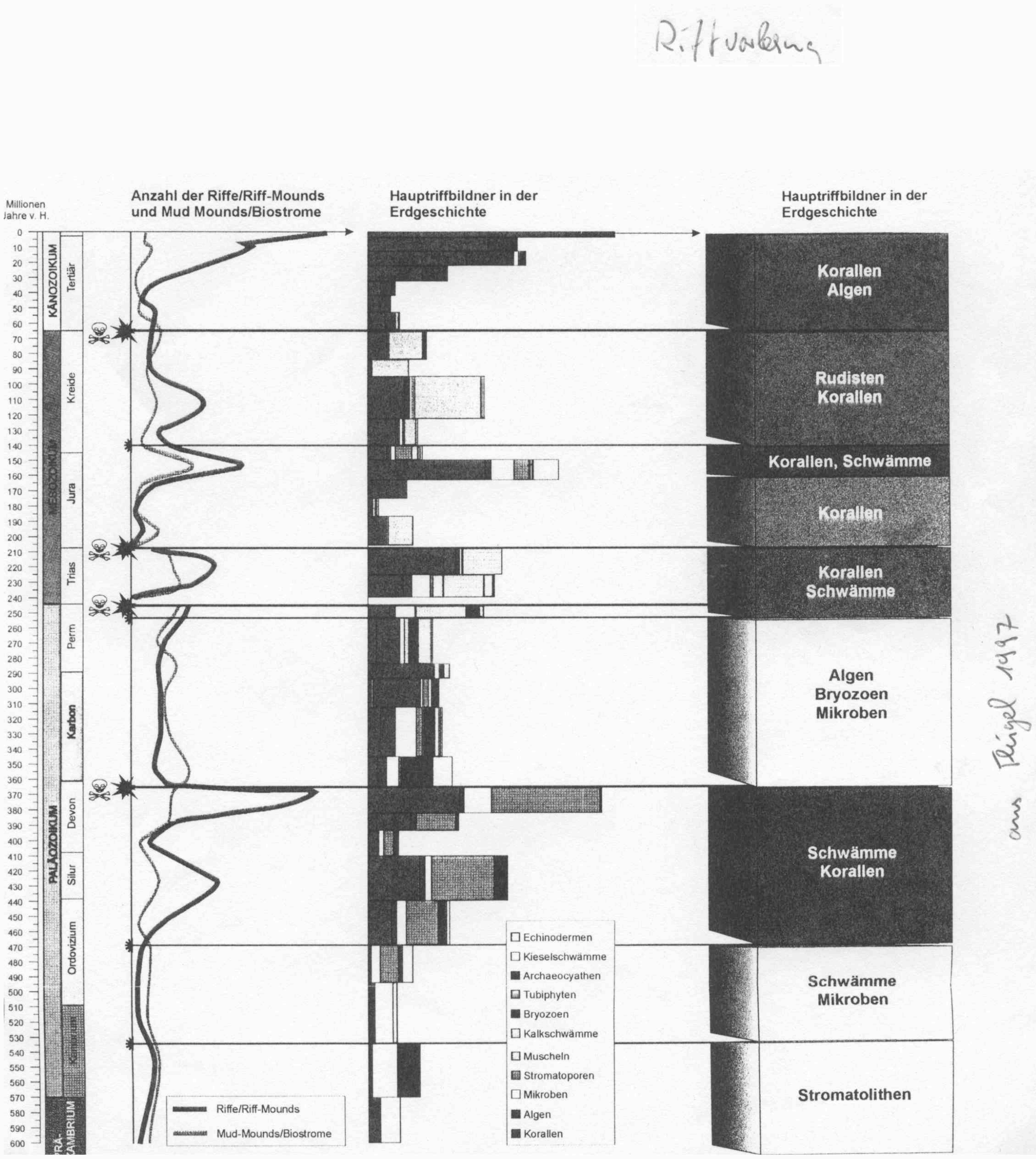
Riffskript – letzter Teil (Version 2000; neues Skript demnächst unter www.palaeo.de/edu/reefcourse)



R. Hvorleng - Auslese

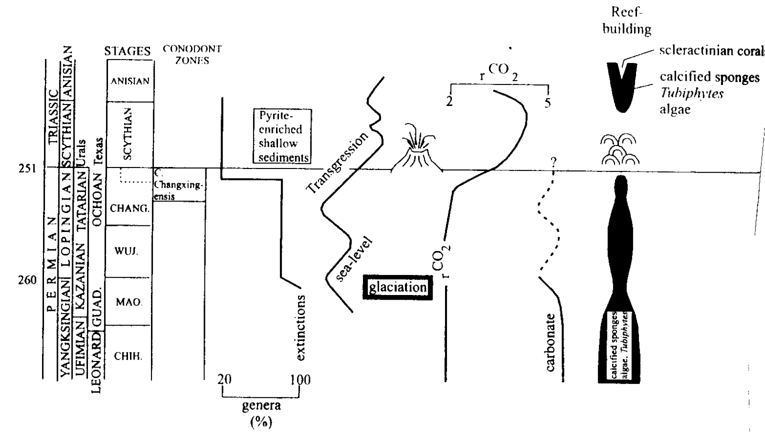


Fig. 5.7 It is now clear that the supposed long Late Permian diversity decline in fact consists of two distinct extinction episodes separated by an extended period of recovery and radiation. The first extinction occurred in the late Maokouan, and was probably caused by climatic cooling induced by glaciation and an attendant, and possibly related, major global major regression. The regression terminated reef formation in the Guadalupian sections of Texas and New Mexico, and caused the loss of vast areas of other shallow-marine tropical carbonate habitats elsewhere resulting in the extinction of endemic biotas. A modest radiation has been recorded from the Lopingian. The second and more disastrous crisis is probably to be entirely confined to the *changxingensis* Zone (representing perhaps less than 1 Myr) and appears to have been the result of global warming—perhaps, in part, triggered by the eruption of the Siberian traps—and marine anoxia. (Carbonate production curve: Bosscher and Schlager 1993; sea-level curve: Hallam and Wignall 1997; rCO_2 estimate curve: Berner 1994.) (CHANG: Changxingian; WUJ: Wujiapingian; MAO: Maokouan; CHIH: Chihsian.

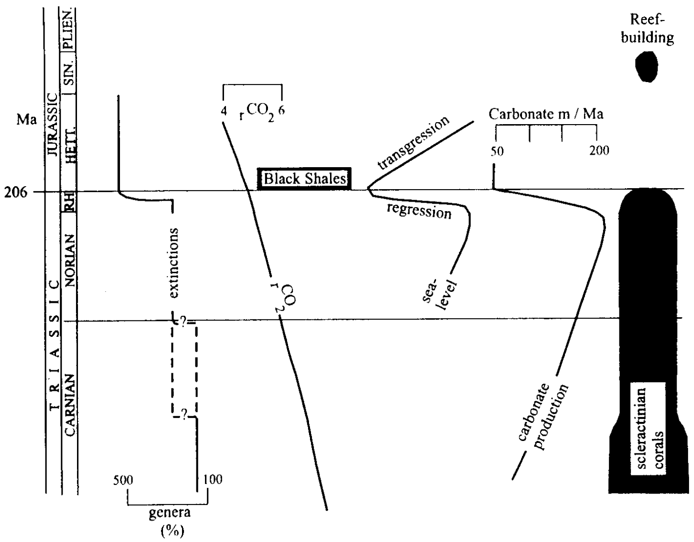


Fig. 5.8 Scleractinian-dominated reef communities disappeared at the end of the Triassic. The dramatic loss of reefs is probably related to the loss of carbonate environments due to regression and anoxic events. (Carbonate production curve: Bosscher and Schlager 1993; sea-level curve: Embry and Suneby 1994 and Brandner 1984; rCO_2 estimate curve: Berner 1994.) (RH: Rhaetian; HETT: Hettangian; SIN: Sinemurian; PLIEN: Pliensbachian.)

