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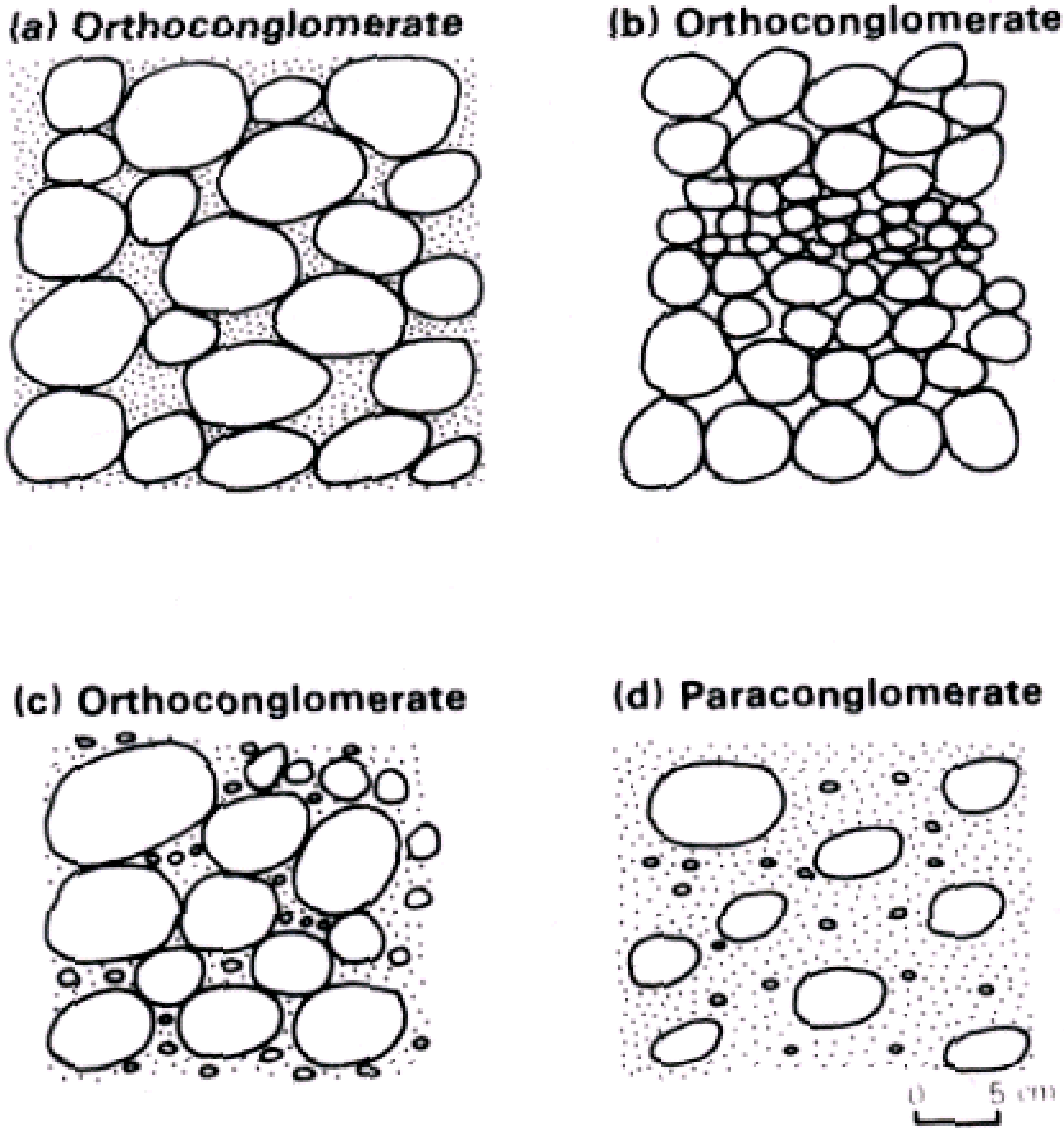
SPECIALISTS MANAGING THE EARTH

