rocks. The latter include several Lithothamnion species, *Mesophyllum* sp. and scarce examples attributable to mastophoroids.

*Elianella elegans* and, in lesser amounts, *Parachaetetes asvapatii* are major components of the reef boundstones. The peyssonneliacean *Polystrata alba* is also very frequent in the intermound deposits.

**ARP G., REIMER A., and REITNER J.**

*Photosynthesis-induced biofilm calcification and Calcium concentrations in Phanerozoic oceans*

Photosynthetic carbon assimilation is commonly invoked to cause CaCO₃ precipitation in cyanobacterial biofilms that results in the formation of calcareous stromatolites, which were common in the marine realm from the Archean to the Cretaceous. However, biofilm calcification patterns in recent lakes, and simulation of photosynthetically-induced rise in CaCO₃ supersaturation, demonstrate that this mechanism does only apply in settings low in dissolved inorganic carbon and high in Ca²⁺. By combining simulation results with paleo-pCO₂ curves, we show that Phanerozoic oceans sustaining calcified cyanobacteria must have had considerably higher Ca²⁺ concentrations than today. Predicted occurrences of marine calcified cyanobacteria correspond to their observed abundances during the Phanerozoic, with the major exception of the Cretaceous that reflects a significant drawdown in Ca²⁺ caused by calcareous plankton. The enigmatic lack of calcified cyanobacteria in stromatolite-bearing Precambrian sequences can now be explained as a result of high dissolved inorganic carbon concentrations.