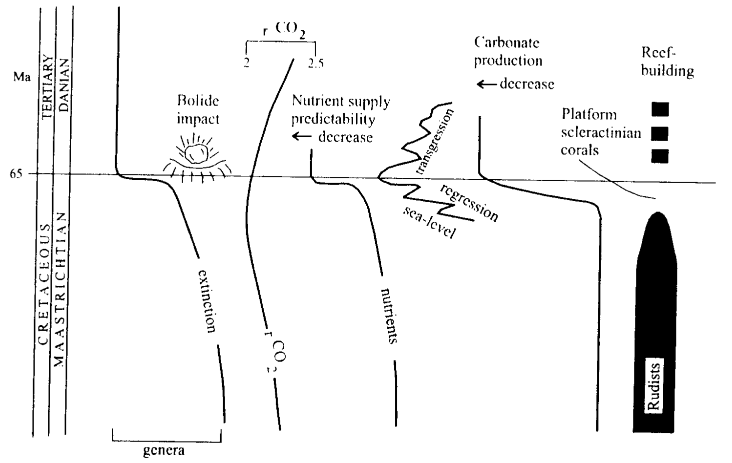
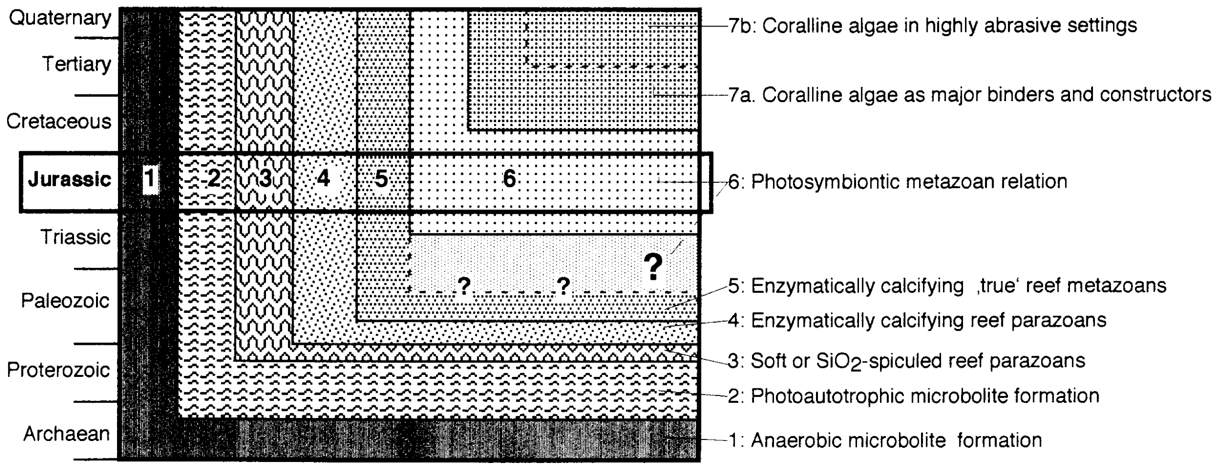
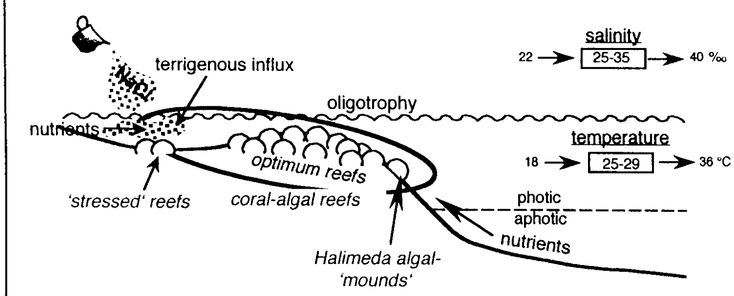


Fig. 5.9 While there is little doubt that a bolide impact caused widespread extinction at the Cretaceous/Tertiary boundary, Late Cretaceous climates were already deteriorating during the Maastrichtian and there is also evidence for unpredictable nutrient supply during this time (A.B. Smith and Jeffrey 1997). Platform-dwelling rudists became extinct 1–3 Myr before the KT boundary, but scleractinian corals persisted. Tropical carbonate platform development was markedly reduced after the KT boundary. (Sea-level curve: Rohling *et al.* 1991; rCO_2 estimate curve: Berner 1994.)

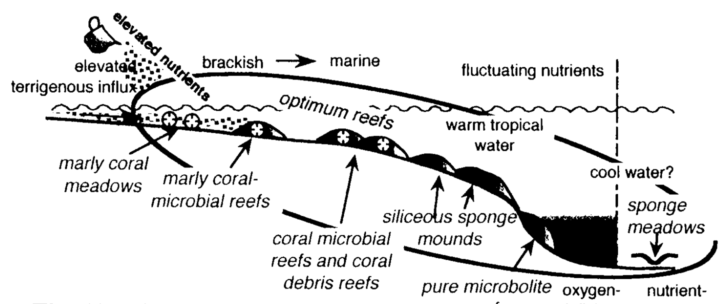


Jurassic Reefs: **RBB 1-2: Pure microbolites**
RBB 1-3 (+/- 4,5): Siliceous sponge - microbolite mounds
RBB 1-6: Coral reefs



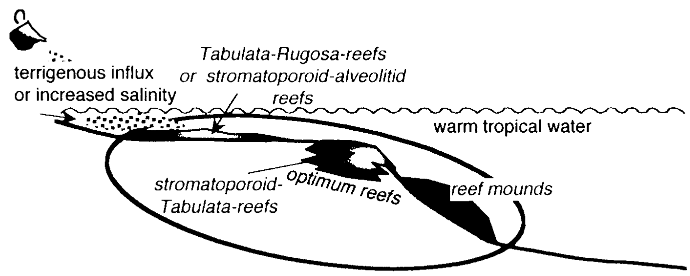
The modern (sub-) tropical 'Reef Window'

152 - 139 mio. years



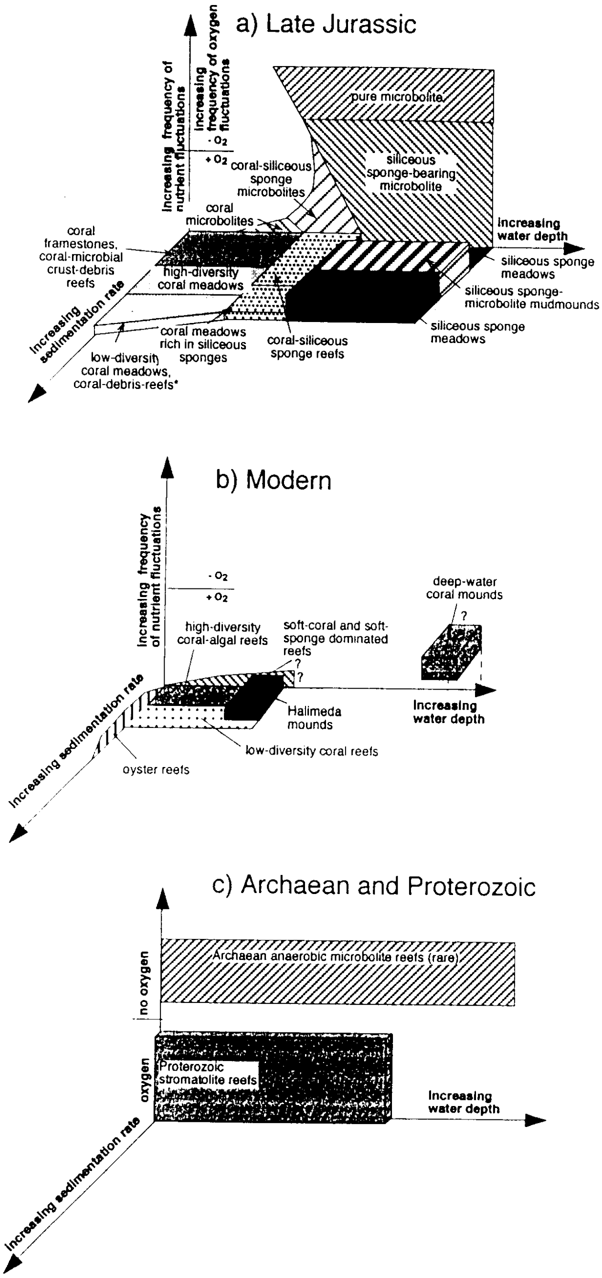
The 'Reef Window' of the Late Jurassic

380 - 367 mio. years



The 'Reef Window' of the Devonian (Givet-Frasne)

