AP15

Classification and Environmental Distribution of Microbial Lithofacies: A Key Reservoir Description Tool

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SUMMARY

Most of the fossil and sedimentary structures that have been referred to as algal, cryptalgal, or cyanobacterial can now be grouped under the term microbial and are understood to have formed through the activities of this diverse group of prokaryotic organisms. Such photosynthetic biota, by removing CO₂ from marine waters, induce the precipitation of carbonate minerals. Microbial lithofacies are extremely common in the mid-Mesozoic Toarcian Series, occurring in many different forms and along nearly all of the depositional profile, down to the base of the photic zone. They may also be transported farther basinward, into slope and basinal environments.

Several authors have suggested classifications of microbial fossil forms. Virtually all of these forms can be recognized within the Toarcian of the Arabian Plate. Long cored intervals in more than 40 wells provide complete coverage of the calciclastic shelf depositional profile from tidal flats to at least outer shelf. Microbial forms are particularly abundant in most wells and provide the basis for a morphological classification based on this model. The subdivisions of this morphological classification are described and illustrated in this paper. Their distribution along the depositional profile is summarized, based on lithofacies, interpreted depositional environment, and ichnofacies data.