ENGINEERING GEOLOGY & GEOTECHNICAL MODELS

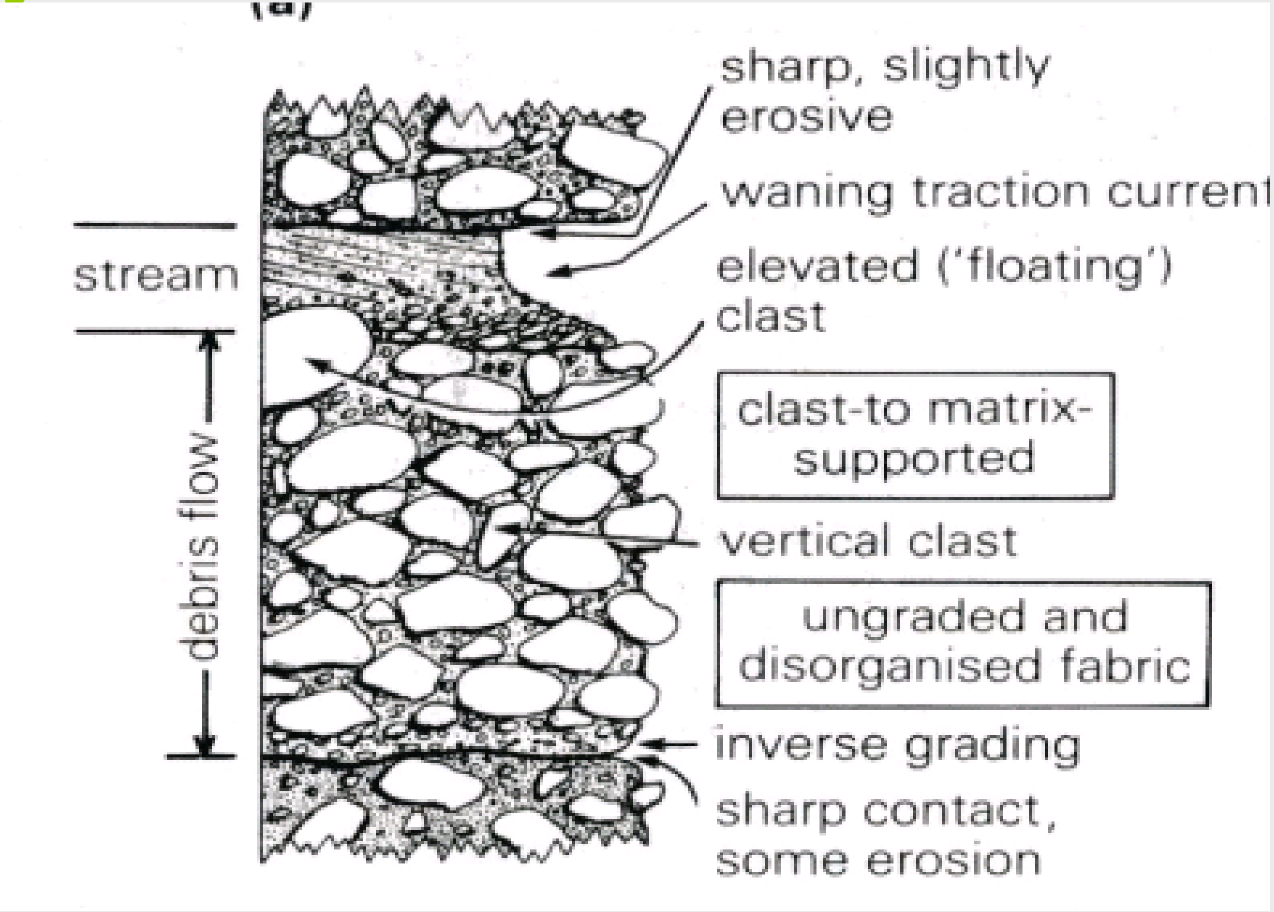
ENGINEERING GEOLOGY

Sedimentary Structures

Conglomerates



Sedimentary Structures