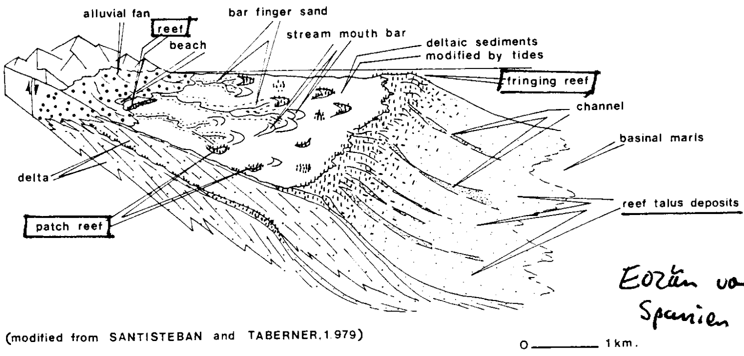
Riffvorlesung



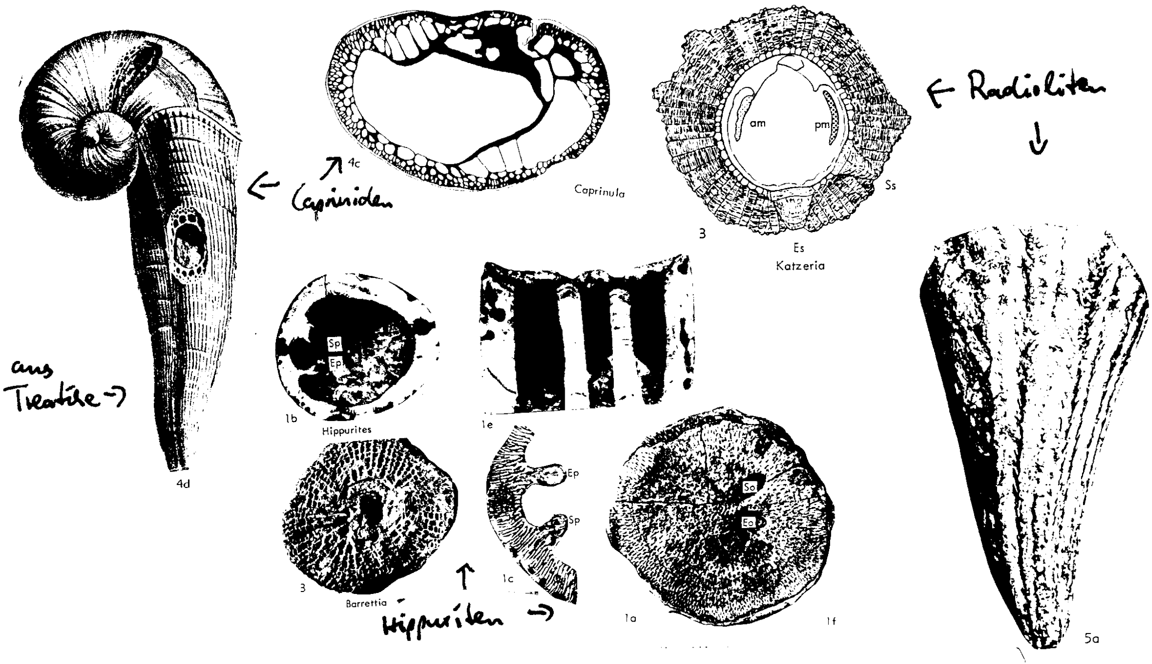
aus Leinfelder 1999

Riffe (18) Riffbeispiele aus der Erdgeschichte

Tertiär, Kreide



Eozän von Spanien



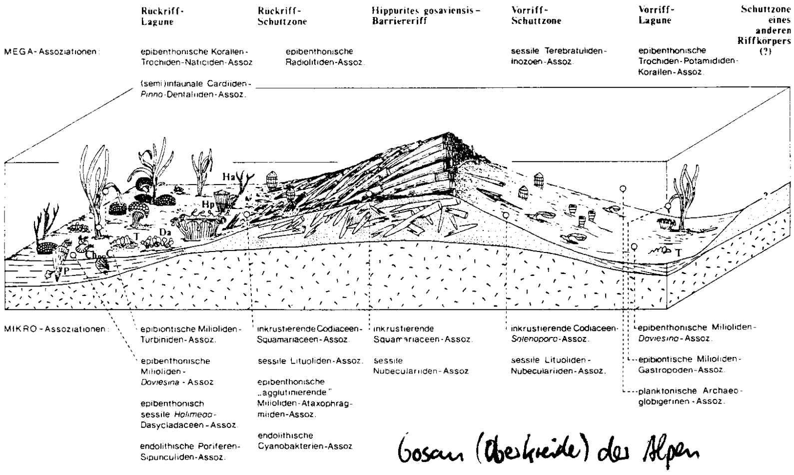
← Capriniden

← Radioliten ↓

aus Treatise →

Hippuriten →

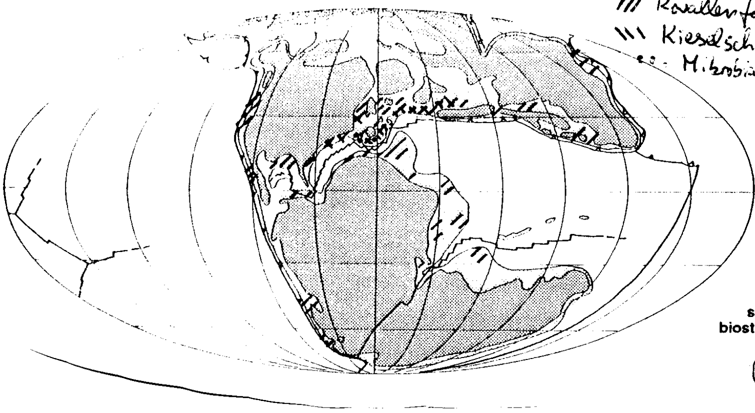
Petkovicia



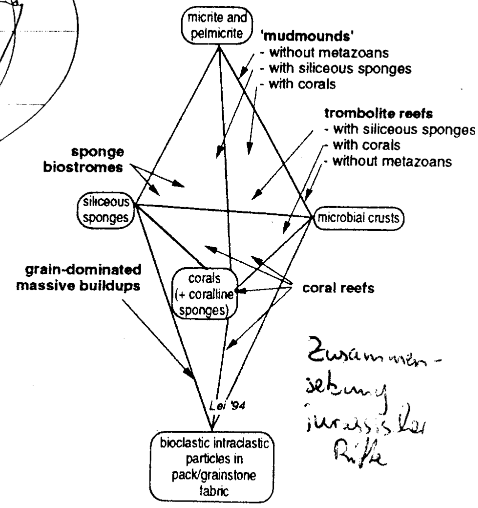
aus Höfling '98

Gosau (Oberkreide) der Alpen

Late Jurassic

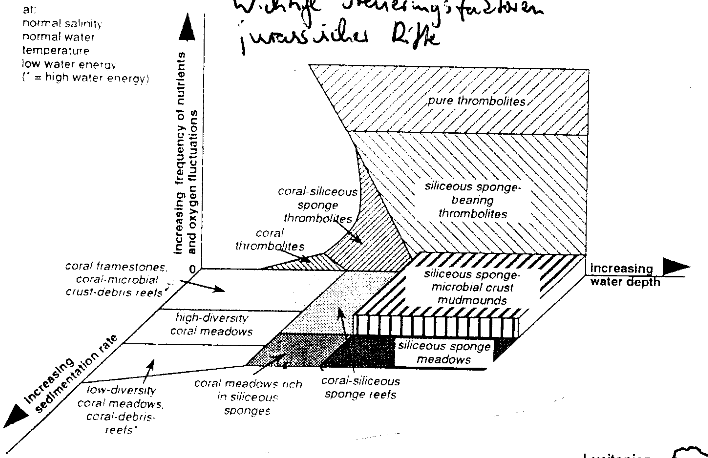


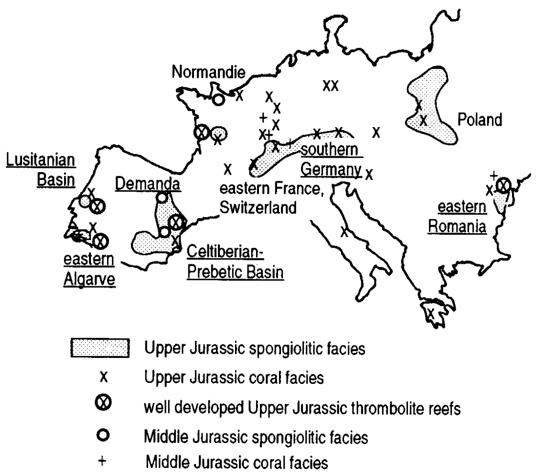
/// Korallenfazies
\\\ Kieselschwammfazies
-.-. Mikrobialithe

