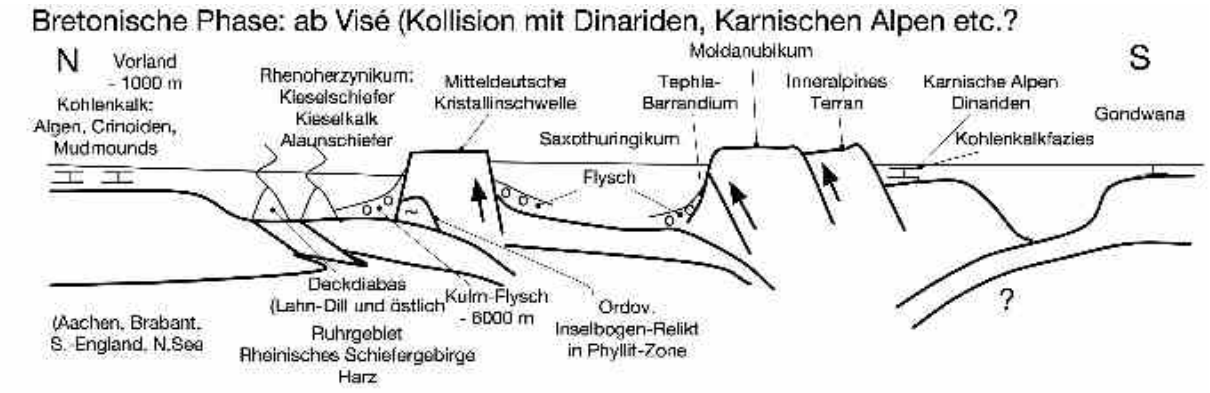
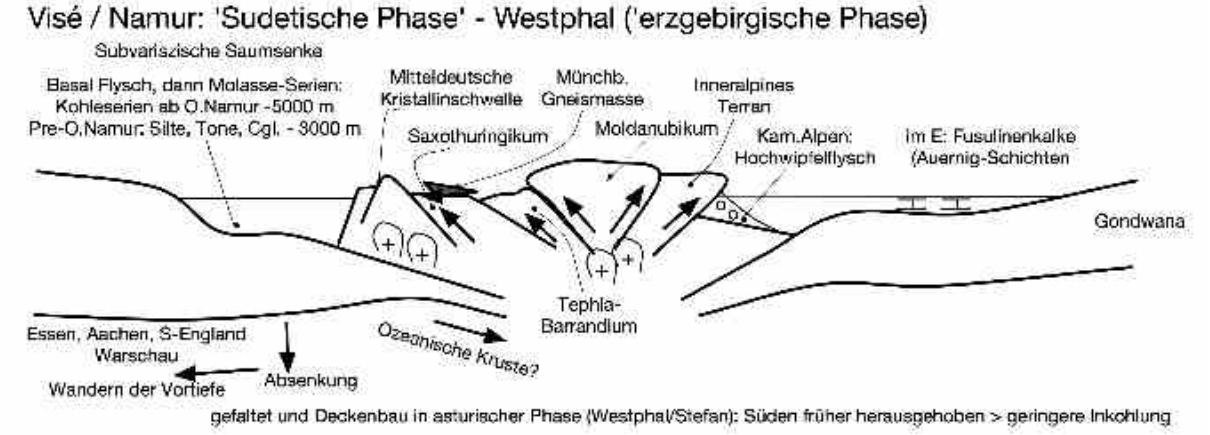
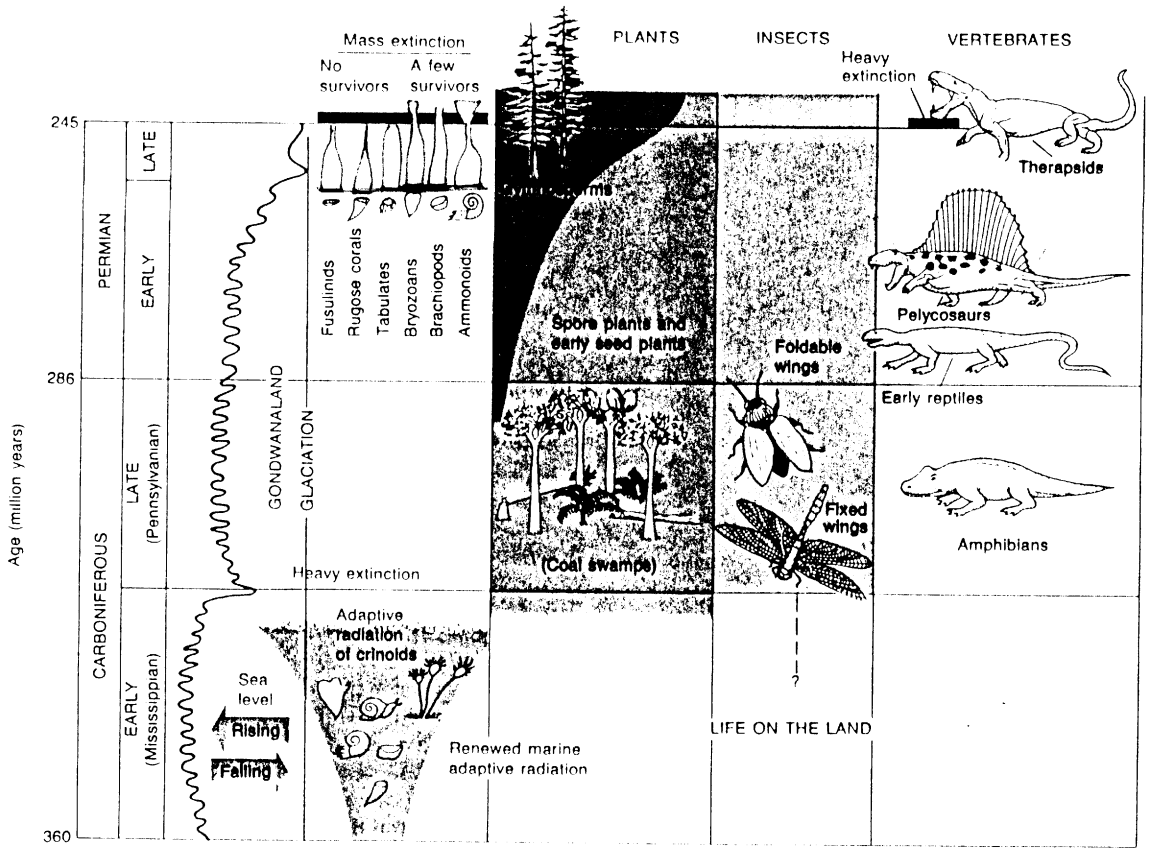
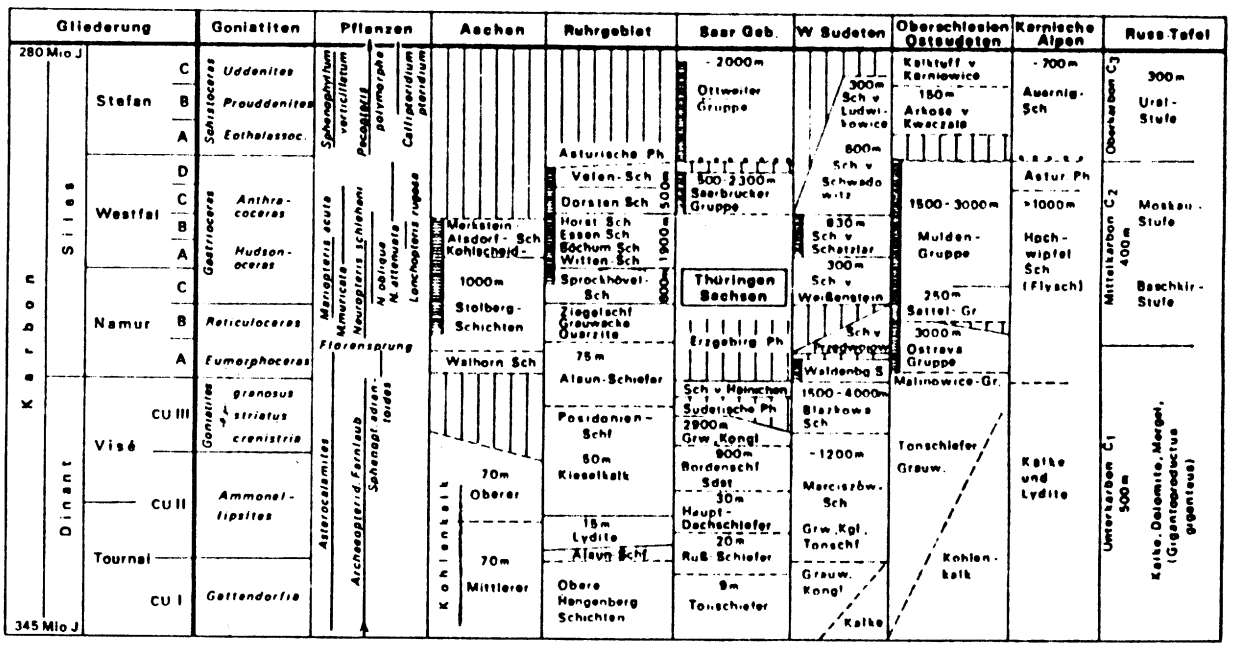
			Internat. Stufen	Nordamerika	
248	Oberes Perm = Thuringium (~Zechstein-Zeit)		Tatarium	Ochoan	
			Kasanium	Guadalupian	
256	Unt. Perm (~Rotliegend-Zeit)	Saxonium O. Rotlieg.	Kungurium	Leonardian	
			Artinskium		
		Autunium U. Rotlieg.	Sakmarium		
			Asselium		Wolfcampian
290	O. Karbon	"O.Karbon"	Stephan A-C	neue internat. Gzelian	Pennsylvanian
				Kasimovian	
		Silesium "O.Karbon"		Moscovian	
		"Mi. Karbon"	Westphal A-D	Bashkirian	
323			Namur A-C	Serpakhovian	
	U. Karbon	Dinant "U.Karbon"	Visé	Visean	Mississippian
354			Tournais	Tournaisian	



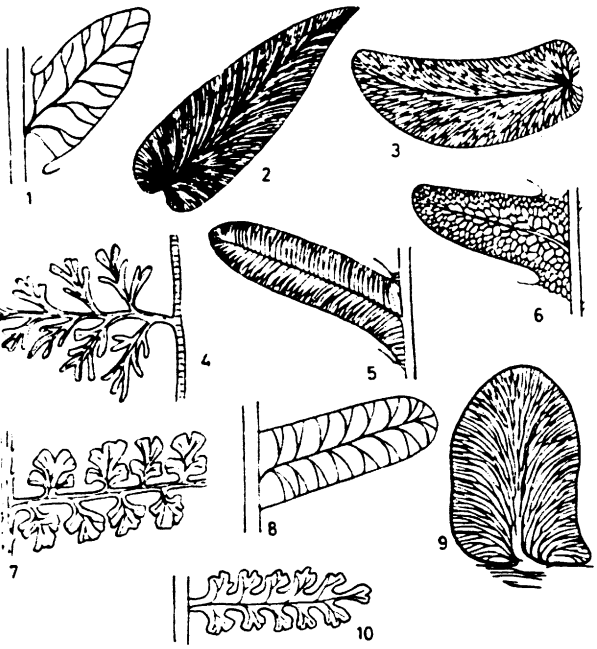


Hist. Geolog. (38) Karbon (Perm): allgemeine Züge, Schichtfolgen





Histor. Geol. (39): Karbon, Tier- u. Pflanzenwelt



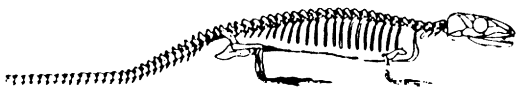
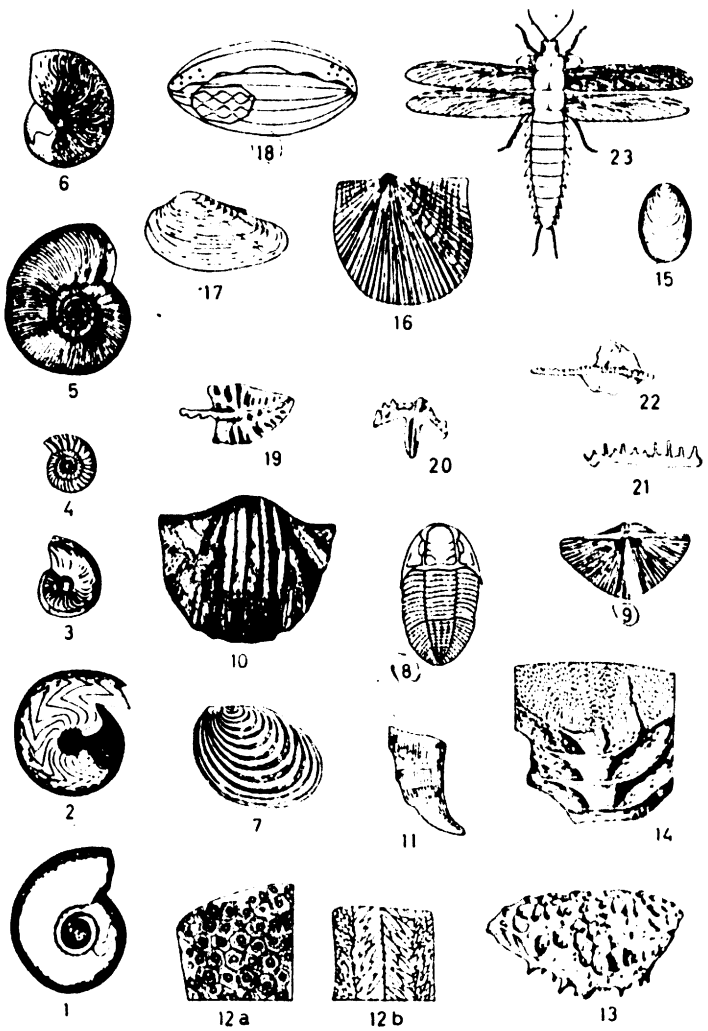
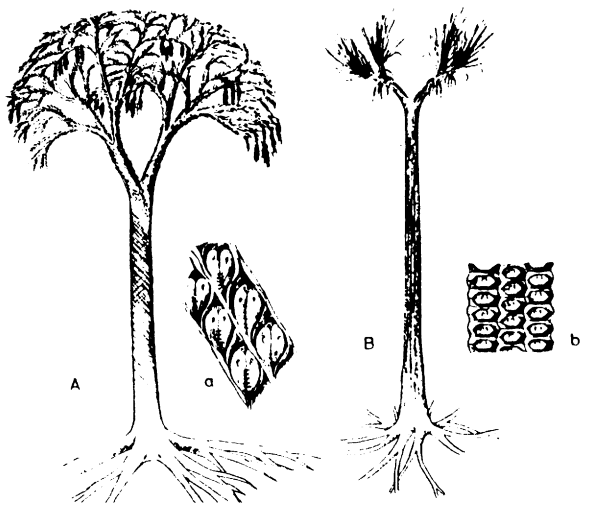


FIGURE 14-22 One of the oldest known reptiles, *Hylonomus*, from the lowest Upper Carboniferous of Nova Scotia. The remains of this animal have been collected from sediments that filled rotted tree stumps. This animal was about 30 centimeters (~1 foot) in length. *(After R. L. Carroll, Jour. Linnean Soc. 15:61–83, 1964.)*

Abb. 37. Blattumrisse und Aderung jungpaläozoischer Pteridophyllen (n. GOTHAN & REMY): Sporen- u. Samenfarne
1. *Pecopteris plumosa* ART., Westfal-Stephan, 2. *Paripteris* [*Neuropteris*] *scheuchzeri* HOFFM., Westf. C–D, 3. *Linopteris neuropteroides* (GUTB.) H. POT., Westfal, 4. *Sphenopteris adiantoides* SCHLOTH., Namur A, 5. *Alethopteris lonchitica* (SCHLOTH.) UNG., Namur B–Westf. D, 6. *Lonchopteris rugosa* BRGT., Westf. A–B, 7. *Sphenopteris hoeninghausi* BRGT., Westf. A, 8. *Pecopteris candolleana* BRGT., Westf.-Rotliegendes, 9. *Imparipteris* [*Neuropteris*] *ovata* HOFFM., Westf. D-Stefan, 10. *Alloiopteris coralloides* GUTB., Westf. A–D.