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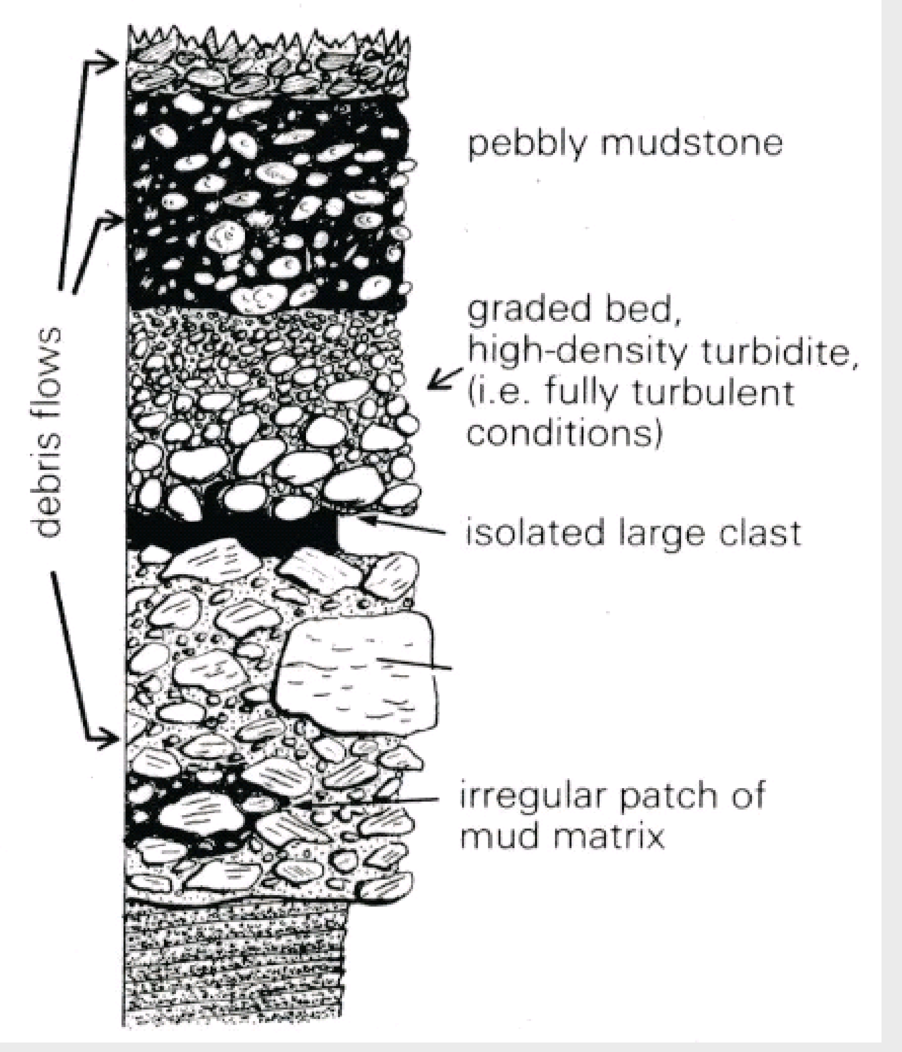
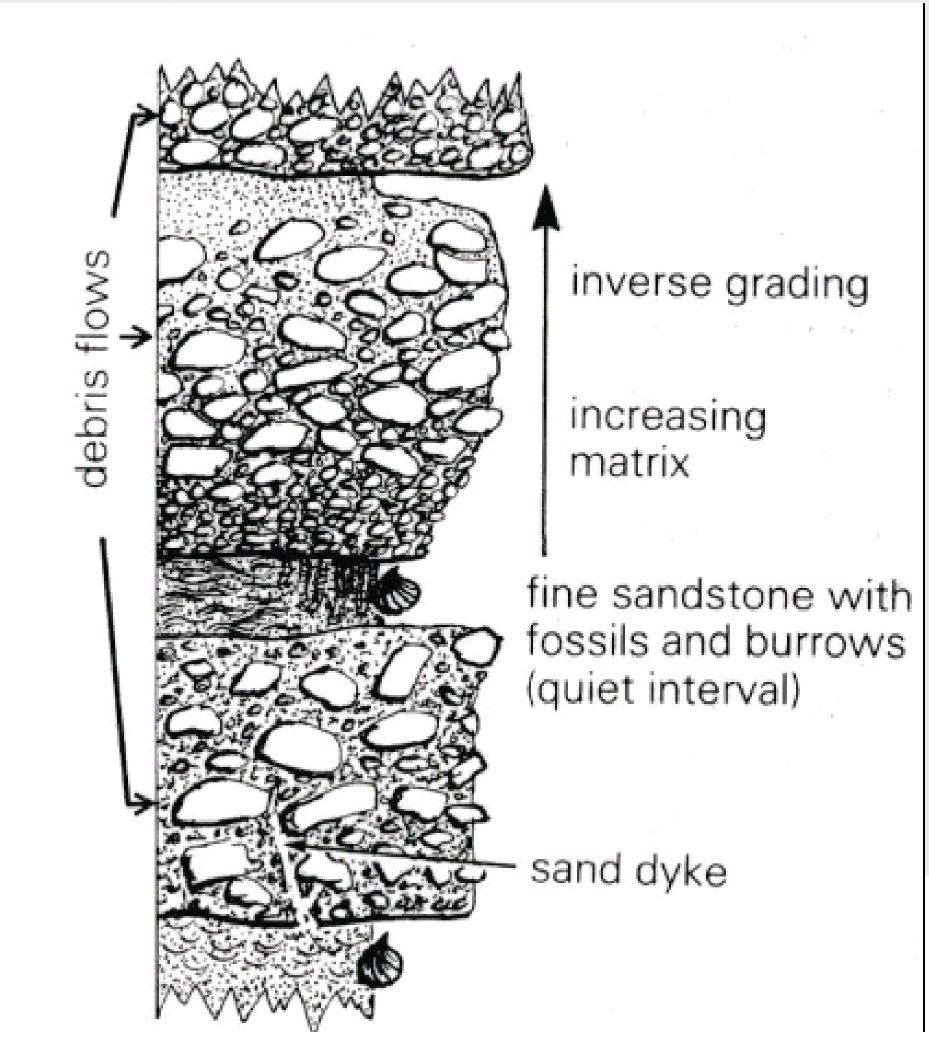
Sedimentary Structures