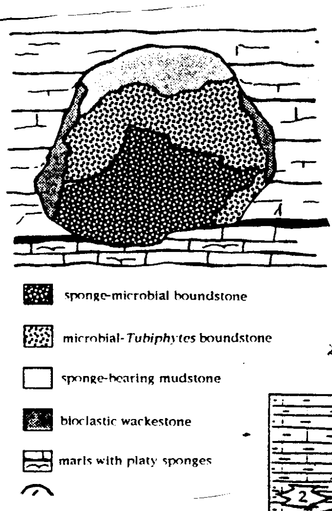


Zusammensetzung jurassischer Riffe

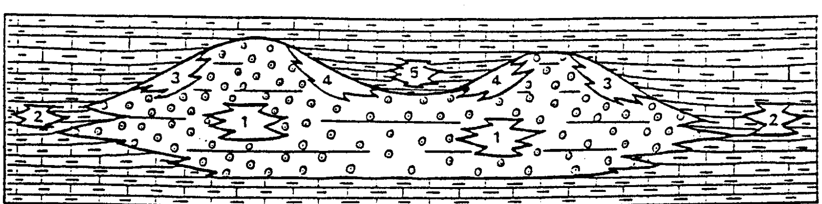
Wichtige Steuerungsfaktoren jurassischer Riffe







↑ Aufbau eines Oxford-Kleinbioherms (Klettgau)



⑦ Aufbau von Massenkalken im höchsten Kimmeridge der Schwäbischen Alb (nach Koch) 1 Schlammsteine 2 ... Bioherme 4 Bruch... Ooide

Rifte (19): Beispiele aus der Erdgeschichte: Oberjura von Portugal

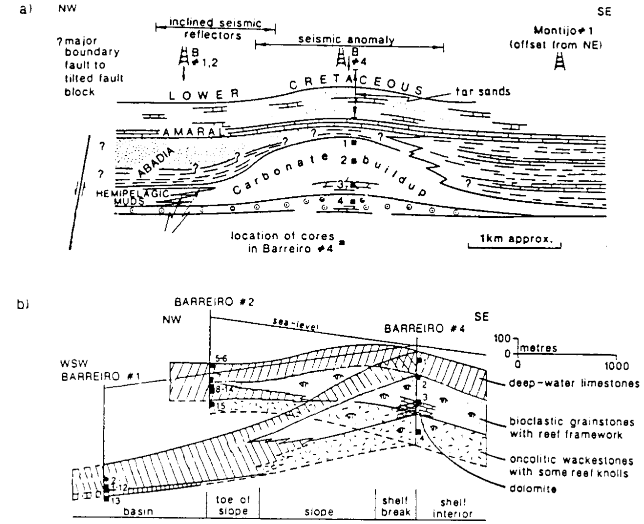


Abb. 63: Interpretativer Schnitt durch das Barreiro "buildup" (aus ELLIS, WILSON & LEINFELDER, im Druck).
a) Die Beziehung des "buildups" zu den umgebenden stratigraphischen Einheiten.
b) Die Architektur und Faziesassoziationen des "buildups".

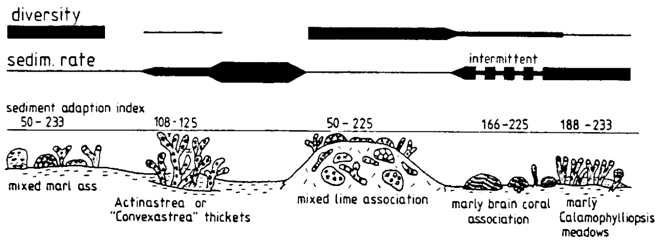


Abb. 75: Abschätzung der Sedimentationsrate anhand funktionsmorphologischer Kriterien von Korallen und Auswirkungen auf die Diversität: das Beispiel der Alrota Biostrome (Tithon).

aus Leinfelder 1989

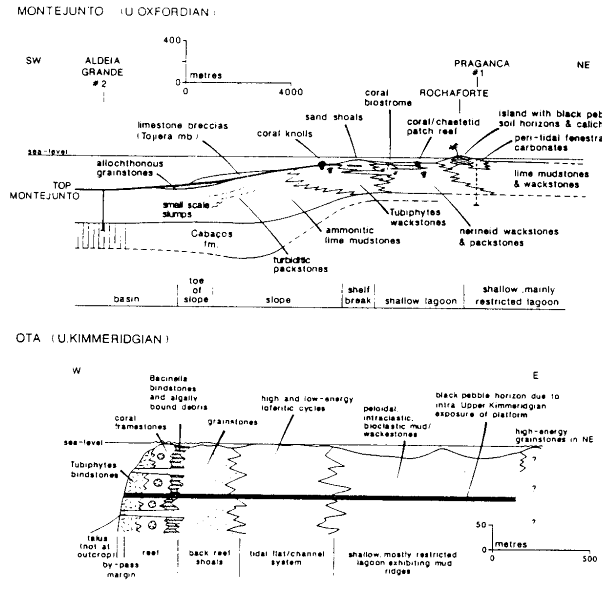


Abb. 49: Idealisierte Schnitte durch die Montejunto- und Otaplattform (aus LEINFELDER & WILSON, im Druck)

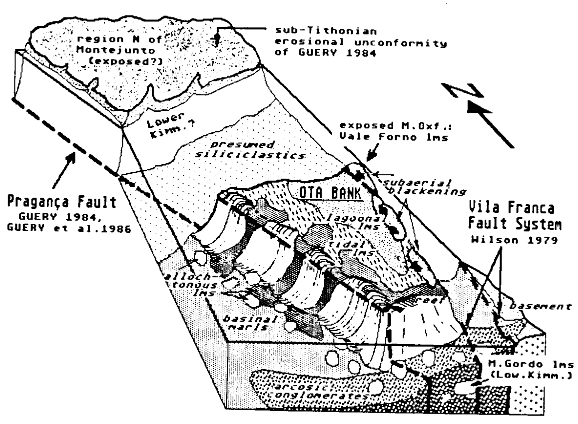


Fig. 4: Hypothetical model of the geotectonic setting of the Ota Limestone in the Montejunto - Vila Franca area during the early Upper Kimmeridgian aus Leinfelder, Erbenich > Ramalho 1988

Rifte (20): Beispiele aus der Erdgeschichte Oberjura von Portugal

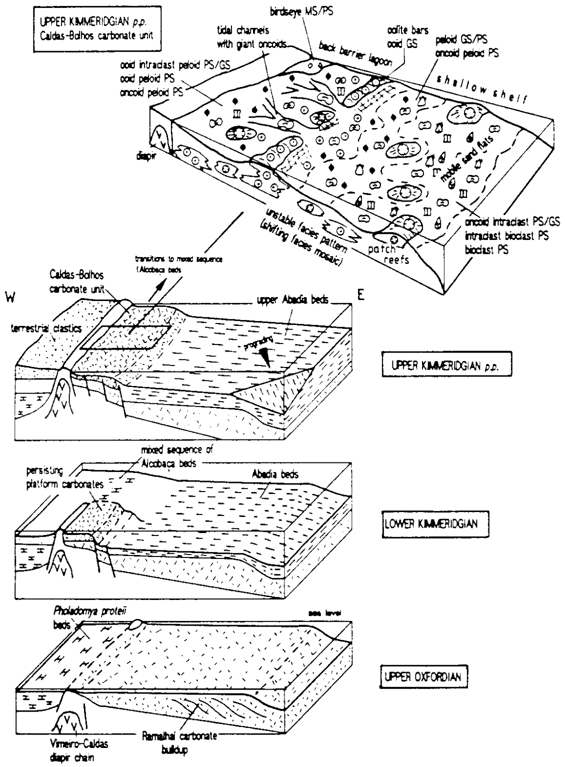


Abb. 70: Ablagerungsmodelle für den Bereich Ramalhal - Vimeiro - Caldas da Rainha für verschiedene Zeitschnitte. Das Faziesmodell der Caldas - Bolhos Karbonateinheit (oben) basiert überwiegend auf den Abfolgen bei Dagorda und Cesaredas.

aus Leinfelder 1989

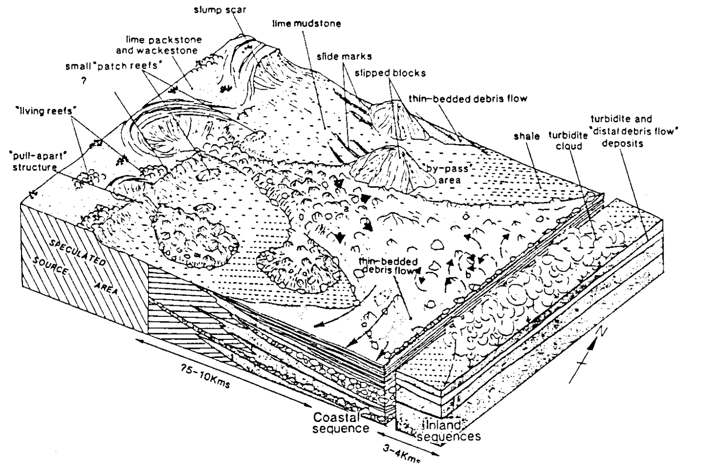


Abb. 72: Ablagerungsmodell für die Kimmeridge Abfolge in der Sintra Region (aus ELLIS 1984, ELLIS, WILSON & LEINFELDER, 1990).