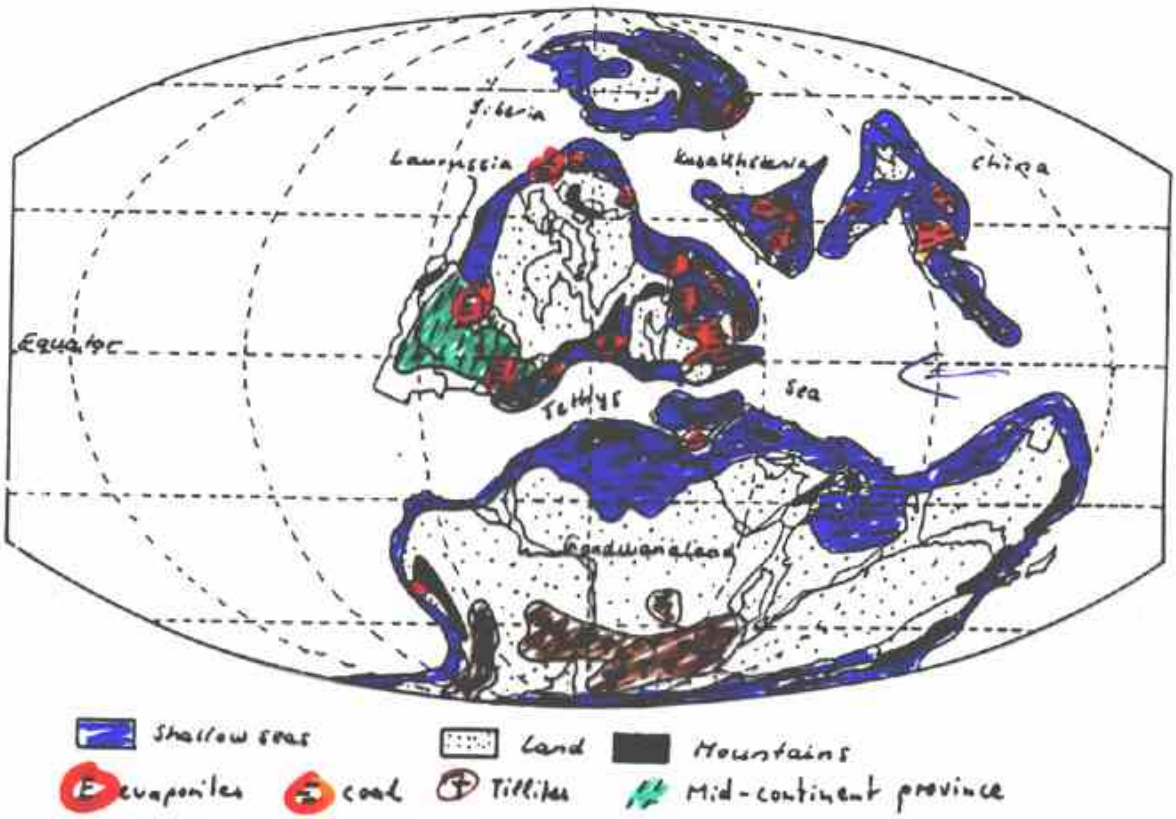




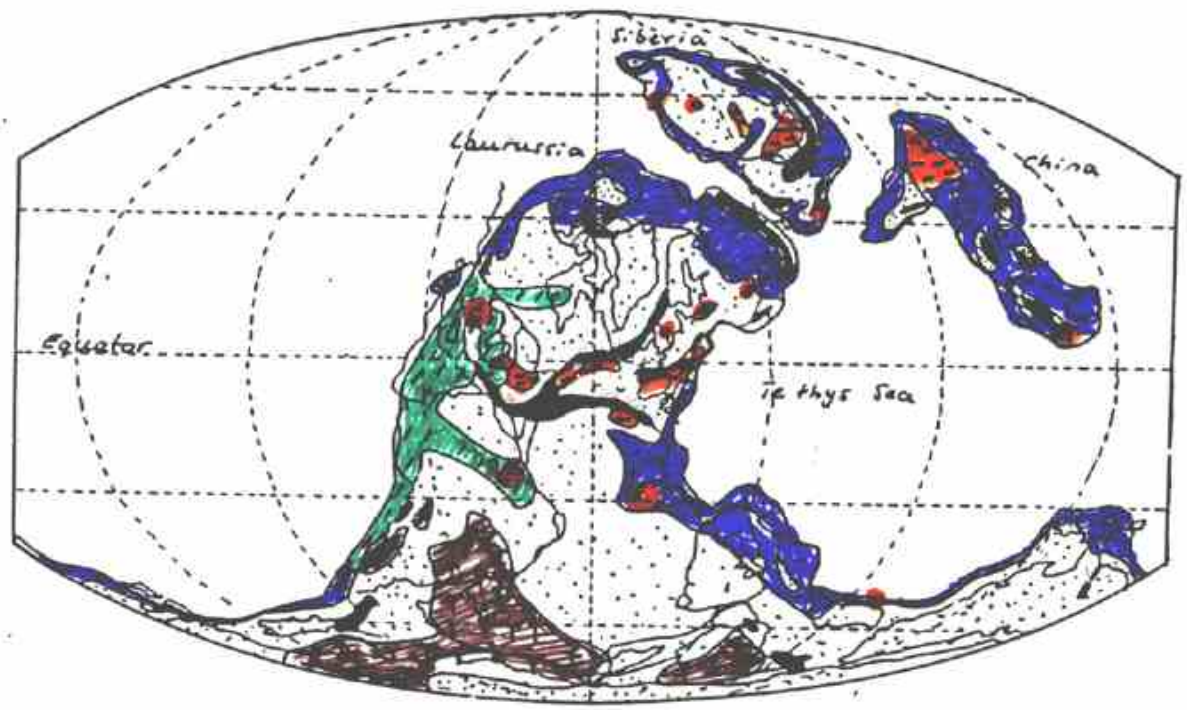
Bärlappbäume: Lepidodendron (A)
Sigillaria (B)

Abb. 38. Fossilien des Karbons. Cephalopoda: 1. *Gattendorfia subinvoluta* MSTR., Tournai, 2. *Goniatites crenistria* (PHILL.), Visé, 3. *Eumorphoceras bisulcatum* GIRTY, Namur A, 4. *Reticuloceras reticulatum* PHILL., Namur B, 5. *Gastrioceras subcrenatum* SCHLOT., Westfal. A, 6. *Anthracoceras aegiranum* H. SCHM., Westfal C.
Lamellibranchiata: 7. *Posidonia becheri* BRONN., 1 : 3.
Trilobita: 8. *Phillipsia gemmulifera* (PHILL.).
Brachiopoda: 9. *Spirifer striatus* MART., 10. *Productus giganteus* SOW., 1 : 4,5.
Anthozoa: 11. *Zaphrentoides konincki* (E. H.), 12. *Lithostrotion portlocki* E. H., 13. *Michelinia favosa* GOLDF.
Bryozoa: 14. *Archimedes wortheni* HALL.
Brachiopoda: 15. *Lingula mytiloides* SOW., × 2,3.
Lamellibranchiata: 16. *Pterinopecten papyraceus* (SOW.), 17. *Carbonicola acuta* SOW.
Foraminifera: 18. *Fusulina cylindrica* FISCH., × 3,5.
Conodonta: 19. *Polygnathus orthoconstricta* THOMAS, × 9, 20. *Scaliognathus anchoralis* BRANSON & MEHL, × 9, 21. *Hindeodella segaformis* BISCHOFF, × 9, 22. *Gnathodus bilineatus* (ROUNDY), × 9.
Insecta: 23. *Stenodictya lobata* BRONGN., 1 : 3,3.