**AUBRECHT R.**

*Bathonian to Oxfordian stromatactis mud-mounds in Slovakia and their origin*

Three occurrences of stromatactis mud-mounds have been found in the Czorsztyn unit, of the Pieniny Klippen Belt (Western Carpathians, Slovakia): Slavnické Podhorie, Štepnická skala and Babiná. Their stratigraphic range is from Bathonian to Oxfordian, i.e. they belong to the latest known true stromatactis mud-mounds. Geometry of the mounds is not always visible as the klippen are tectonic blocks enveloped by younger Cretaceous marls. At Štepnická skala site only, a flat mound shape of the stromatactis beds is visible. The wall rocks are invariably micritic to pelmicritic mudstones, wackestones to packstones with fauna of pelecypods, brachiopods, ammonites, crinoids etc. All the mentioned occurrences contain networks of stromatactis cavities. At Slavnické Podhorie they occur as low as in the underlying Bajocian-Bathonian crinoidal limestones which testifies their biological origin. Any of so far presented inorganic models of stromatactis origin is hardly applicable to the wall rock sediment formed by crinoidal skeletal detritus. The only difference between this site and other occurrences of the Bajocian to Bathonian crinoidal limestones in the Pieniny Klippen Belt is peloidal interparticle matrix probably of microbial origin. This site was then pre-disposed to be a site of mud-mound growth still before the turning from skeletal to mudstone deposition. The stromatactis cavities are invariably filled by radiaxial fibrous calcite (RFC) and then sometimes by internal sediment and, finally, by clear blocky calcite. Some fillings were even incomplete, with empty void in the centres. In two instances, at Babiná and Slavnické Podhorie localities, tests of ostracods *Pokornyopsis* sp. were found, surrounded by the latest stages of the RFC. The mentioned ostracods were cave-dwellers (AUBRECHT and KOZUR, 1995) which indicate that stromatactis cavities for a certain period of time formed an open-space network through which
these ostracods and their larvae could migrate. Except stromatactis cavities, at all
the examined sites there are numerous examples of seeming recrystallization as
was discussed by BLACK, 1952 and ROSS et alii, 1975 versus BATHURST (1977).
The radiaxial fibrous calcite enclose patches of matrix and isolated allochems. The
RFC crystals are invariably oriented perpendicular to the substrate whether it is a
cavity wall or an enclosed allochem. Therefore, they could not grow from the
centre of the cavity outward, for later they would not be able to re-orient
themselves perpendicular to the allochems they meet on their way. This
observation was introduced already by BATHURST (1977). However, he did not
provide a satisfactory explanation of this phenomenon. His answer, that the
"floating" allochems are in fact interconnected in three dimensions which is not
visible in a single thin-section, seem to be very unlikely in the samples we have
studied. There were numerous cases when the "floating" allochem was much
smaller than the RFC crystals that surrounded it and the average distances
between the allochems too. In the portions of rocks where the sparry calcite
prevailed, the same picture was observed in both directions of perpendicular-
made thin-sections. There was a very little possibility of any allochems to be
supported by being attached to other allochems. Moreover, such construction
would be so friable that any water-current would destroy it. In such a case,
numerous allochems would be fallen on the bottoms of the cavities forming an
internal sediment which is quite rarely observed. Therefore, examining the
Slavnické Podhorie and Babiná mud-mounds one meets a conflict between
apparently empty cavities that had to exist in the rock (internal sediment, cave-
dwelling ostracods Pokornyopsis sp. etc.) and seeming "recrystallization"
evidently related to the same RFC which also forms the initial void filling. There
are, however, some alternative explanations of the "recrystallization". The RFC
crystals did not necessarily have to start their growth in the cavity and growing
outward as proposed by BLACK (1952) and ROSS et alii (1975). Instead, the
allochems might serve as nucleation sites on which the crystals started their
growth. But what about the patches of micritic host-rocks enveloped by the RFC?
How could the RFC crystals know which portion of the micrite is to be taken as a
nucleation site and which one to be recrystallized? Apparently, not only allochems
but also the micritic patches had to be different from the matter that surrounded
them and supported them. The most likely origin of "recrystallization", which was
also adopted by us, was proposed already by ROSS et alii (1975) as one of their
alternative explanations. They stated that "...the radiaxial fibrous calcite must
have replaced some other substance which may have been mineral, or vegetable,
or partly both..." and "...some modern blue-green algae have the consistency of
tough rubber. Layers of such a rubbery organic material might have supported
layers of calcilutite and later been replaced by sparry aragonite..." A good old
theory of an unknown soft-bodied organism is then apt to explain not only origin
of the stromatactis cavities themselves but also the cases of seeming
"recrystallization". By our opinion, the RFC crystals (either short- or long-bladed)
of our "recrystallization" spar grew at the expense of decaying microbial
muclages, similar to those described by REITNER et alii (1995) from the modern
reef sediments of Lizard Island. The mucus might enclose peloids, allochems or
whole mudstone patches which, in this sense, really "floating" in the cavity space
and served as nucleation sites for RFC. The entire mud-mound represented most
probably a microbially bound autochthonous micrite; the stromatactis and
stromatactoid cavities originated where clearer mucilage patches occurred,
relatively free of inessential elements. Common morphological variability of
stromatactis, penetration of the sparry calcite to narrow spaces, enclosing of the
"floating" allochems and mudstone matrix patches by sparry calcite are the facts
that are in favour of presence of mucus, as disorganized assemblage of various
protozoans, as proposed by TSIEN (1985a) or KAUFMANN (1997, p.947-948),
rather than of sponges and other well organized metazoan organisms which
would by filtering prevent the allochems from entering their growth cavities.
Moreover, sponge spicules and skeletons represent just subordinate elements in the examined mud-mounds. The proposed microbial colonies had to be specialized for living in mud-mounds and thus represent a soft-bodied reef-forming organism. These specialized colonial microbes extincted during Late Jurassic-Cretaceous time as there were no true younger stromatactis fabrics revealed.

References


BARATTOLO F.

Fossil algae (mainly Dasycladaleans) at the K/T boundary and Palaeocene

The Upper Cretaceous is to be considered a period of crisis for dasycladaleans. According to stratigraphical evidence the minimal occurrence of dasycladaleans seems restricted to the Cenomanian - Senonian interval. In respect to the Senonian, the Maastrichtian can be considered as a moment of moderate increase for dasyclads. In the Palaeocene we see a full and important flourishing of new genera and species.

Margin and open platform facies

Dasycladaleans possibly flourishing in these environments are Broeckella belgica L. Morellet et J. Morellet, Orioporella malaviae Pia, Sandalia multipora Dieni, Massari et Radoičič, Oroseina solaris Dieni, Massari et Radoičič, Cymopodia edwardsi L. Morellet et J. Morellet, Cymopodia frugifera Segonzac, Jodotella veslensis L. Morellet et J. Morellet, Jodotella sloveniaensis Deloffre et Radoičič, Trilopoporella apenninica Baretti as well as most bornetellids (Zittelina, Dactylopora), uteriids (Uteria) and thyrsoporellids (Thyrsoporella, Trinocladius). Thyrsoporellids preferentially occupied open environment (J.P. Beckmann and R.