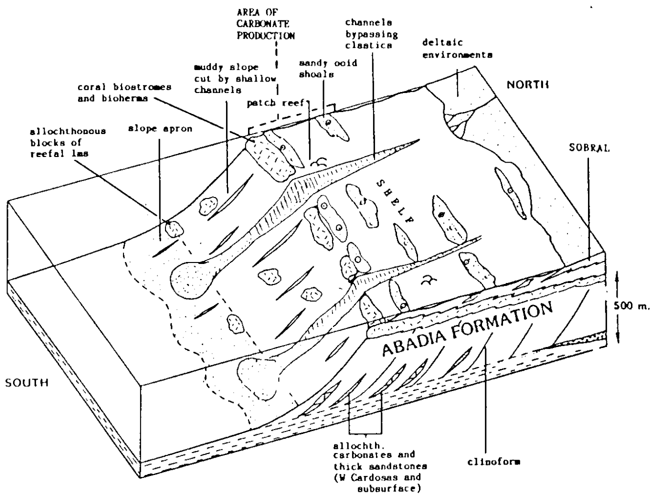


Abb. 61: Das Ablagerungssystem der Abadia/Amaral Sedimentation für das Arruda Subbecken. Die Amaral Formation entwickelte sich zeitgleich mit den höheren Abadia Schichten als lateral progradierende "Hangkappenkarbonate". Basierend auf ELLWOOD (in ELLIS *et al.* 1987), stark verändert und angepaßt auf das zentrale Arruda

Riff (21): Beispiele aus Trias und Oberjura

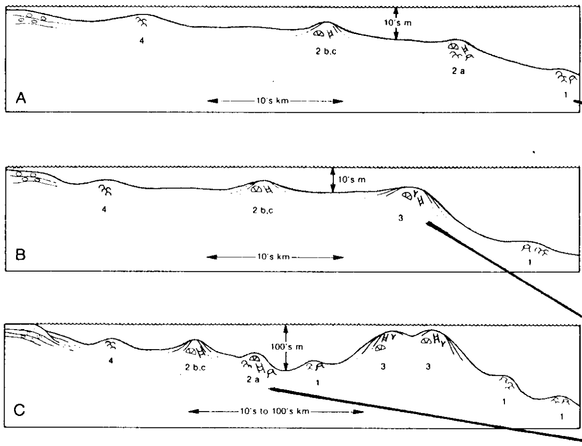


Figure 21. Idealized cross sections illustrating the location of Jurassic carbonate reefal buildups across a gently sloping platform (A), a steepened platform margin (B), and a steepened or rimmed platform margin facing an open ocean with an intrashelf basin or deep-water lagoon (C). Distribution of major reef framebuilders appears to be related to physical energy (wave related) and local environmental stresses (temperature, salinity, nutrients, or turbidity). (type 1) sponge and sponge-algal mounds, (type 2a) sponge-coral-algal buildups, (type 2b and c) coral-dominated patch reefs and bioclastic piles, (type 3) stromatoporoid-coral platformmargin buildups and near back-reef coral-stromatoporoid patch reefs, and (type 4) stromatolite build-ups. aus Crevello & Harris 1984

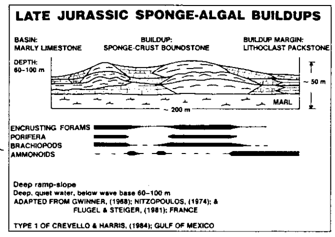


FIGURE 1—Model of Late Jurassic sponge-algal buildups within basins.

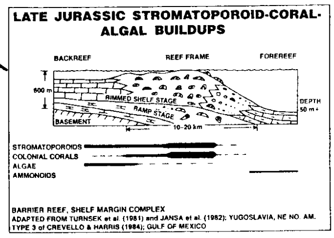


FIGURE 2—Model of Late Jurassic stromatoporoid-coral-algal build-ups at the shelf margin.

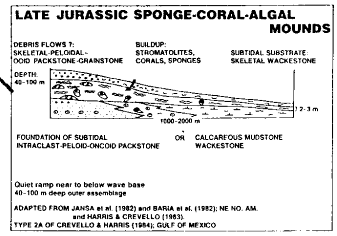
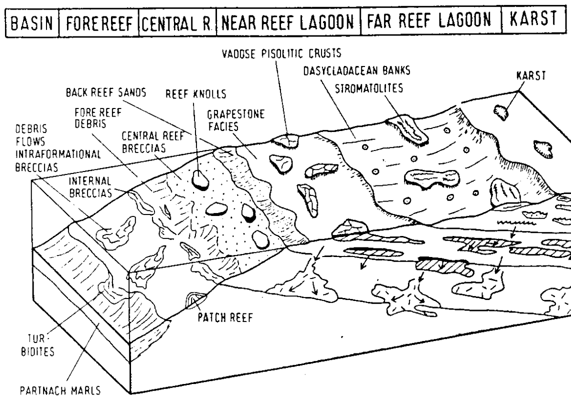


FIGURE 3—Model of Late Jurassic sponge-coral-algal mounds upon the slope.

aus Scott 1988



Schematisches Blockdiagramm der Fazies - und Diagenesebereiche des Wettersteinkalks unter besonderer Berücksichtigung der Dolomitisierungsphasen. aus Henrich 1984

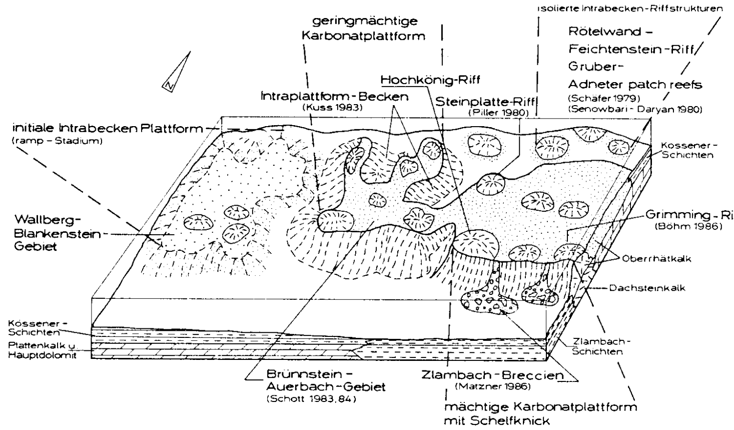


Abb. 26: Paläogeographisches Sedimentationsmodell für das Oberrhät der Nördlichen Kalkalpen zwischen Tegernsee und Hallein. aus Ehses & Leinfelder 1988

Riffe (22): Perm, Trias

aus G. D. Stanley, jr. (1988) 1,2,3)

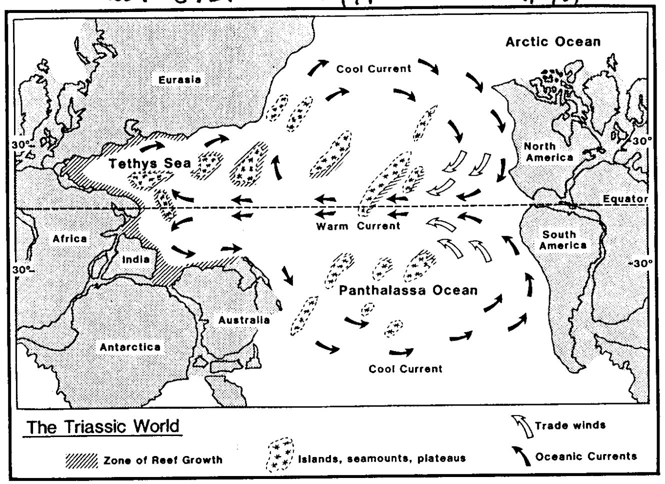


FIGURE 1—Reef development in the Late Triassic showing the Pangaea continental reconstruction with possible current and trade wind patterns indicated. The exact location of numerous islands, seamounts, and plateaus that studded the ancestral Pacific are diagramatic and are not precisely known.