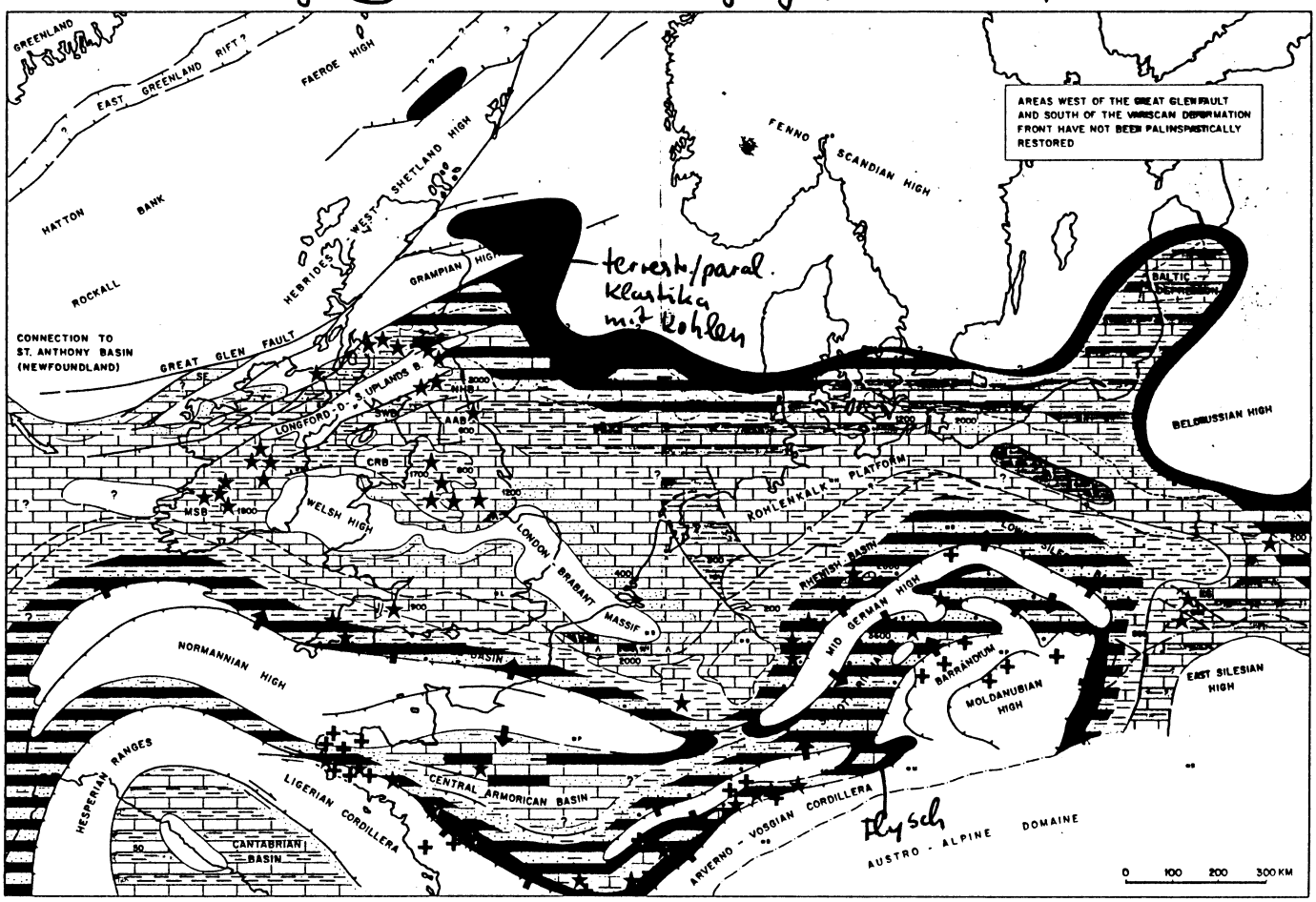
Early
Carboniferous



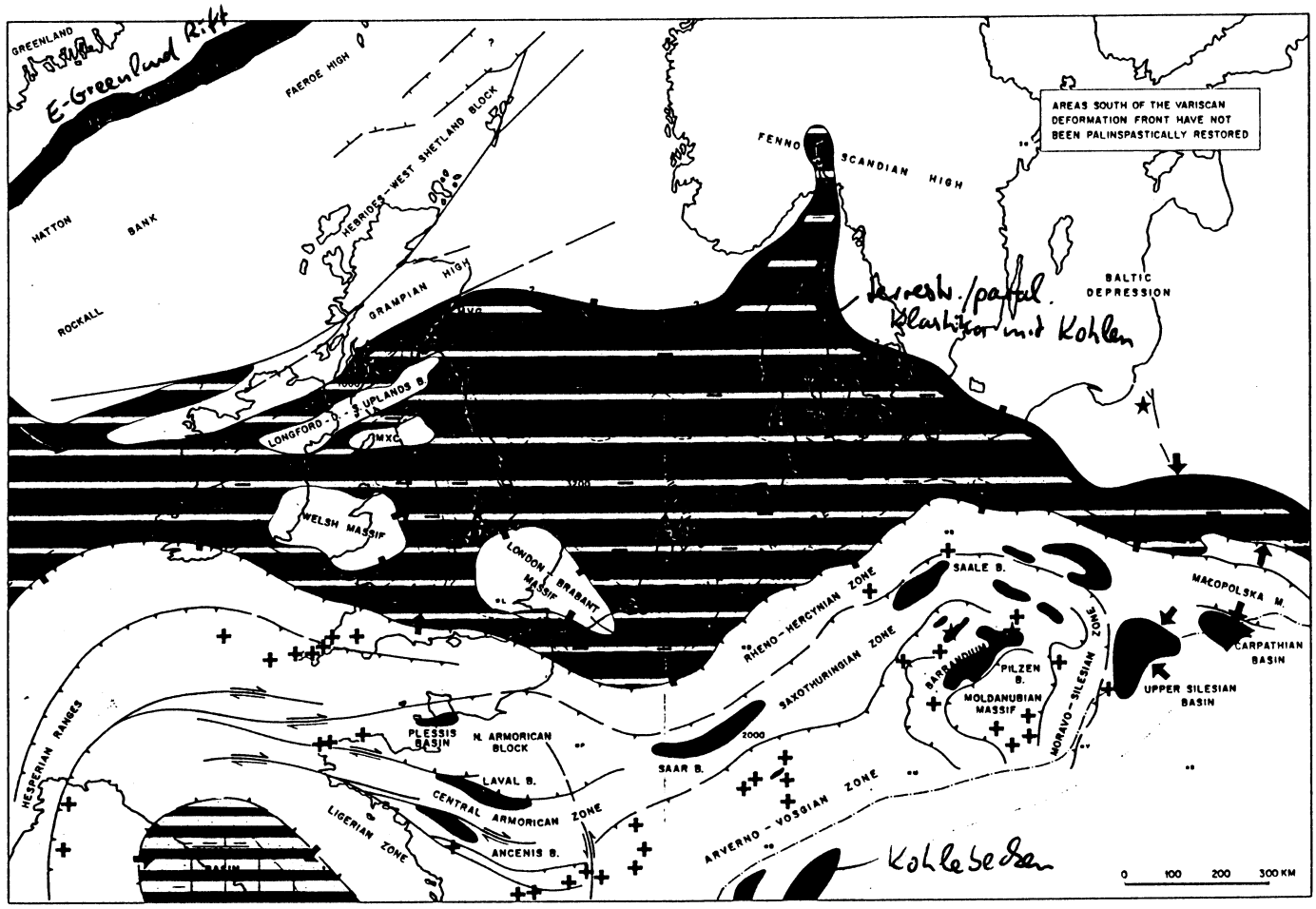
Late Carboniferous



Hist. Geolog. (41) : Karbon. Paläogeographie v. Europa

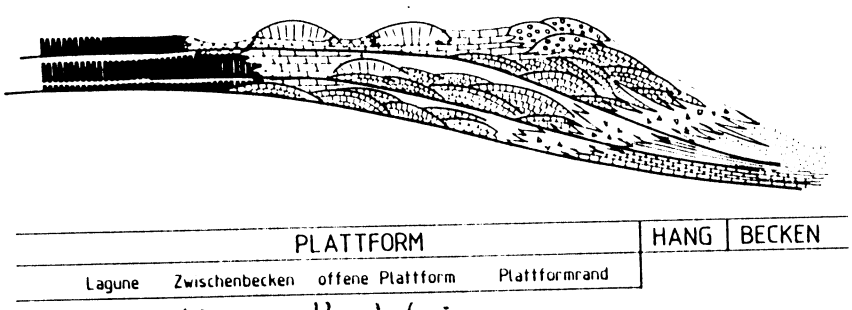


ENCL. 9. DINANTIAN PALAEOGEOGRAPHY. (Main sources: Czerminski and Pajchlowa, 1974; Dvorak et al., 1977; Franke et al., 1978; George et al., 1976; House et al., 1977; Pfeiffer, 1968; Schmidt and Franke, 1975).



ENCL. 11. WESTPHALIAN PALAEOGEOGRAPHY. (Main sources: Autran and Cogné, 1980; Behr, 1978; Bless et al., 1977; Czerminski and Pajchlowa, 1974; IGCP-Project 86 draught maps).

Hist. Geol. (42) : Faziesbeispiele Karbon



Namur Kantabrien

Abb. 8: Faziesmodell der Karbonatplattform der Valdeteja Formation.

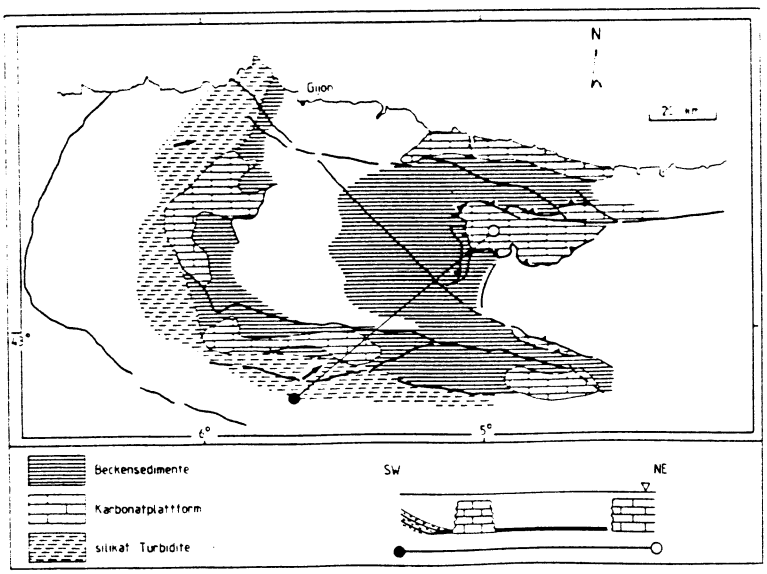
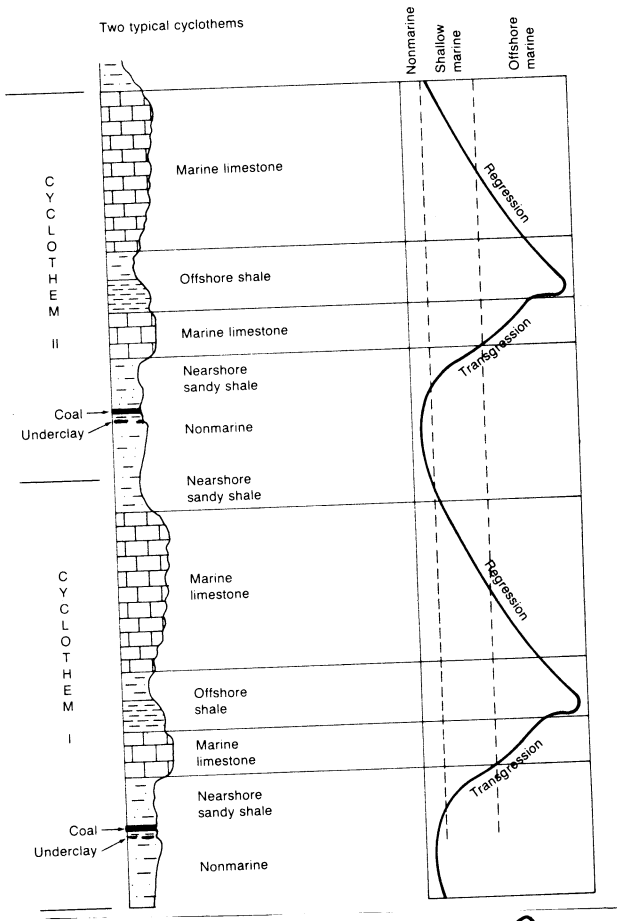
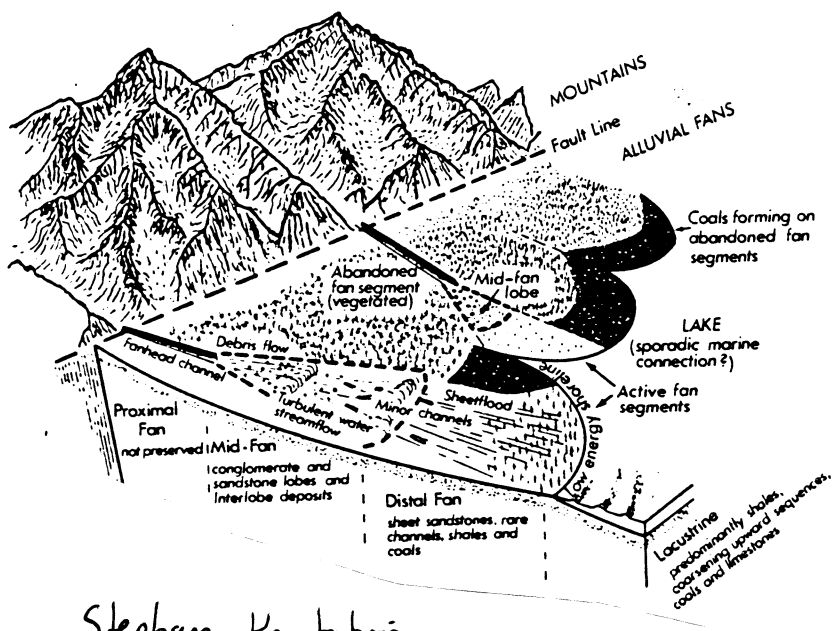


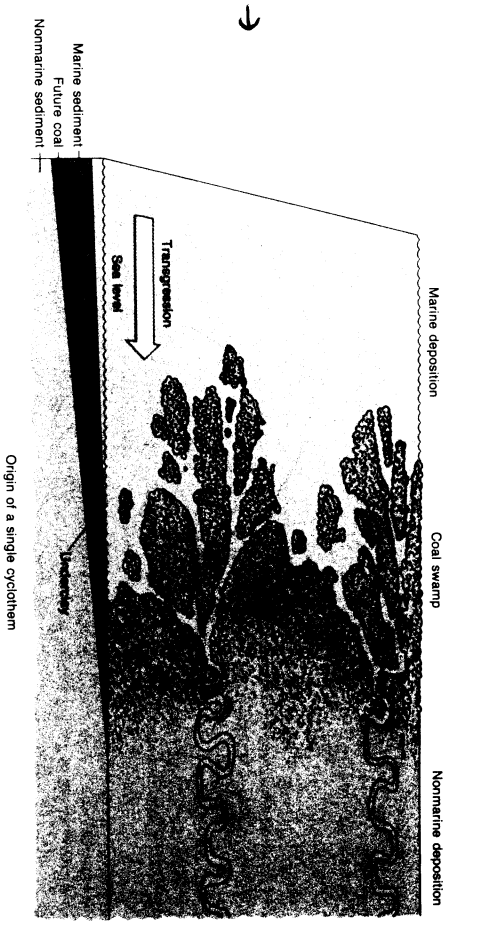
Abb. 7: Fazieskarte des Namur A/B (Top E_2—R_1), Kantabrien
(zusammengestellt nach REUTHER 1977; SJERP 1967; MAAS 1974; DELÉPINE 1943; MARTINEZ DIAZ 1969; EVERS 1967; KOOPMANS 1962; MARTINEZ GARCIA 1981; LYS & SERRE 1958).



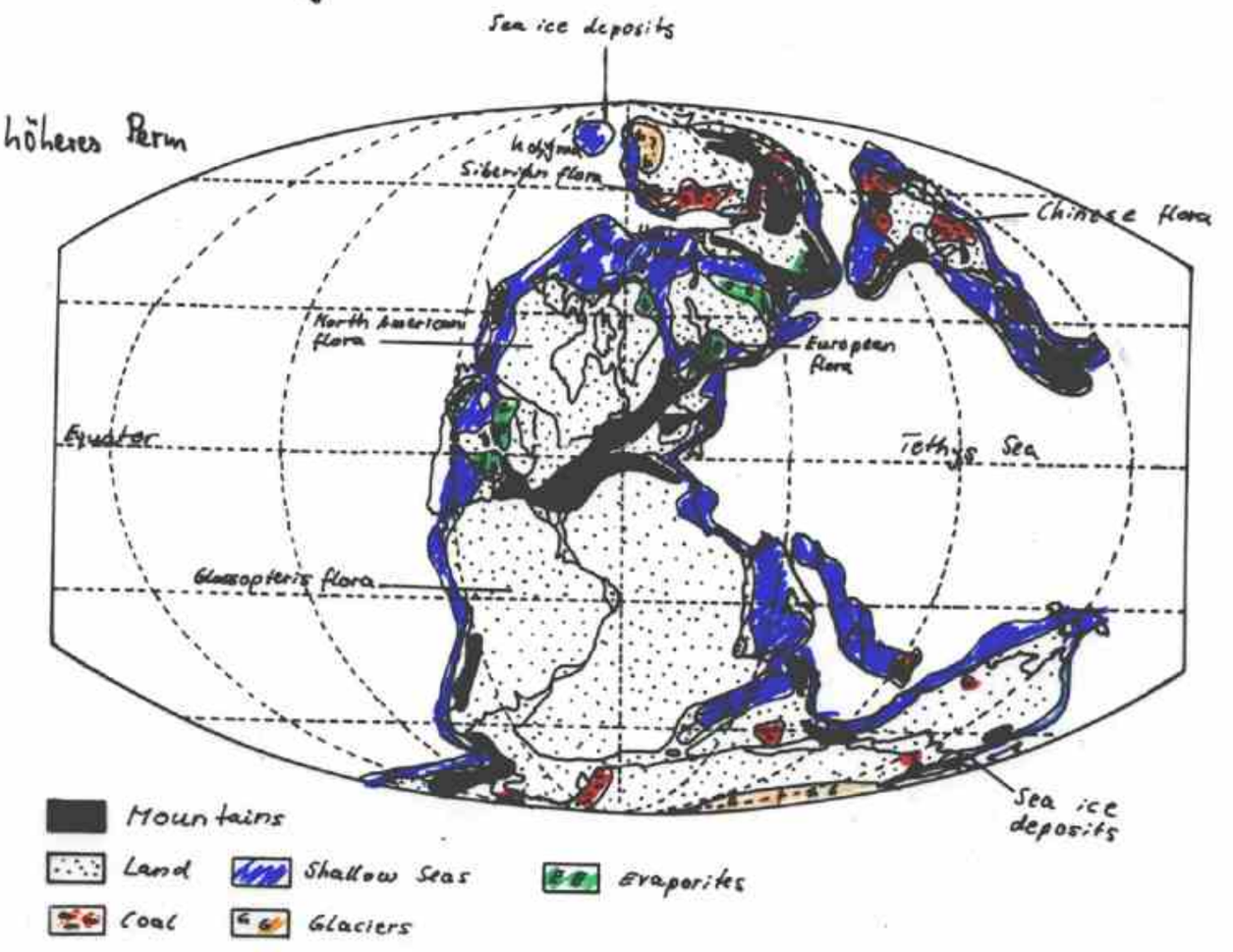
Cyclotheme, O. Karbon, Nordamerika



Stephan, Kantabrien



Historische Geologie: Perm



		Saar-Nahe	Thüringen	Bober-Katzb.-Geb.
230 M.J.				
Ober-Perm	Zechstein	300 m Kreuznach-Gruppe	Mariner Zechstein 1 m Zechst. Kgl.	30 m Schömberg-Schichten
Unter-Perm: Oberes Saxon	*Pseudovoltzia Ullmannia*	250 m Wadern-Gruppe		Sdst. Kgl.
			200 m	
		300 m Grenzlager-Gruppe	Tambach-Schichten	Arkosen
				Stegocephalen-Schiefer
Unteres Rotliegendes	*Lebachia*		Saalische Ph.	
		200 m Tholey-Gruppe	300 m Oberhof-Schichten	Sandstein
Autun		800 m Lebach-Gruppe	250 m Goldlautern-Schichten	Anthracosien-Schiefer
	Callipteris	600 m Kusel-Gruppe	150 m Manebach-Schichten	
			Gehren-Schichten	Arkosen-Konglomerate
280 M.J.				

