponges and bryozoans (composition, relative abundance and growth forms, etc.). '*Archaeolithoporella*' is a particularly important binder, which not only binds skeletal organisms together, and also covers sediments and produces peloids and cements. Botryoidal and isopachous cements are essential for infilling fenestral spaces formed and/or buffered by skeletal organisms and '*Archaeolithoporella*', according to changing environments. The nature of cements (compositions, relative abundance, and morphology) also played an important role in boundstone formation and may be strictly controlled by an age-specific, high saturation state with respect to $CaCO_3$

Reference

Saller, A. H., Harris, P. M., Kirkland, B. L. & Mazzullo, S. J. (eds.) 1999. Geologic Framework of the Capitan Reef. SEPM Special Publication. No. 65. 224p.