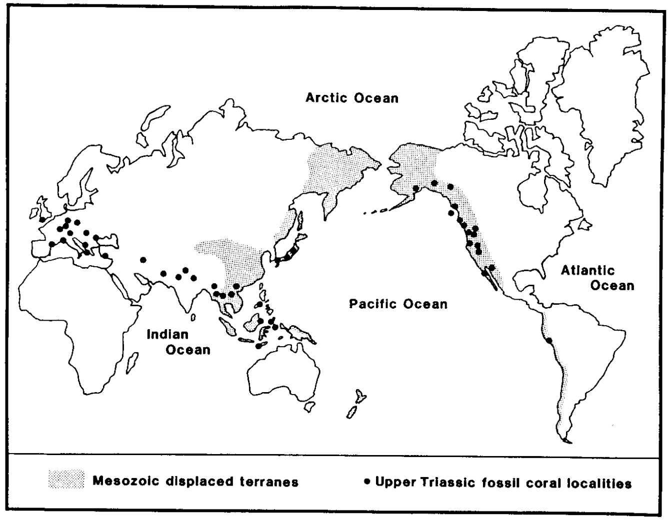


FIGURE 2—Upper Triassic coral localities. Most of these are also associated with a variety of other benthic invertebrates which together formed reef communities. General areas of accreted terranes are indicated.

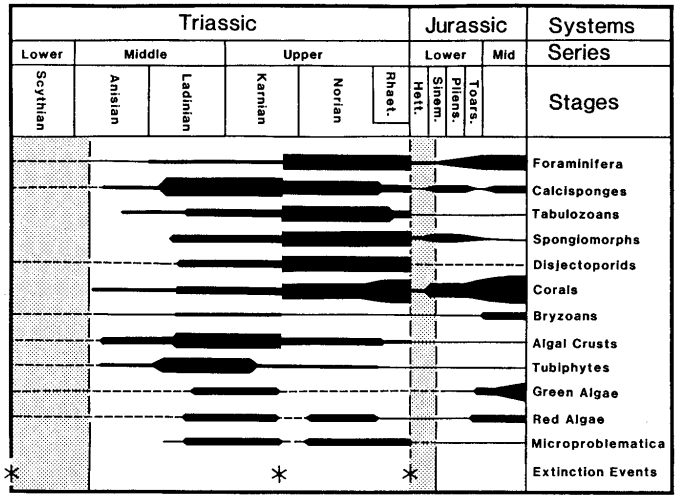


FIGURE 3—Relative importance and diversity of reef organisms through the Triassic and part of the Jurassic with mass extinction events indicated. Shaded areas indicate intervals where reefs and reef communities are not present.

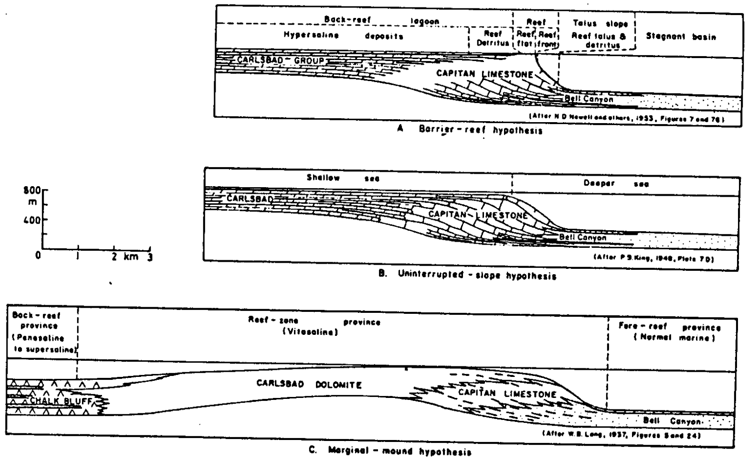


Figure 5 Permian Reef Complex: Alternative hypothesis of reconstructed profiles along shelf margin. After DUNHAM (1972).

aus Flügel 1984

Riffe (23):
Paläozoikum, v.a. Karbon / Perm

Mound Facies Sequence

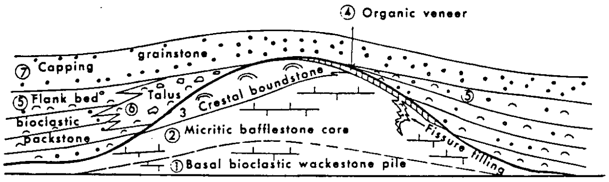


Figure 10 Ideal carbonate mud mound with seven commonly developed facies units. The sequence of facies develops when the mound grows into the wave base.
After WILSON (1975)

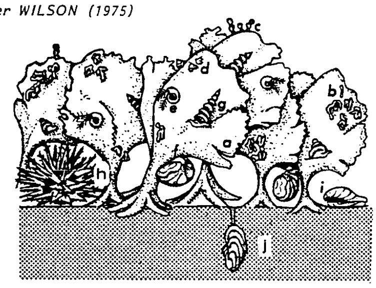


Figure 11 A reconstruction of the Phylloid Algal Community. The phylloid algae A dominate the seabottom. Encrusting organisms such as the foraminifers Minammodytes B, Tuberitina C, Tetrataxis D, and the polychaete worm Spirorbis E cover the algal "leaves". The pedunculate brachiopod Composita subtilita (HALL) F attaches itself to the upright codiacean algae, thus placing itself in a more favorable feeding position, while various snails G and echinoids H graze the algal meadow. A few clams such as the epifaunal Myalina I and the infaunal Bakevellia J round out and balance this unique community.
After TOOMEY (1976)

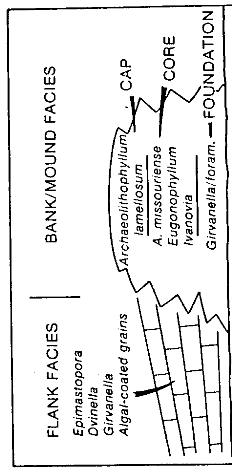


Figure 9 Distributional model of dominant calcareous algae within phylloid algal bank complexes. Pennsylvanian.
After WRAY (1979)

cf Flügel 1984

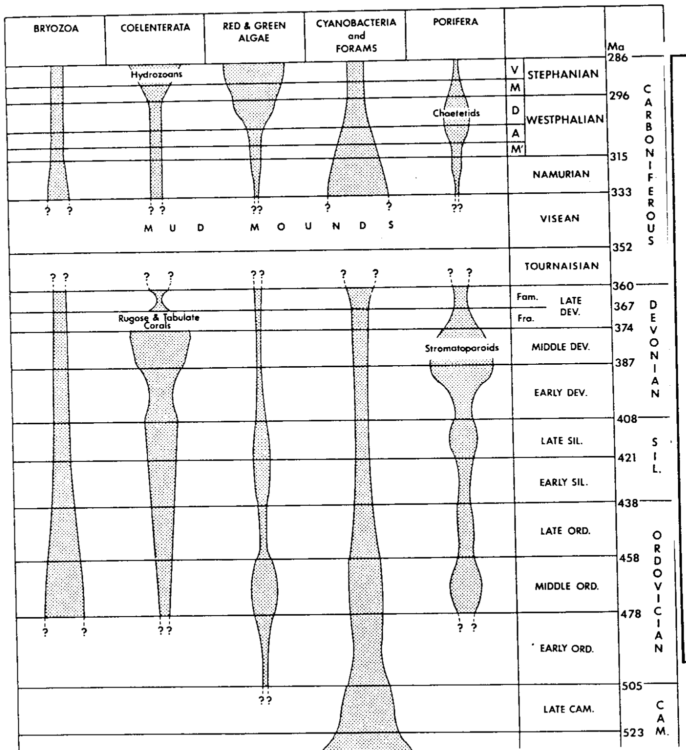


FIGURE 1—Relative skeletal biovolume of the major groups of frame-building taxa of Paleozoic (pre-Permian) reefs and reef mounds. Relative skeletal biovolumes are estimated based on a general impression obtained from field work and by reviewing the literature. (M' = Morrowan, A = Atokan, D = Desmoinesian, M = Missourian, and V = Virgilian).

aus West 1988

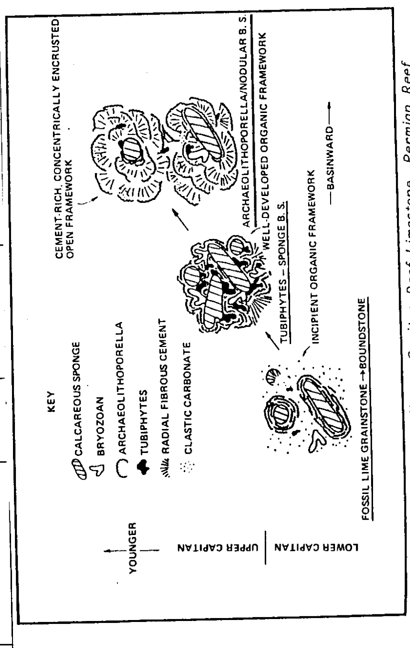


Figure 12 Genesis of the Upper Capitan Reef Limestone. Permian Reef Complex, Texas.
After BABCOCK (1977)