	Leitfossilien		Östl. Südalpen		Ural-Randsenke
230 M.J. Ober-Perm	*Araxoceras*	*Palaeofusulina*	~200 m Bellerophon-Kalke		400-1000 m Tatar-Stufe
		Codonofusiella			
		Yabeina			
Mittel-Perm		*Neoschwagerina*	~400 m		Kasan-Stufe marin / Belebei-Stufe terr.
	Waagenoceras				20-200 m Ufa-Stufe
			Grodener Sandstein	Sosio-Kalk (Sizilien)	10-700 m Kungur-St.
		Parafusulina			
Unter-Perm	*Perrinites*				10-1000 m Artinsk-St.
		Pseudofusulina	Tarvis-Breccie		
	Propopanoceras		Trogkofel-Kalk		5-500 m Sakmara-St.
		Pseudoschwagerina		Bozener Quarzporphyr	
			Rattendorf-Schichten		10-600 m Assel-St.
	Properrinites				
280 M.J.					

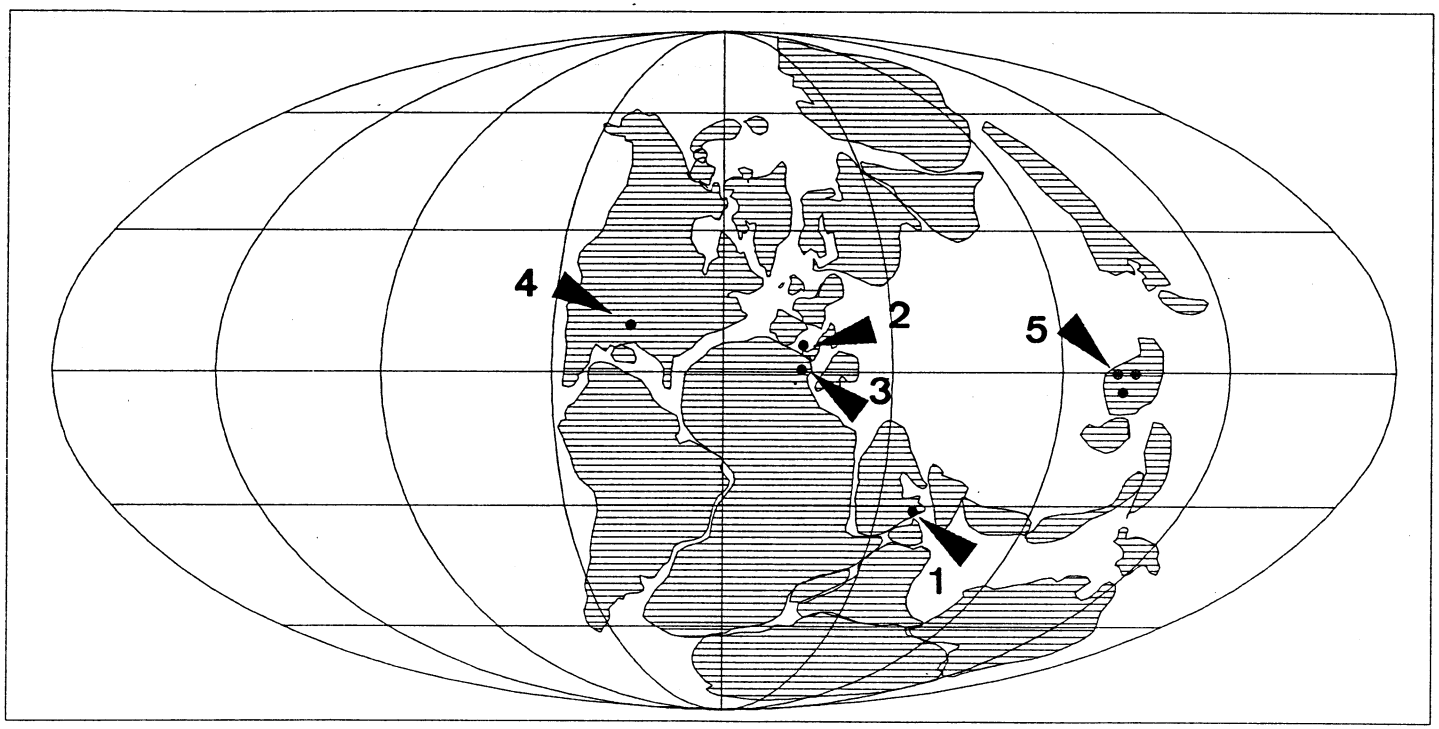
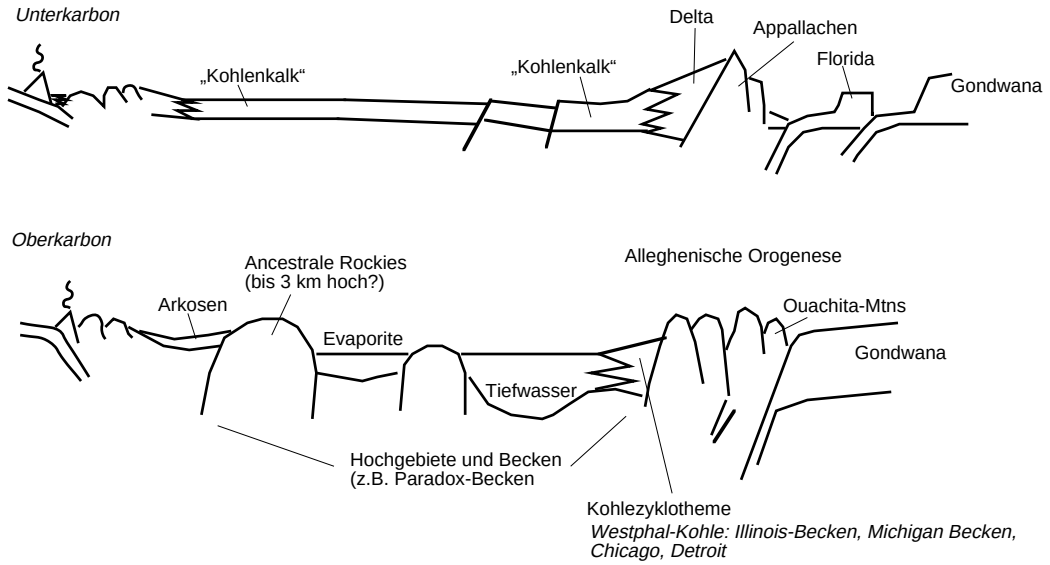


FIGURE *1*—Paleogeographic reconstruction of the Upper Permian showing distribution of major sponge reef locations: *1*, Ba'id area, Sultanate of Oman; *2*, Pietra di Salomone, Sicily (Italy); *3*, Jebel Tebaga, Tunisia; *4*, Guadalupe Mountains (Capitan Reef), Texas/New Mexico, United States; *5*, Hubei and Guangxi Provinces, China. Exotic blocks in the Oman Mountains are the southernmost remains of sponge reefs in the Tethys. Modified after Scotese and McKerrow (1990).

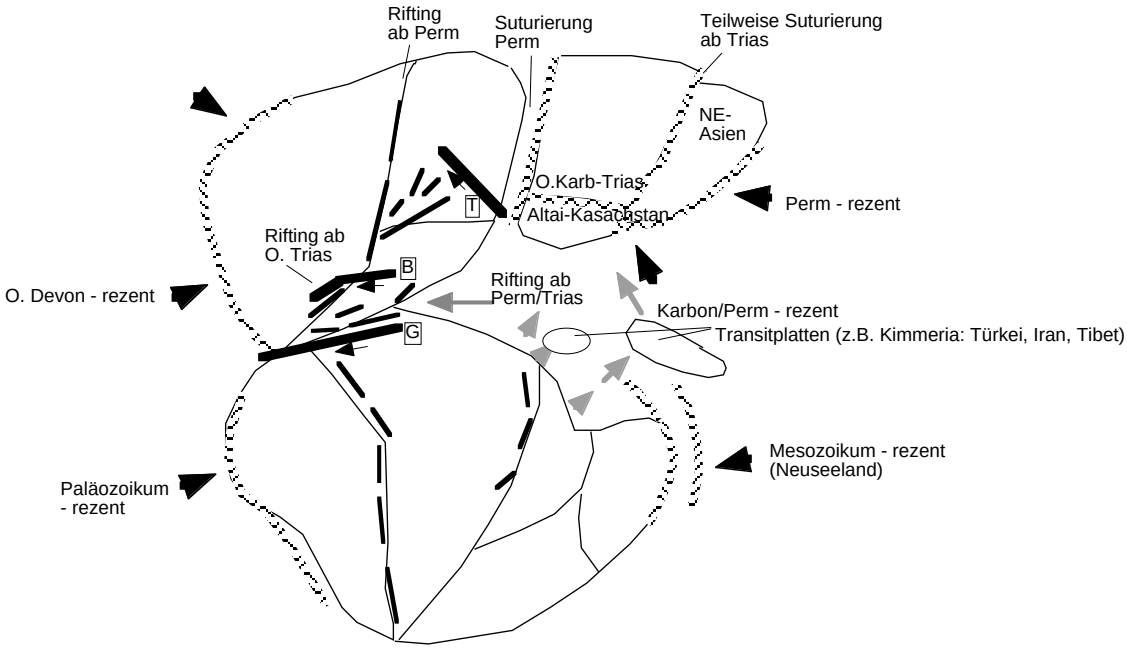
aus Weidlich & Senowbari-Daryan 1996

Nordamerika

W E



Paläogeographische Entwicklung ab Permokarbon sowie Vorschau Mesozoikum



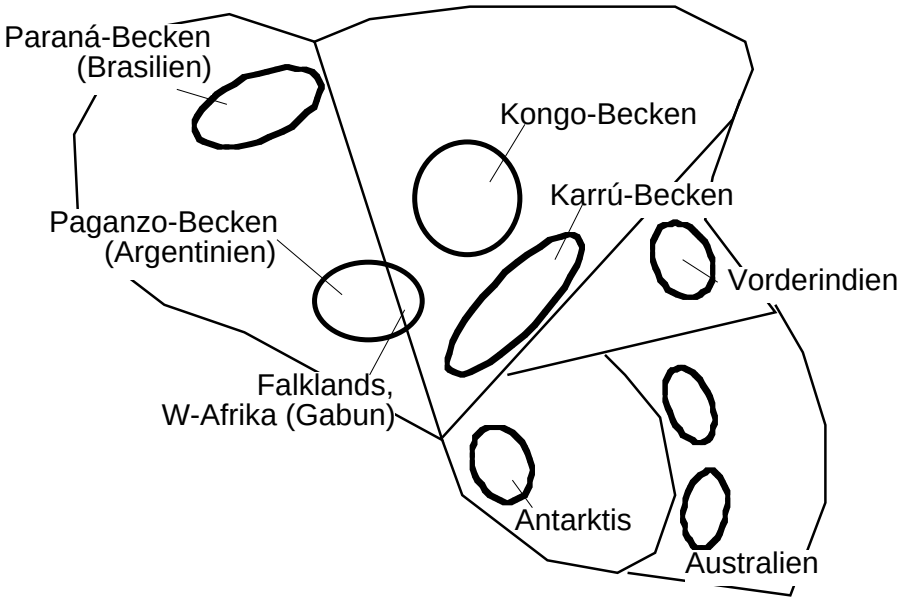
Permokarbon:
Rechtshändige Verschiebungen zwischen Nord- und Süderde (Gibraltar, Biscaya, Tornquist-Fracture Zone)

ab Perm:
* differenziertes Rifting auf Norderde: Atlantikbereich von N nach S fortschreitend, Tethys von E nach W fortschreitend
* Drift: Atlantik: Jura-rezent; westliche Tethys: v.a. Jura
* Rifting Süderde: (Jura), Kreide
* Drift Süderde: Kreide - rezent

Epikontinentale Entwicklung: Norderde v.a. Zechstein bis Kreide; Süderde v.a terrestrische Inlands-Becken Permokarbon bis Jura (z.T. länger)

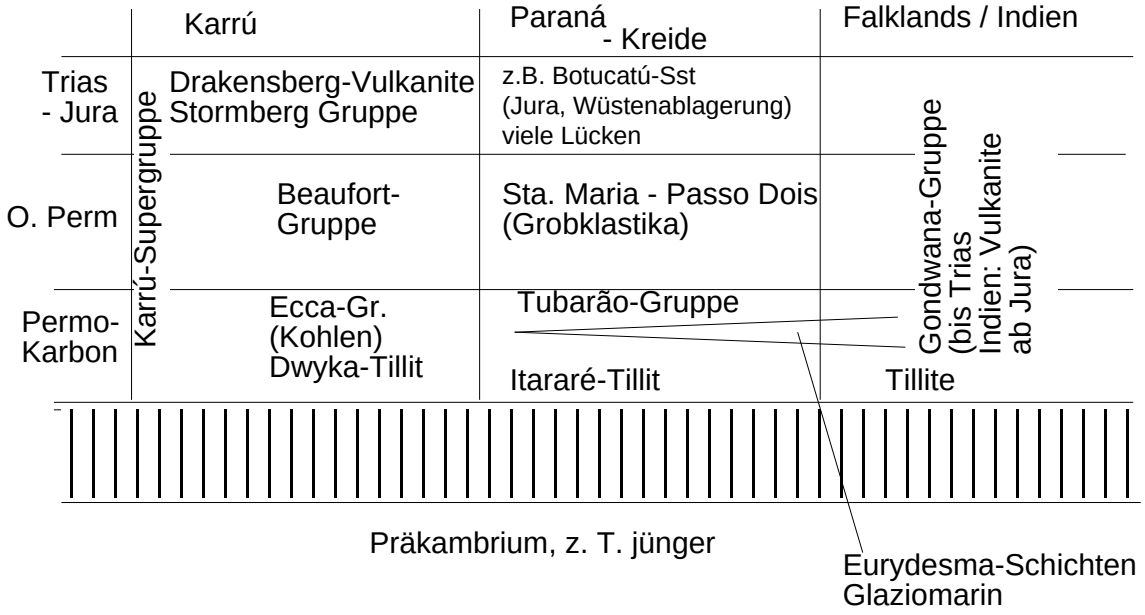
Gondwana-Geologie (v.a. Jungpaläozoikum - Jura)