Riffe (24
Devon

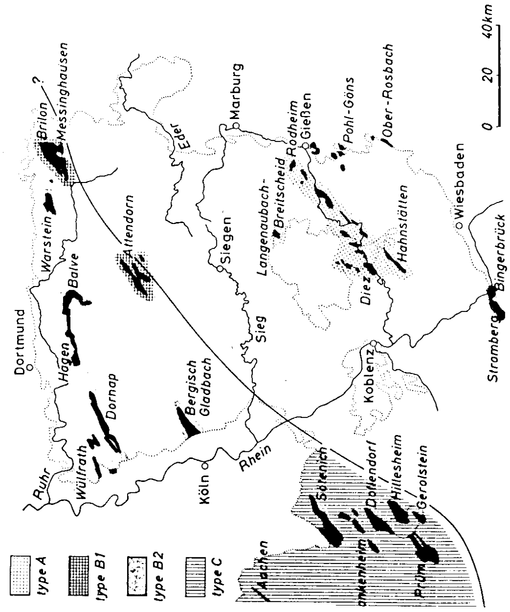
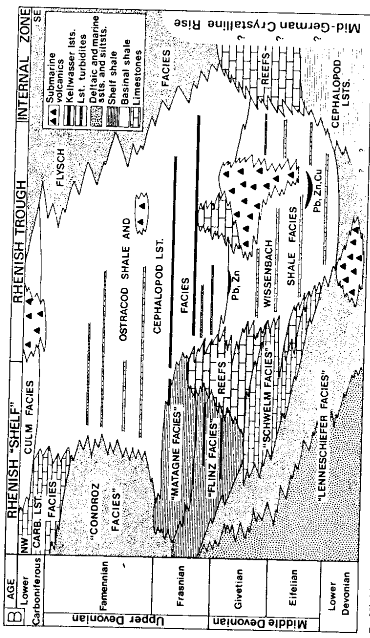


FIG. 5.—Distribution of Devonian carbonate complexes in Rhenish Schiefergebirge.

aus Krebs 1974



B. Highly schematic section through the Devonian of the Rhenish Schiefergebirge showing facies distribution and the stratigraphical context of reefal limestones; modified and simplified after Krebs (1971, fig. 2).

aus Burchette 1981

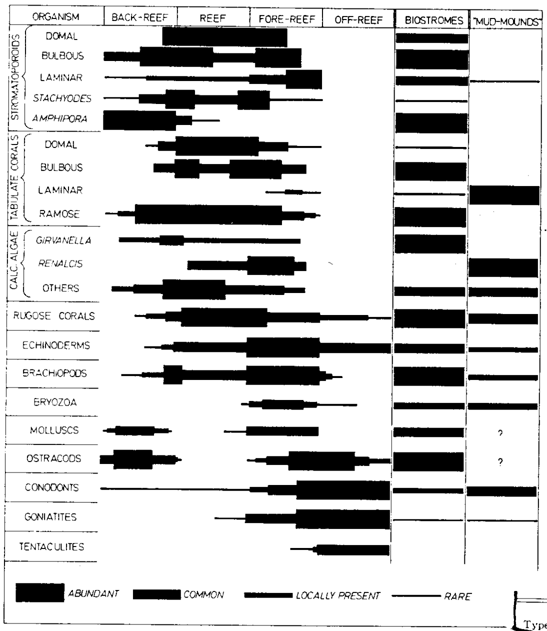


FIG. 19.—Relative abundance of the main groups of reef building and associated organisms in European Devonian reef complexes; data from many sources.

Burchette 1981

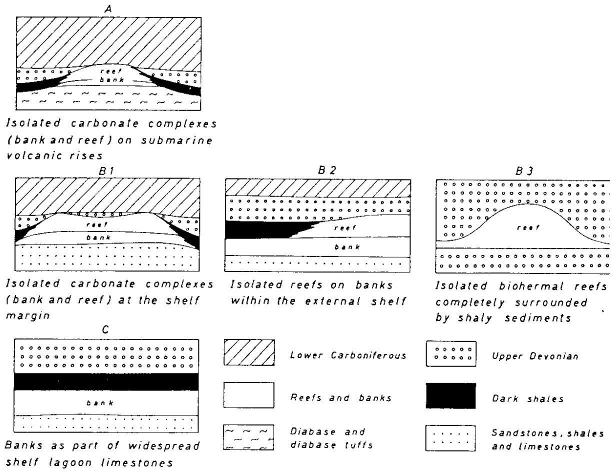
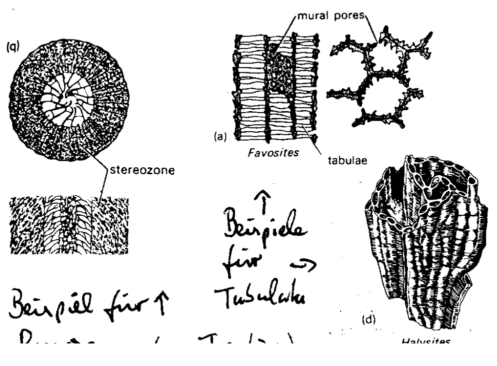


FIG. 4.—Types of Devonian carbonate complexes in central Europe.

Krebs 197-

TABLE 4.—SUMMARY OF DEVONIAN CARBONATE COMPLEXES IN CENTRAL EUROPE

Type	Paleogeographic position	Examples	Foundation of carbonate complexes	Overlying sediments	Relation of carbona[te] complexes to basinal shales
A	Isolated carbonate complexes (mostly atolls) within trough	Garbeck-Langenholthausen, Messinghausen, Langenaubach-Breitscheid, Lahn Syncline, Elbingerode	Submarine volcanic rises (diabase, diabase tuffs, keratophyres)	Hiatus between reefs and middle Lower Carboniferous or limestones of minor thickness only	Time equivalent o[r] somewhat younger in part
B1	Isolated carbonate complexes (atolls) at outer shelf margin	Attendorn, Brilon	Limestones, shales, and sandstones of outer shelf facies (Lenneschiefer)		Time equivalent (Flinz)
B2	Isolated carbonate complexes (mostly atolls) within outer shelf	Wülfrath, Dornap, Hagen, Balve, Bergisch Gladbach, Stromberg?, Iberg-Winterberg?		Dark shales and limestones	Time equivalent as well as younger (Flinz and Matagne Shales)
B3	Isolated reef complexes (atolls or table reefs) in vicinity of outer shelf margin	Anticline of Philippeville, southern flank of Dinant Syncline, Meggen?	Shales and nodular limestones	Shales and nodular limestones	Reef complexes are completely surrounded by basinal shales
C	Part of the widespread shelf lagoon of the outer and inner shelf	Eifel Synclines, Namur Syncline, northern flank of Dinant Syncline, bore hole Münsterland, bore hole Saar 1	Limestones, shales, and sandstones of the near-shore shelf	Shales and limestones	Younger (Matagne Shales), lacking in part (e.g., Münsterland, Saar 1)

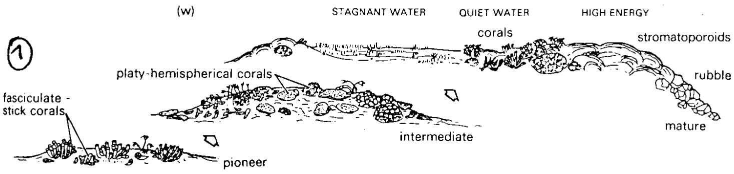


Beispiele für → Tabulata

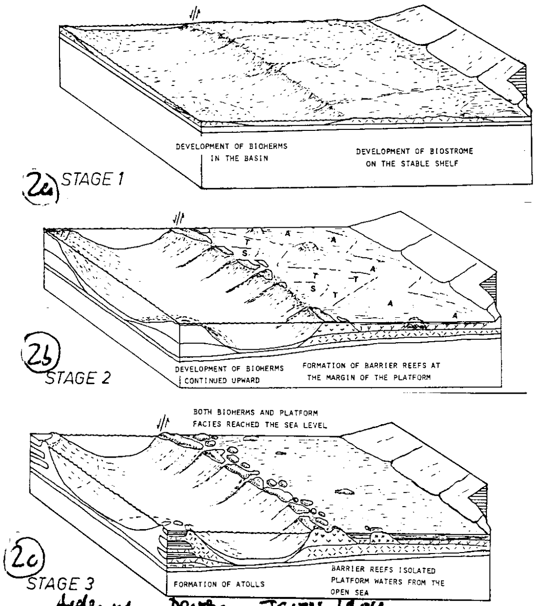
Beispiel für ↑

Riffe (25) Devon (1,2)
Silur (3,4,5)
Ordoviz (6)