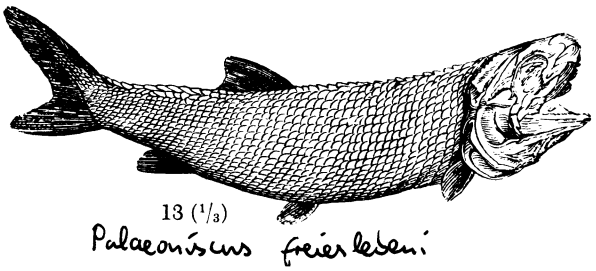
Zusatzblatt zu
Historische Geologie
Karbon, Perm



Situation von Kambrium - Jura (-U.Kreide) ähnlich

* i. allg. nur randlich von Meeren bedeckt
* nur selten marine Vorstöße entlang Trennfugen der späteren Kontinente (v.a. Madagaskar-Straße: Callovium bis Kimmeridgium
* ausgedehnte Inlandeisfelder: O. Ordovizium: Sahara, O.Karbon - Perm: Südafrika, Antarktis, Indien
* weite intrakratonische, terrestrische Becken O.Karbon - Jura (-Kreide), mächtige siliziklastische Serien, z.T. mit Kohlen. Häufige Wirbeltierreste (z.B. Therapsiden)
* ab Trias, v.a. ab Jura Vulkanismus (Indien auch Alttertiär: Dekkan-Trappe)





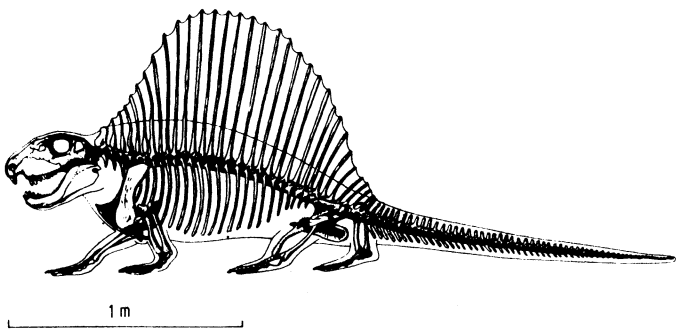


Abb. 46. *Dimetrodon* – Unt. Perm – N-Amerika. Raubechse mit differenziertem Gebiß, große Vorder- und Eckzähne, die den Zähnen der Säugetiere vergleichbar sind. Der etwa 3 m lange Körper war schlank und trug auf dem Rücken eine segelartige Haut, die von den stark verlängerten Dornfortsätzen der Rückenwirbel gestützt wurde (n. A. S. ROMER).

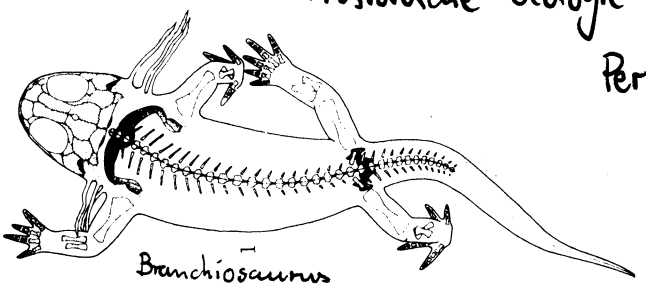
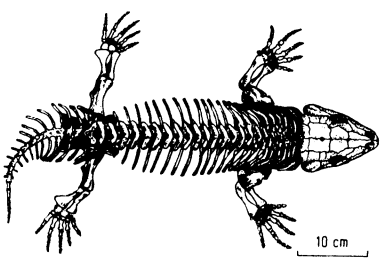


Abb. 45. *Seymouria*. Unt. Perm – Texas – Länge 50 cm. Im Skelettbau sowohl Reptil- als auch Amphibien-Merkmale (n. A. S. ROMER).



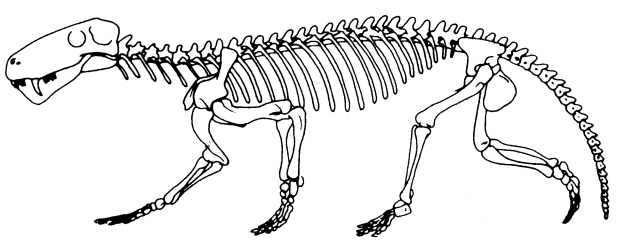
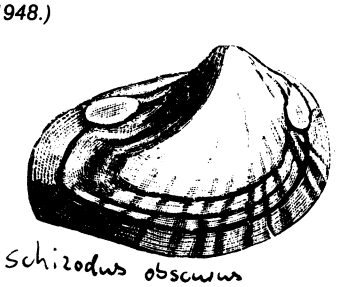
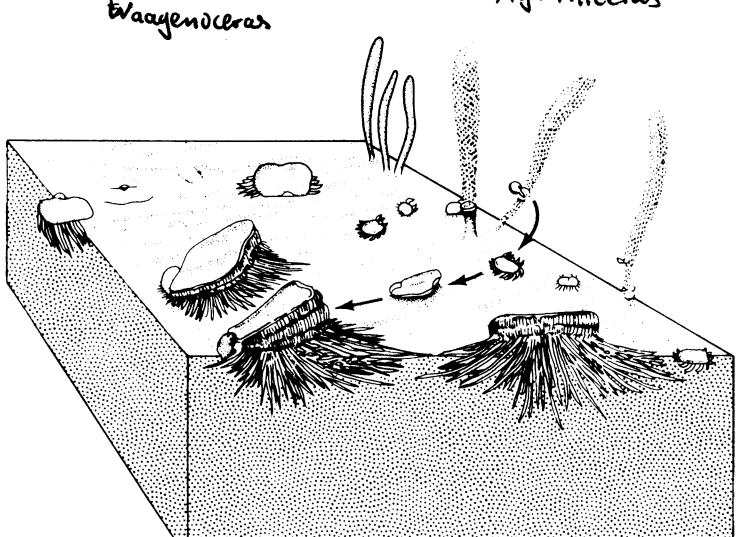
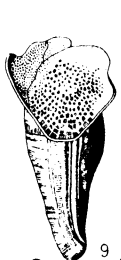


FIGURE 14-28 Skeleton of the therapsid *Lycaenops*, a Late Permian therapsid that was particularly mammal-like. This predator, with its highly differentiated teeth, was about 1.5 meters (~5 feet) long in the posture shown. *(After E. H. Colbert, Amer. Mus. Nat. Hist. Bull. 89:353–404, 1948.)*







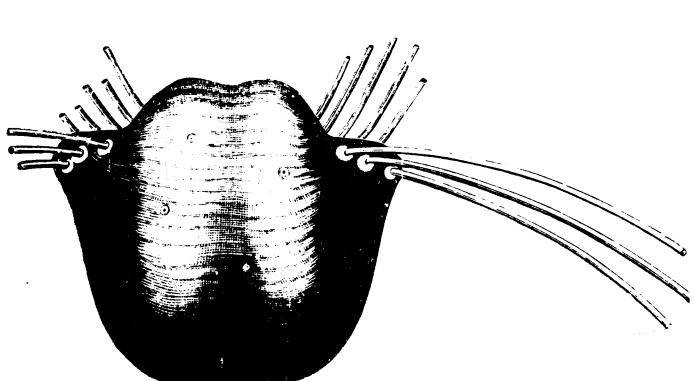
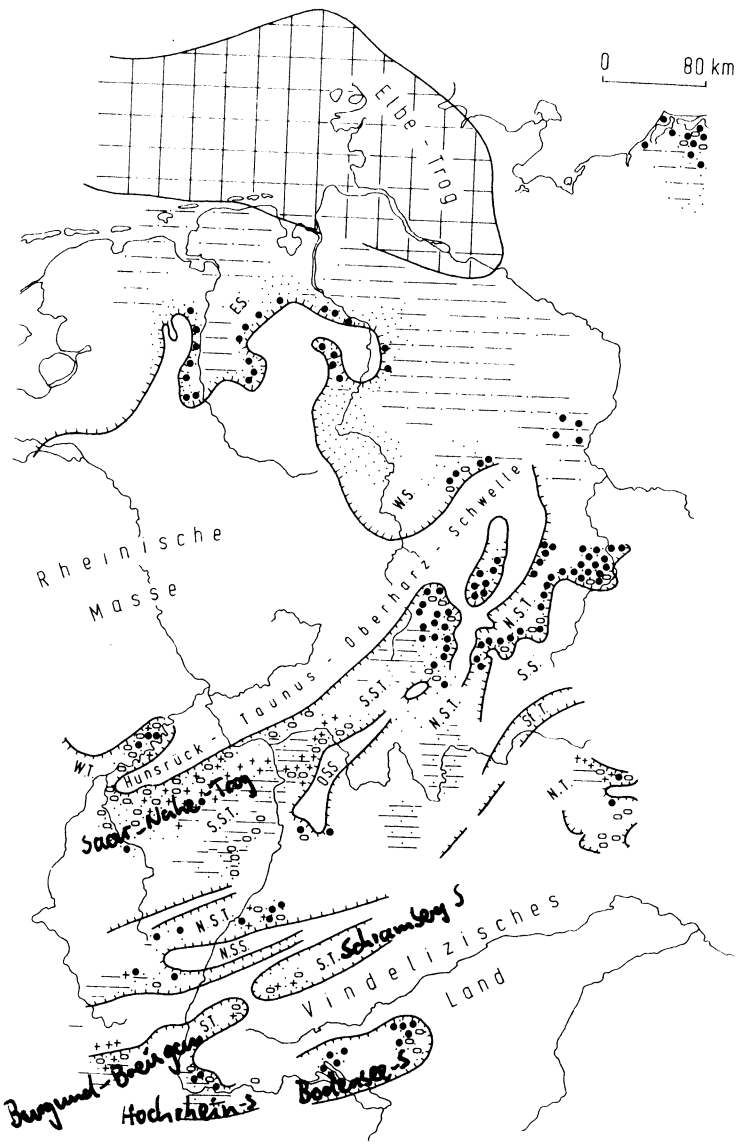


FIGURE 14-2 Modes of life of late Paleozoic spiny brachiopods of the productid group. *A.* Reconstruction showing changes in the life habits of a mud-dwelling species during its lifetime *(arrows)*. The juvenile brachiopods appear to have been attached to stalks of algae by curved spines. Then the algae died, and the small brachiopods came to rest on fine-grained sediment. As the brachiopods grew, their long spines served as "snowshoes," preventing the animals from sinking into the sediment. Thus, the brachiopods could pump water in and out between the two halves of their shells in order to obtain food and oxygen without the danger of being clogged by mud.

Historische Geologie Perm



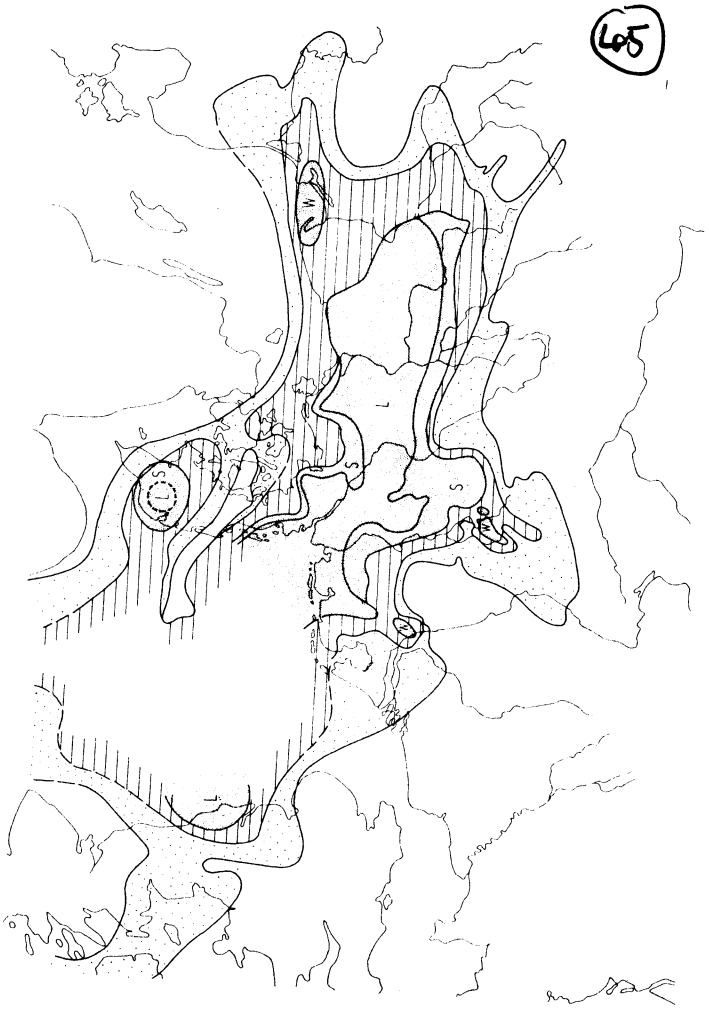


Abb. 49. Paläogeographie und Gesteinsfazies während der Zechsteinzeit in Mitteleuropa (n. HEYBROEK u. a. 1967, SORGENFREI 1969 u. PODEMSKI).

Abb. 48. Die Paläogeographie Westdeutschlands zur Zeit des Oberrotliegenden n. FALKE.
E. S. Ems-Senke; N. S. S. Nordschwarzwald-Schwelle; N. S. T. Nideck-Oos-Saale-Trog; N. T. Naab-Trog; O. S. S. Odenwald-Spessart-Schwelle; S. S. Schwarzburger Schwelle; S. S. T. Saar-Selke-Trog; S. T. Schramberger Trog; St. T. Stockheimer Trog; W. S. Weser-Senke; W. T. Wittlicher Trog.

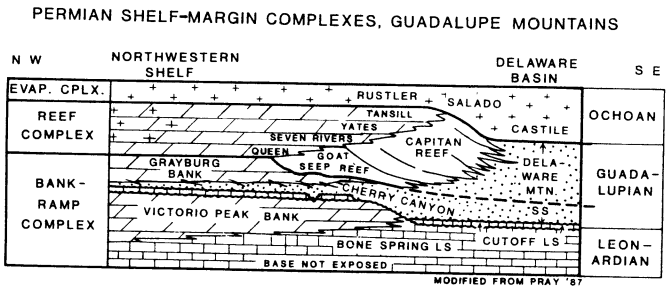


FIG. 2.—Schematic cross section (location shown on Fig. 1) of major Permian stratal complexes, their principal rock units, and erosion surfaces (wavy lines) of the Guadalupe Mountains at the Northwestern Shelf-Delaware Basin transition area. Major erosion surface truncating Grayburg Formation separates bank-ramp style of sedimentation of earlier Permian shelf margins from later reef style of shelf margin sedimentation.

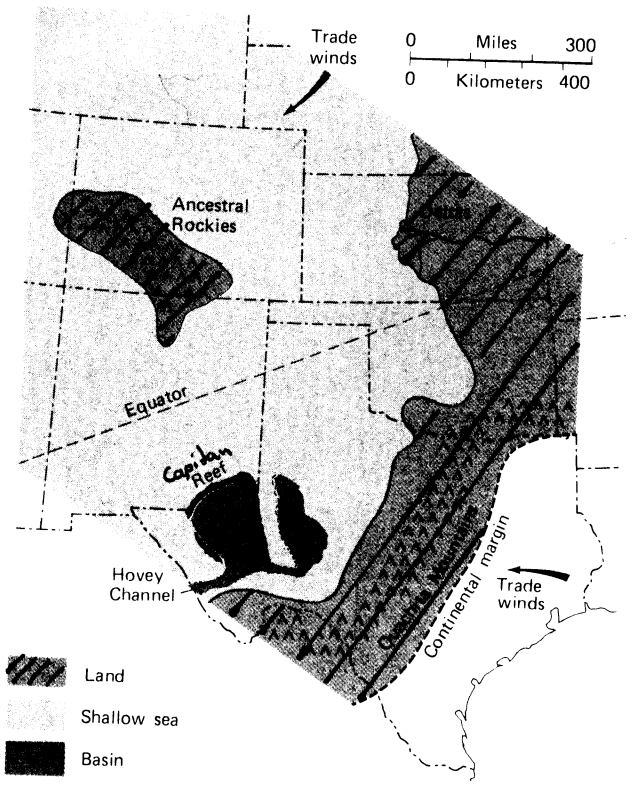


FIGURE 14-52 Paleogeography of Texas and neighboring regions when reefs encircled the Delaware Basin in Late Permian time. During this interval, a narrow passageway (Hovey Channel) connected the Delaware Basin with the open ocean to the west, but the Midland Basin was eventually filled with sediment.

Zusatzblatt zur Historischen Geologie

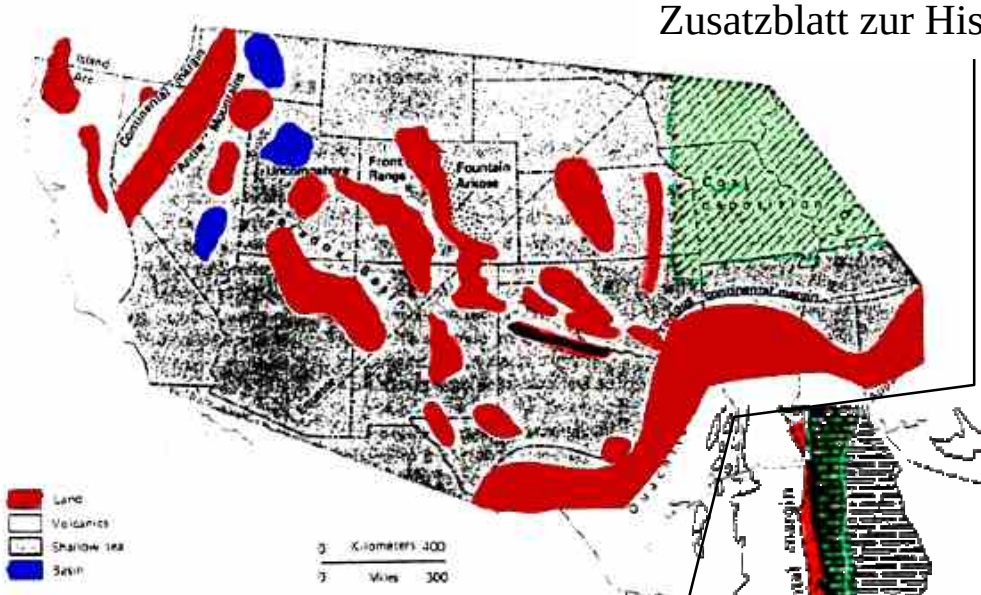
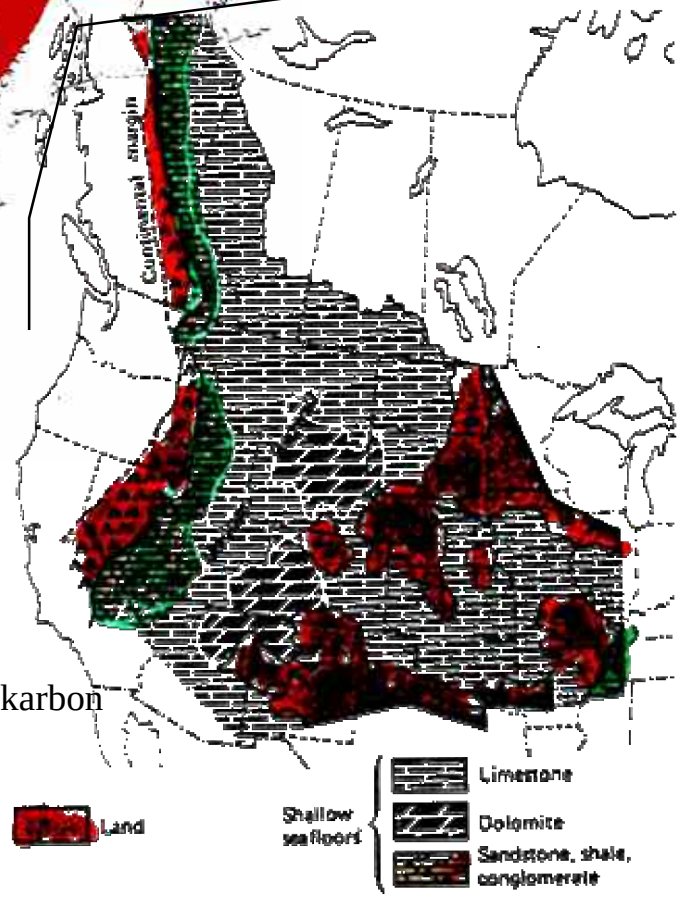
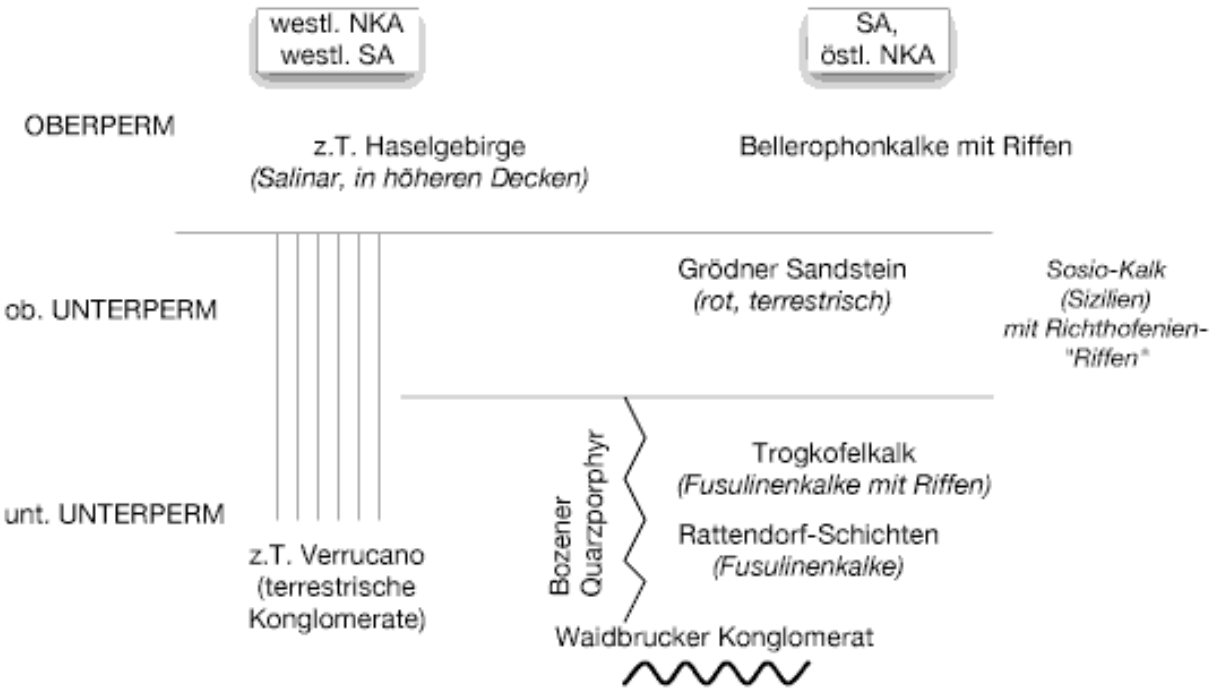


FIGURE 14-45 Paleogeography of the southwestern United States during Late Carboniferous (Pennsylvanian) time. Part way through the Late Carboniferous interval, Hercynide deformation formed the early Ouachita Mountains at the southern end of the Appalachians. Most of this deformation occurred offshore, uplifting oceanic sediments and welding them onto the previous continental margin. Coal-bearing cyclotherms formed in marginal marine environments in the midcontinent region. To the west, shallow seas covered most of the craton, but many uplifts and basins developed from Texas to eastern Nevada, apparently in association with the Ouachita orogeny. The highest uplifts, the Front Range and the Uncompahgre, are together known as the Ancestral Rocky Mountains. Farther west, mountains produced by the earlier Antler orogeny still bordered the continent, and an island arc now lay along a subduction zone offshore in what is now California and Oregon.

Aus Stanley

mi. Unterkarbon





Zusatzblatt zur Historischen Geologie

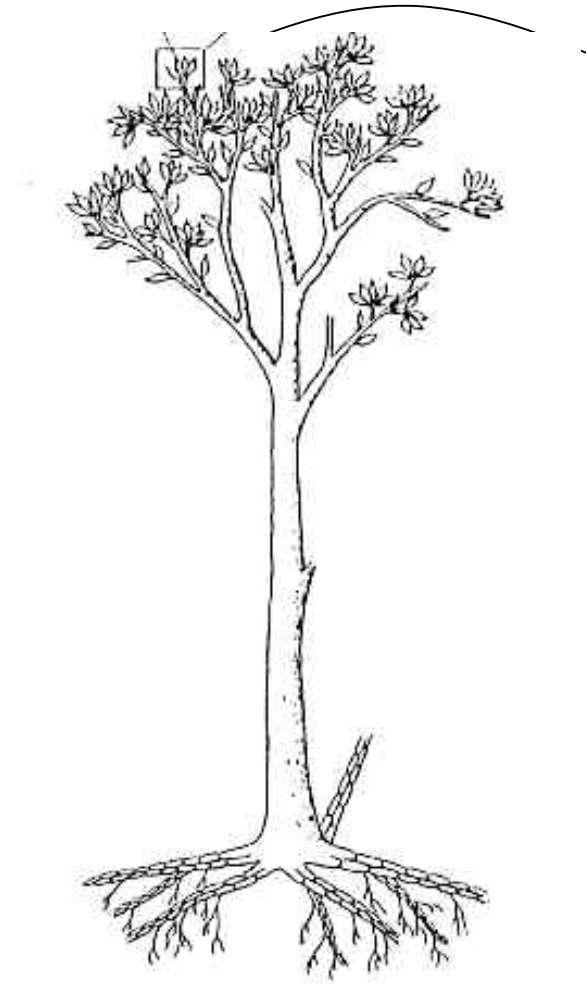
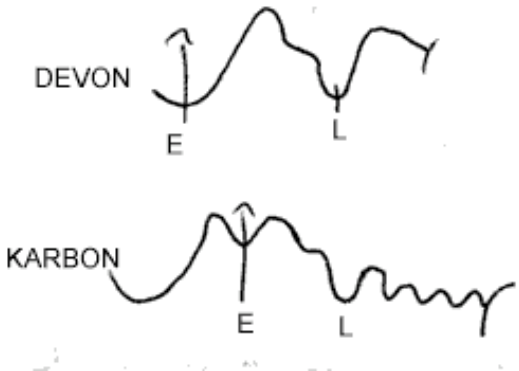
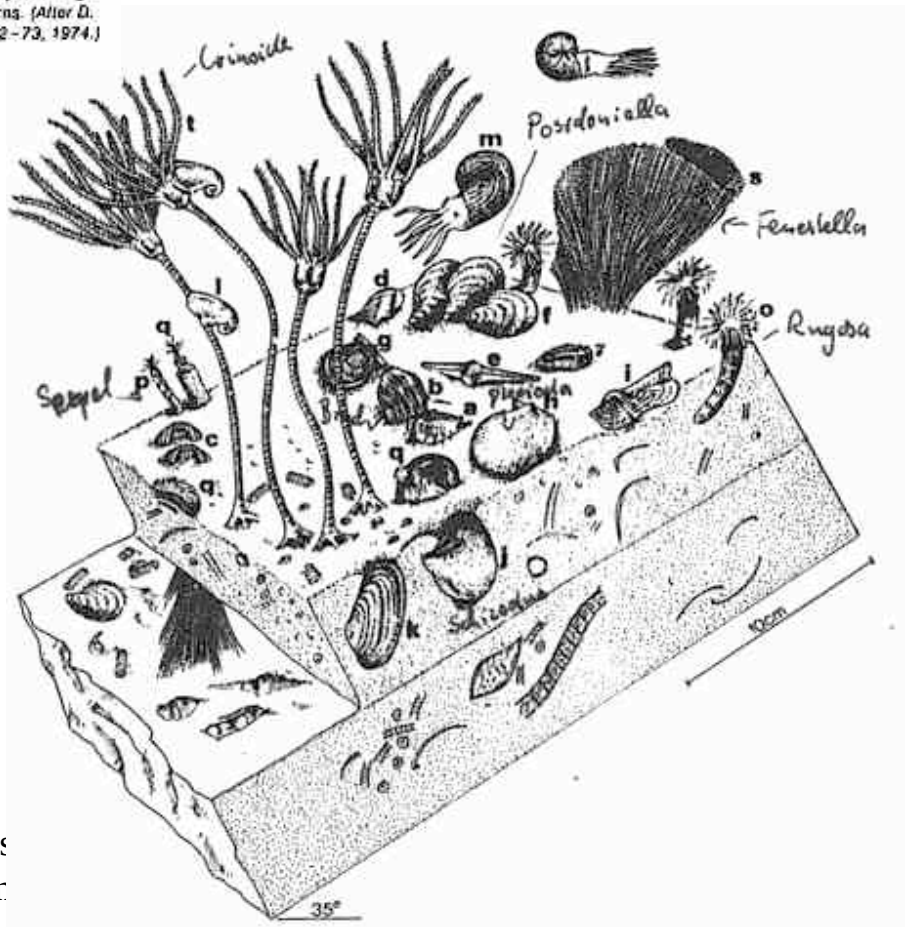