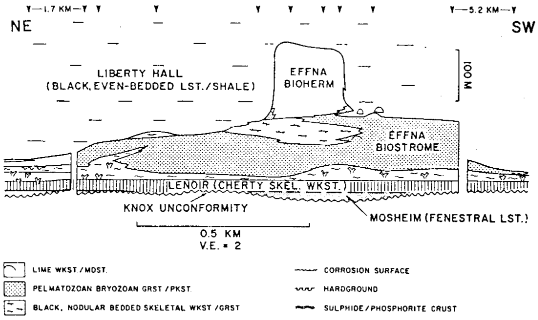
(1)



(w) palaeoecological succession of a Devonian reef, from pioneering to climax stages (based on Copper, 1974). (Mainly redrawn from Hill in '*Treatise*' Part (F), except where indicated)'

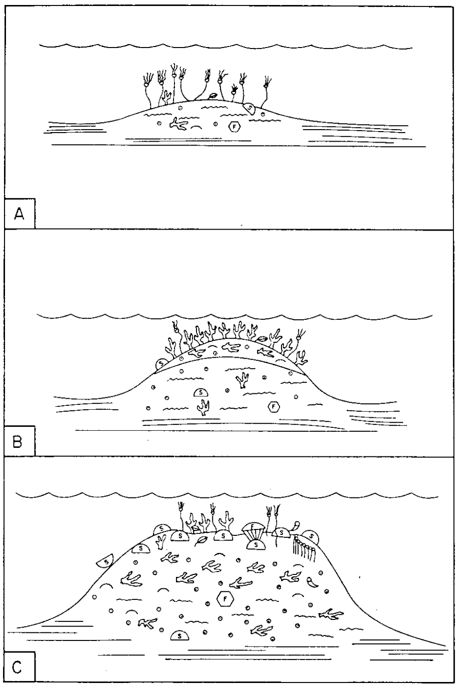


Ardennen, Devon TSIEN 1984



(6) Figure 3 Cross-sections showing facies relations of buildups. Measured sections indicated by arrows. Top: Rockdell shallow ramp buildup. Middle: Catawba downslope buildup. Bottom: Porterfield downslope buildup.

Ordoviz, Virginia Grover & Read 1983



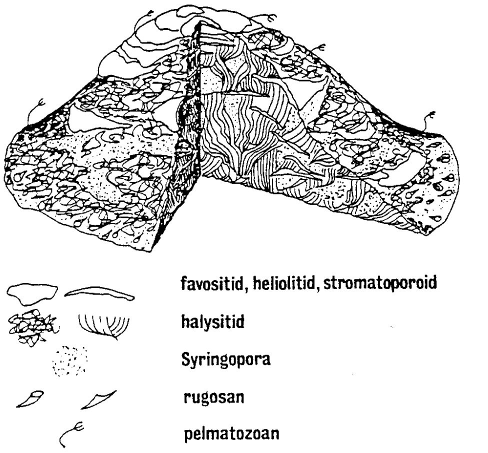


Figure 4 Petit récif dans les Lower Visby beds près de Ireviken. Il s'agit d'une variante du type Axelsro, dominée par des Tabulés, surtou Halysites. D'après NIELD (1982).

(3) Silur, Gotland (Hess 1984)

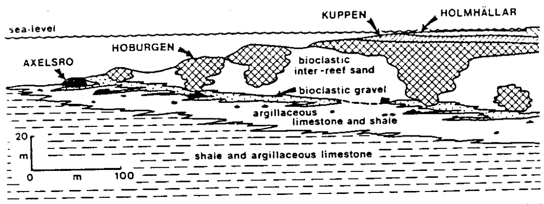
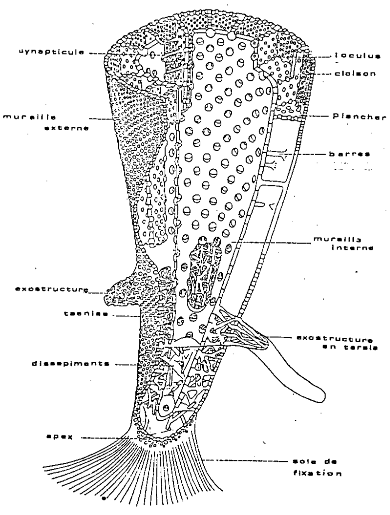


Figure 19 Coupe interprétative de la position des quatre types de récifs reconnus, montrant les relations avec la profondeur d'eau ain: qu'avec le sédiment sous-jacent et adjacent. D'après RIDING (1981).

(4) Silur, Gotland; (Hess 1984)

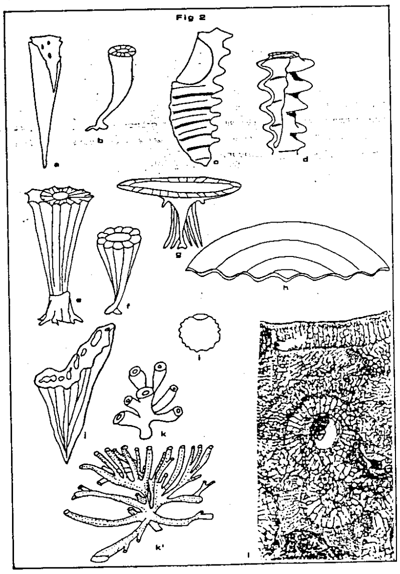
(5) Growth and development of the Wayne 1549 patch reef. A. Initial bank development by the crinoid biofacies. Site is on a topographic high, a relic of the underlying Keefer sand bars. B. Second stage inhabitation by a Cladopora community. The current-baffling nature of these stick corals and other upright organisms leads to upward growth of the bank. Meanwhile, the substrate is continually being altered by addition of skeletal material, becoming coarser and, presumably, firmer. C. Diversification stage is marked by stromatoporoid biofacies. This stage contains the only true framework-builders; faunal diversity is highest. Though in shallow water, the stromatoporoid framestone develops in a quiet environment. [illegible]

Riffe (26) Kambrium (1-3)
Präkambrium (4,5



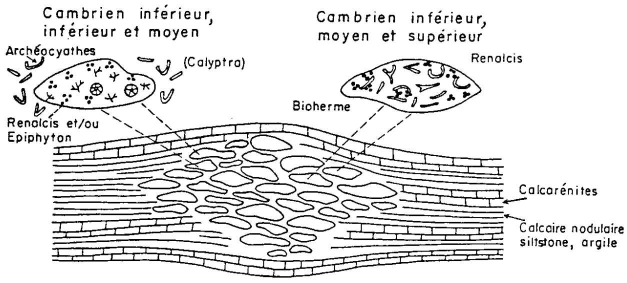
(1)

Archäocyathide Bauplan
(aus Debrenne 1984)



(2)

Morphologie von Archäocyathiden
(aus Debrenne 1984)



(3)

Fig. 1 Evolution des constructions biohermales au Cambrien inférieur (d'après JAMES & DEBRENNE 1980).

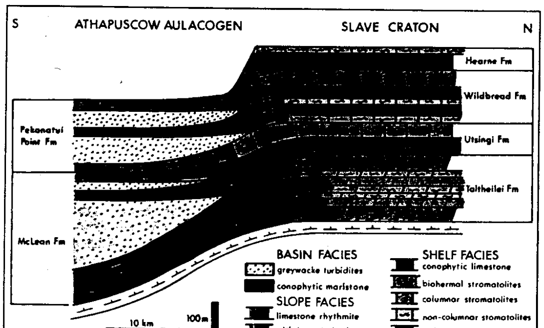
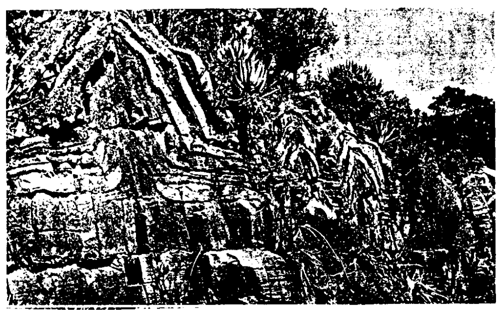


Figure 66—A diagrammatic cross section illustrating facies transitions in the Pethei Group of early Proterozoic age from the Slave craton into the Athapuscow aulacogen (modified from Hoffman, 1974).

(4)

aus James 1983



Stromatolithen aus präkambrischem Transvaal-Dolomit. Domhöhe > 2 m
aus Förster & Wachendorf 1977 (5)