FIGURE 14-13 The famous Gondwanaland seed fern *Glossopteris*. The name means "tongue leaf," and the tongue-shaped leaves, which are sometimes found preserved in the clusters in which they grow, were positioned at the top of a large trunk. This is one of many treelike genera of seed ferns. (*After D. D. Pant and R. S. Singh, Palaeontographica 147[B]:42–73, 1974.*)

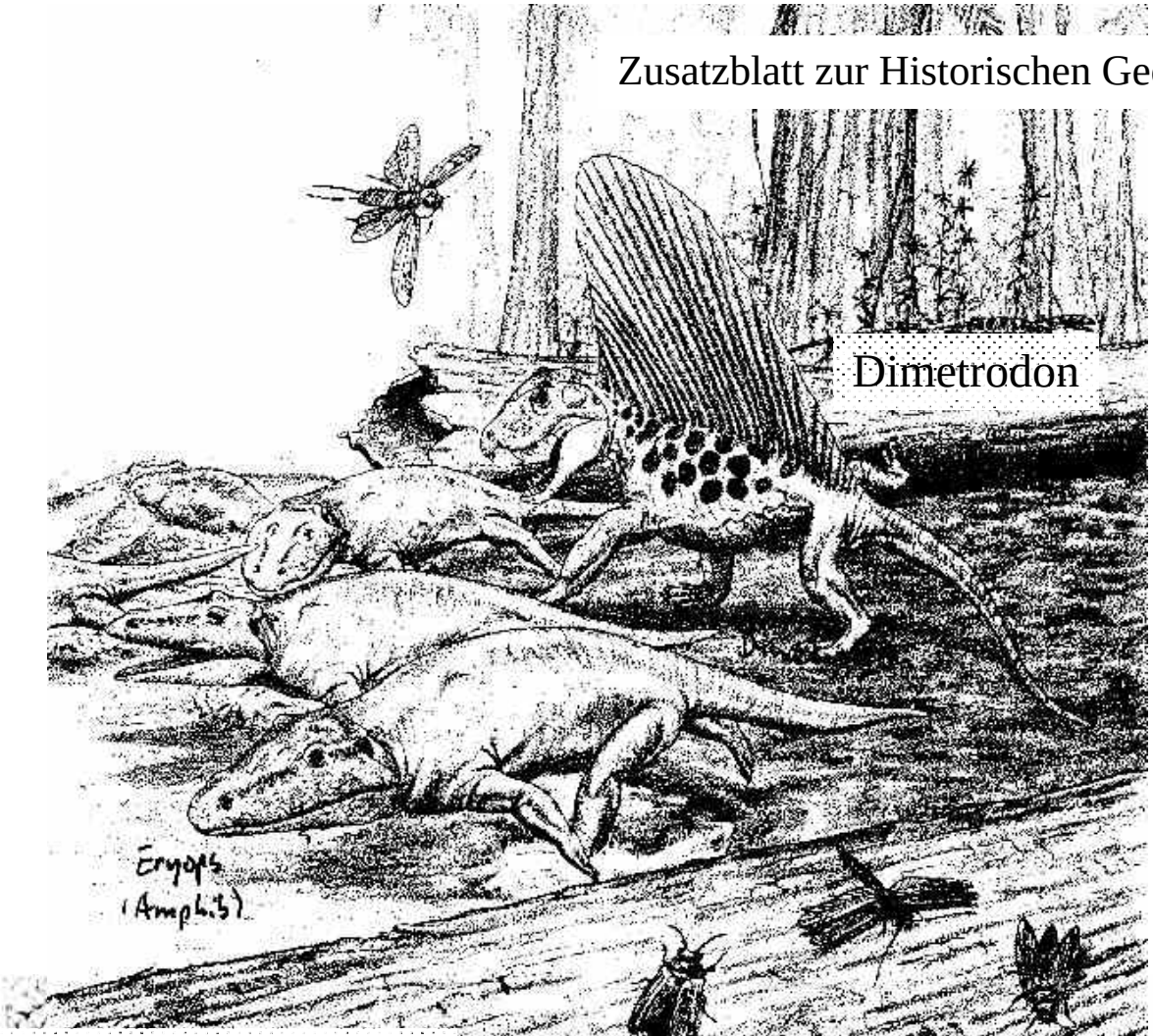


Lobenlinien-Trends bei Ammoniten

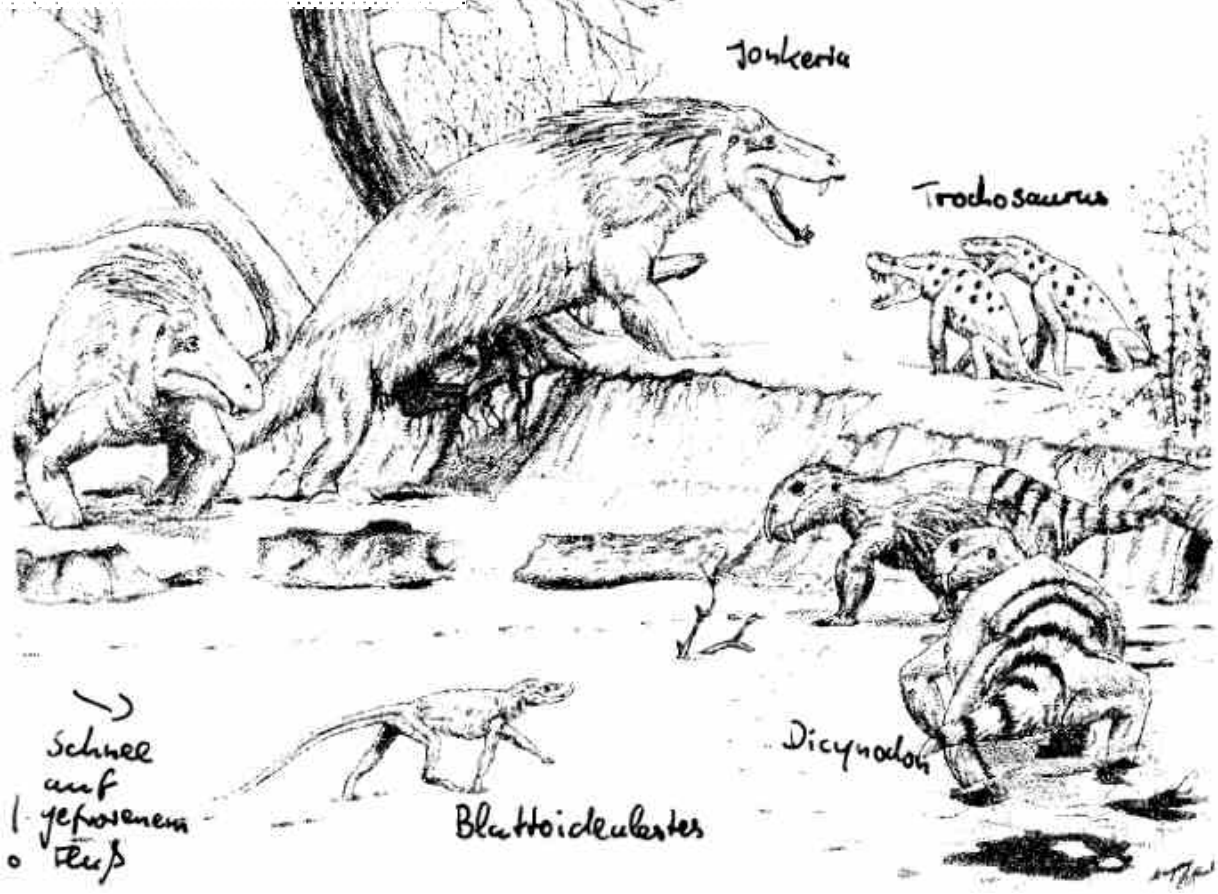


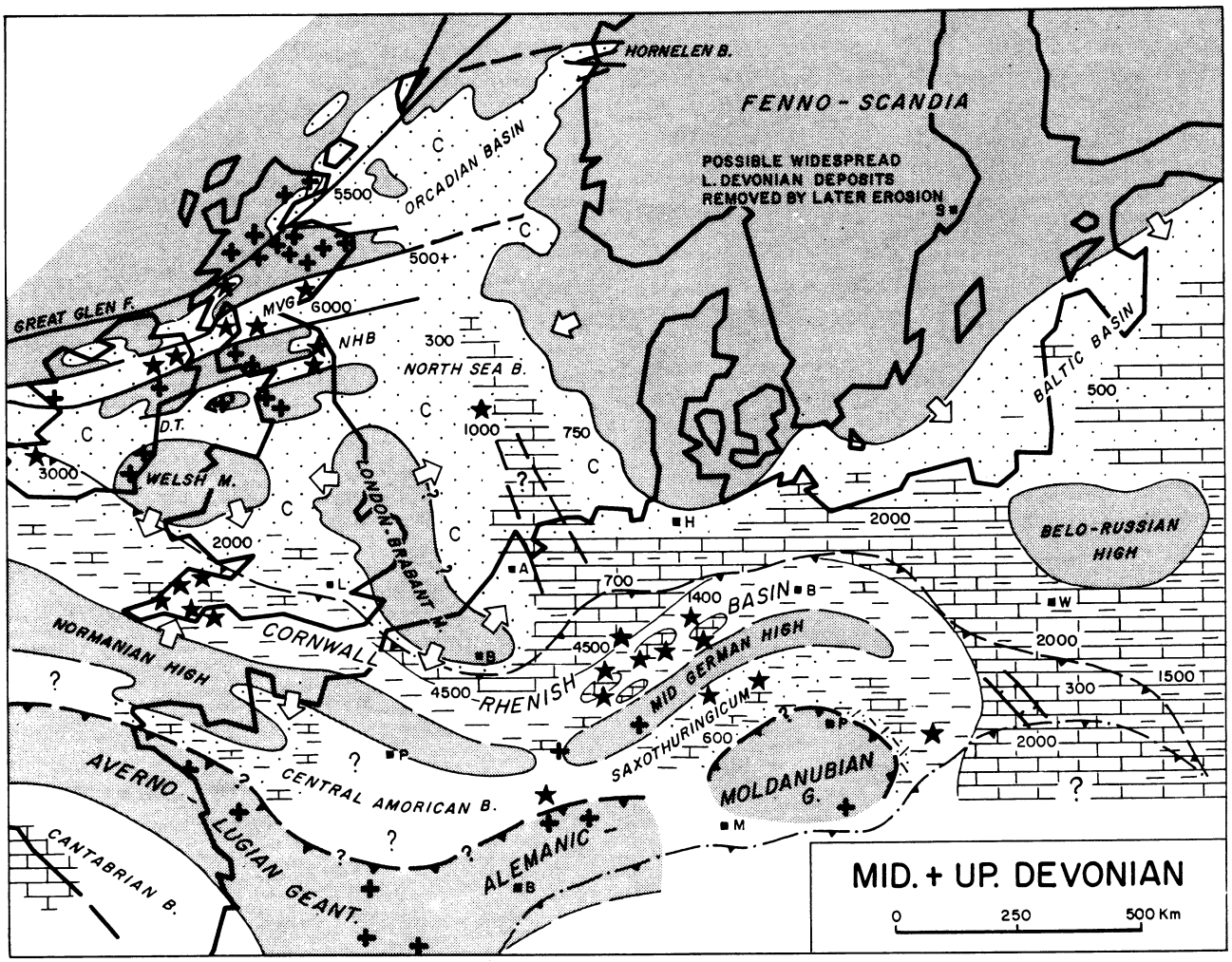
Mollusken-Crinoiden-Gemeins
Am Fuss von Karbon-riffmour
(aus McKerrrow)

Zusatzblatt zur Historischen Geologie



oben:Unterperm-Rekonstruktion
unten: Oberperm v. Südafrika
(aus Stanley)





LEGEND TO PALEOGEOGRAPHIC MAPS

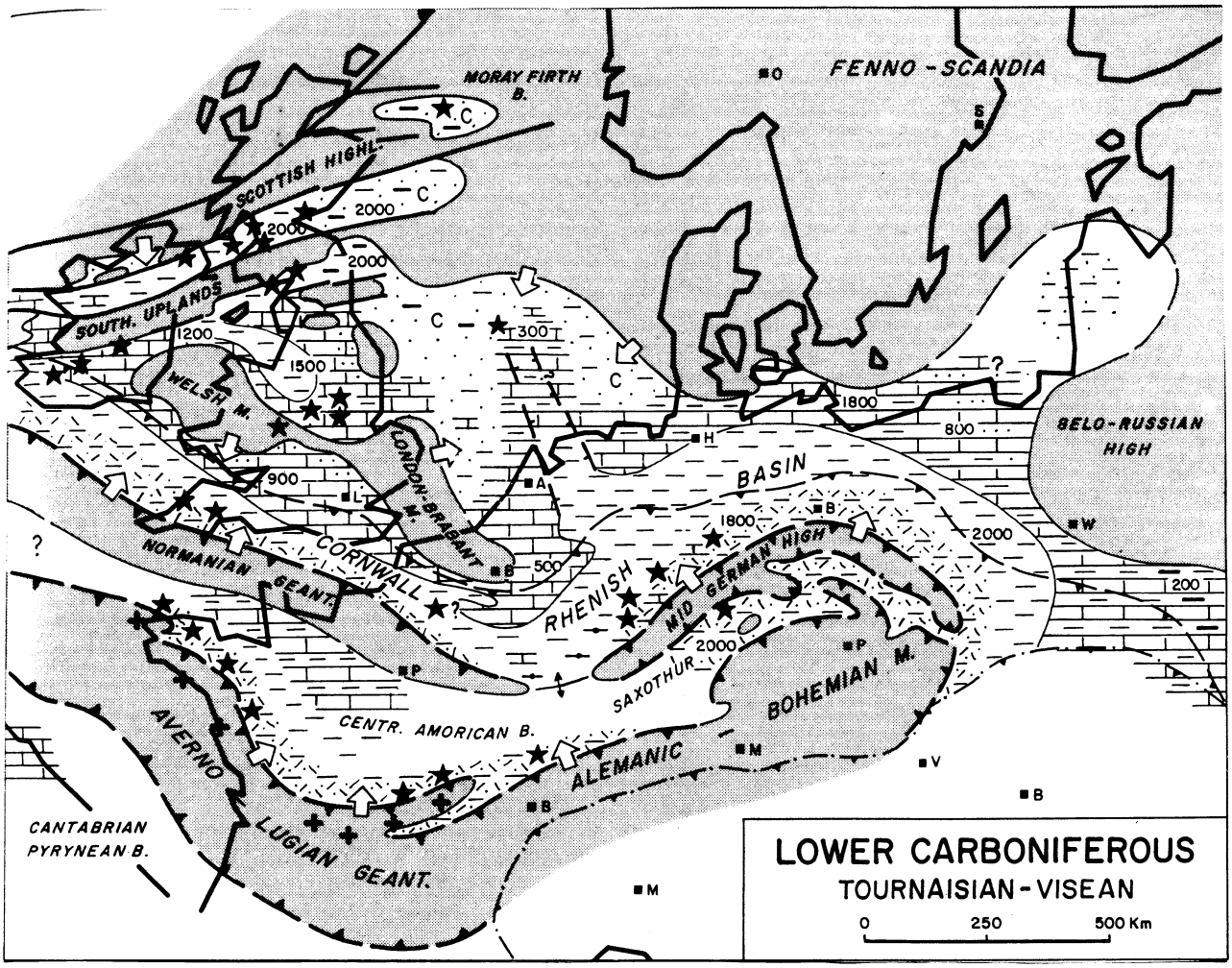
DOMINANT LITHOLOGIES

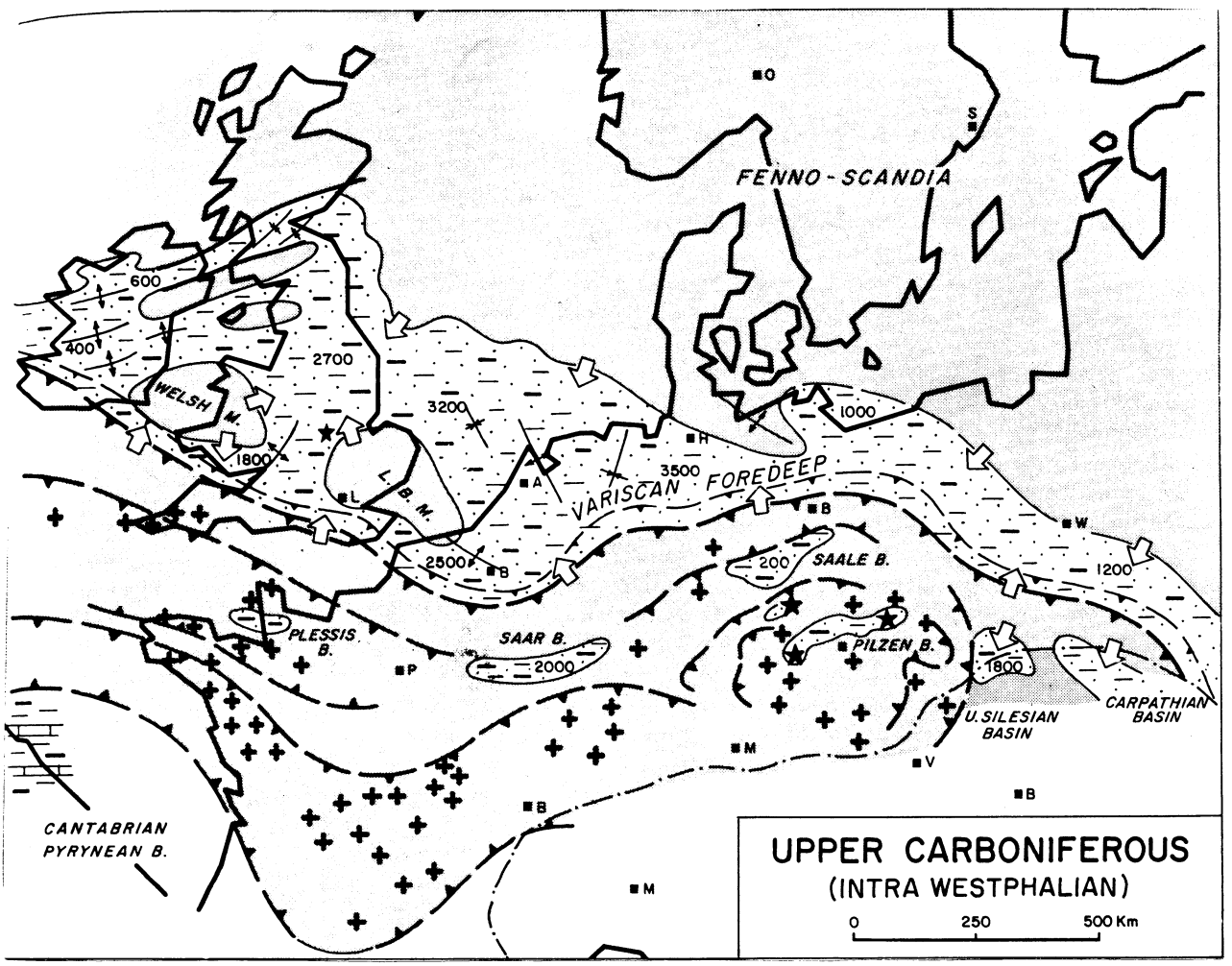
- Sandstones, conglomerates
- Sandstones
- Flysch, deep water sands
- Shales
- Organic shales
- Deep marine shales
- Carbonates
- Anhydrite
- Halites

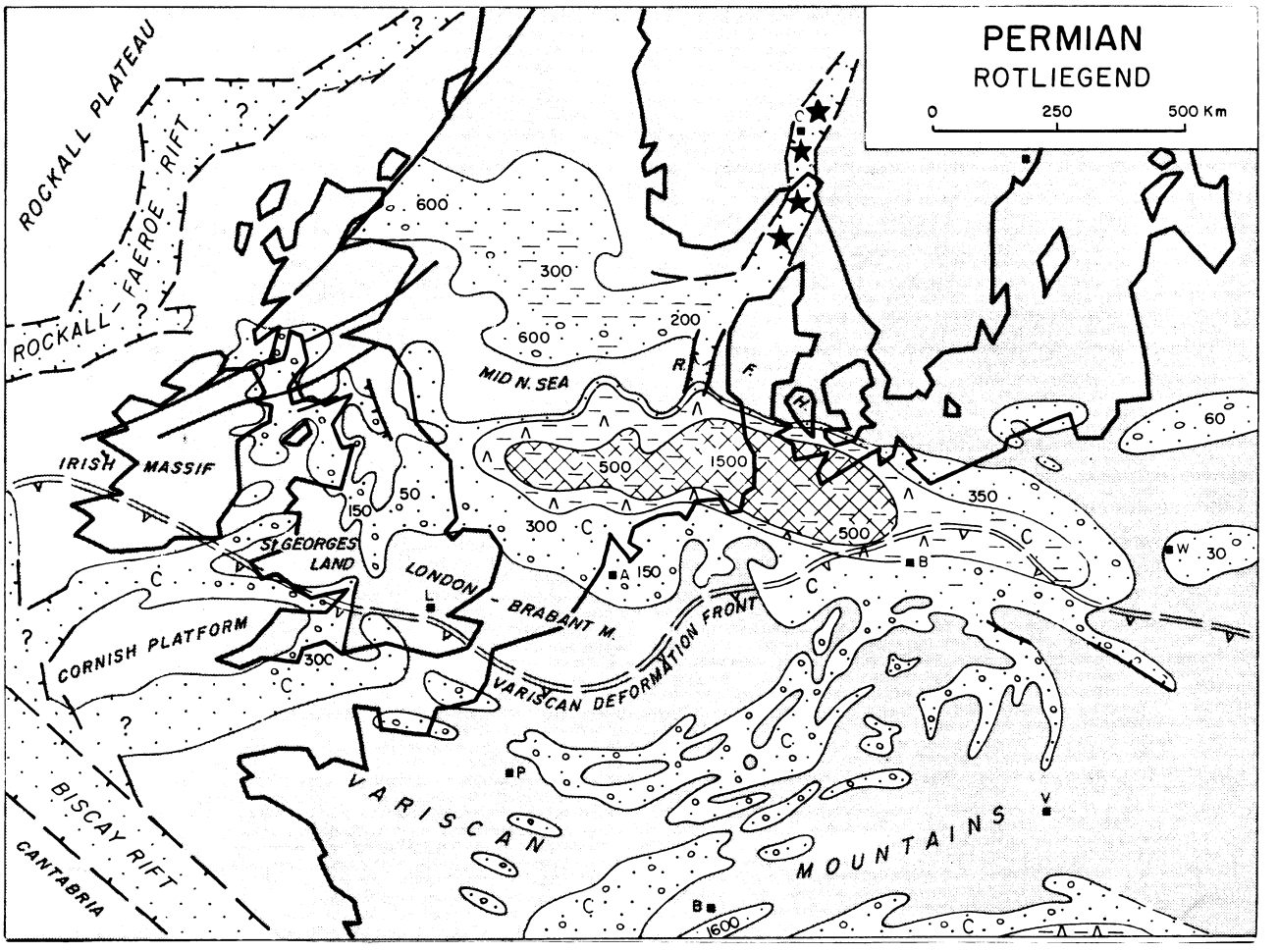
OTHER SYMBOLS

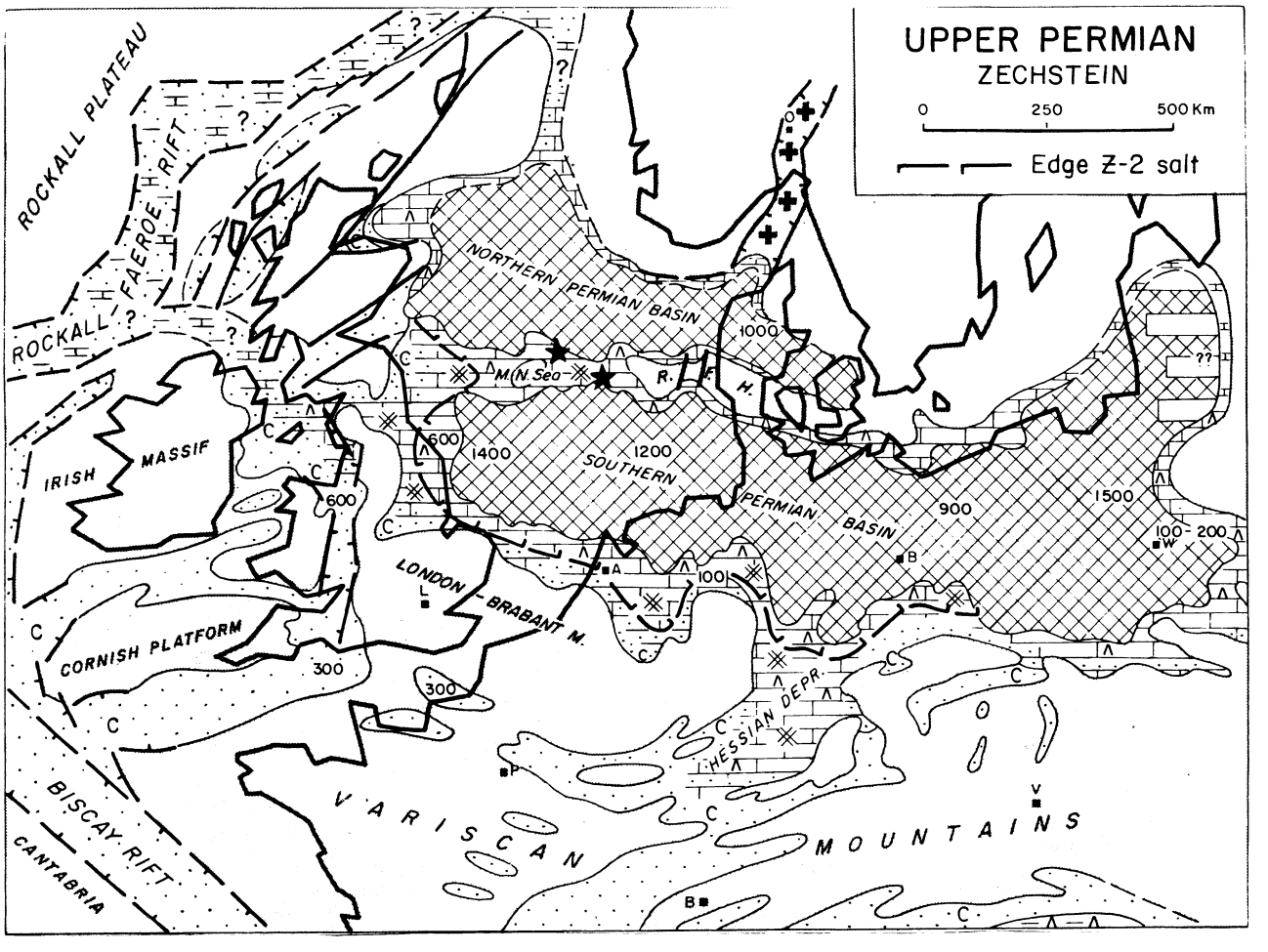
- Positive areas
- Volcanics
- Intrusives
- Sea mounts
- Continental slope
- 500 Thickness in m.
- Salt
- Coal
- C Continental
- Direction of clastic supply
- Variscan deformation front
- Alpine deformation front
- Active deformation fronts
- Faults (schematic)

Fig. 4
Middle and Upper Devonian palaeogeography. The legend is to be used for the other palaeogeographic maps, too.


MORAY FIRTH B.
FENNO - SCANDIA
SCOTTISH HIGHL.
SOUTH. UPLANDS
WELSH M.
LONDON-BRABANT
CORNWALL
NORMANIAN GEANT
RHENISH
MID GERMAN HIGH
SAXOTHUR
BASIN
BELO-RUSSIAN HIGH
BOHEMIAN M.
CENTR. AMORICAN B.
ALEMANIC
AVERNO
LUGIAN GEANT.
CANTABRIAN PYRYNEAN B.
LOWER CARBONIFEROUS
TOURNAISIAN - VISEAN
0 250 500 Km


FENNO - SCANDIA
WELSH M.
L. B. M.
VARISCAN FOREDEEP
PLESSIS B.
SAAR B.
SAALE B.
PILZEN B.
U. SILESIAN BASIN
CARPATHIAN BASIN
CANTABRIAN PYRYNEAN B.
UPPER CARBONIFEROUS
(INTRA WESTPHALIAN)
0 250 500 Km


PERMIAN
ROTLIEGEND
0 250 500 Km
ROCKALL PLATEAU
ROCKALL - FAEROE RIFT
MID N. SEA
IRISH MASSIF
St GEORGES LAND
LONDON - BRABANT M.
CORNISH PLATFORM
VARISCAN DEFORMATION FRONT
BISCAY RIFT
CANTABRIA
VARISCAN MOUNTAINS
600
300
200
500
1500
150
50
60
350
30


UPPER PERMIAN
ZECHSTEIN
0 250 500 Km
Edge Z-2 salt
ROCKALL PLATEAU
ROCKALL - FAEROE RIFT
NORTHERN PERMIAN BASIN
M (N. Sea)
IRISH MASSIF
SOUTHERN PERMIAN BASIN
LONDON - BRABANT M.
CORNISH PLATFORM
HESSIAN DEPR.
BISCAY RIFT
CANTABRIA
VARISCAN MOUNTAINS
1000
1400
1200
900
1500
600
300
100
100 - 200