Sedimentary Structures – sub aqueous conglomerate



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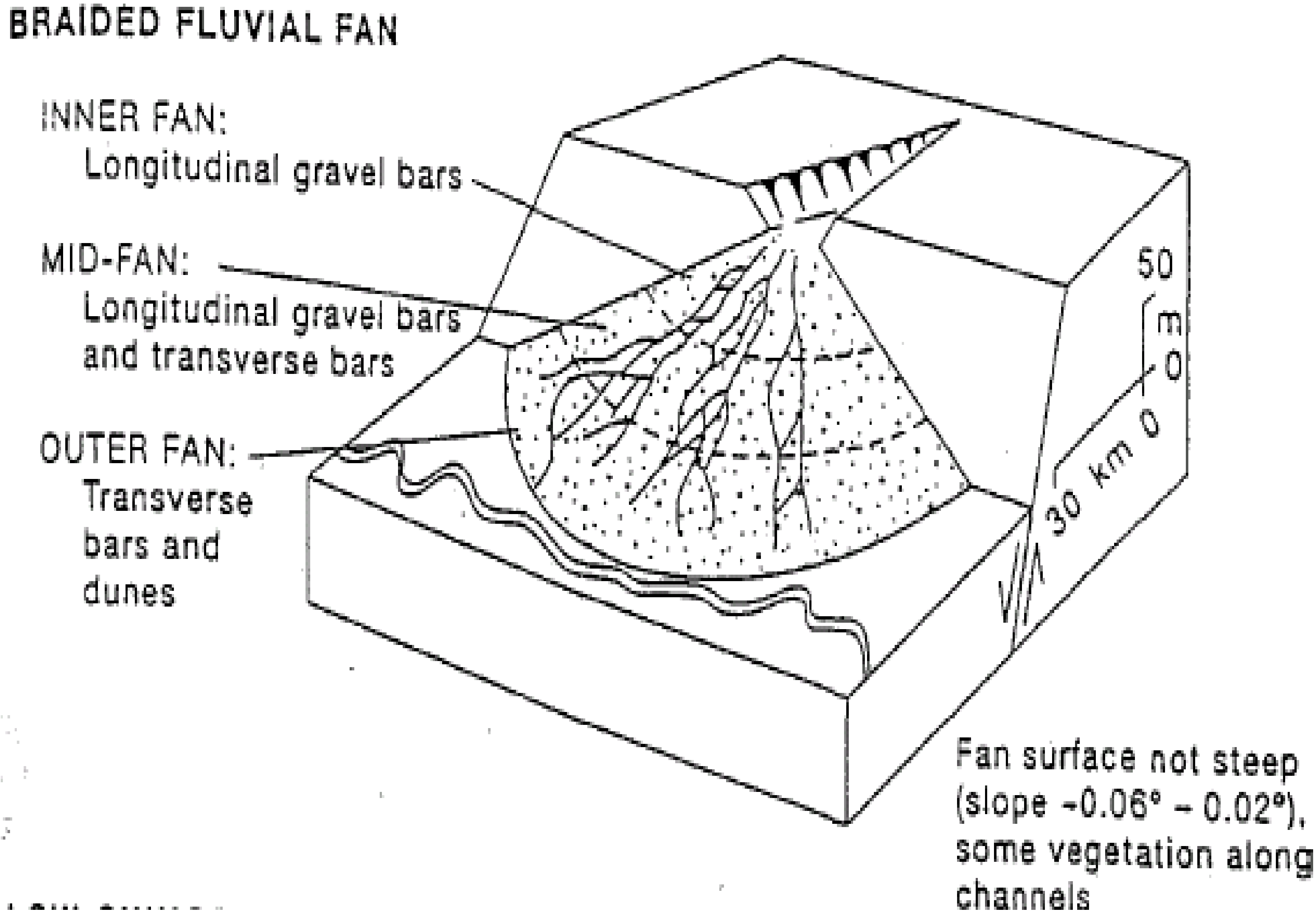
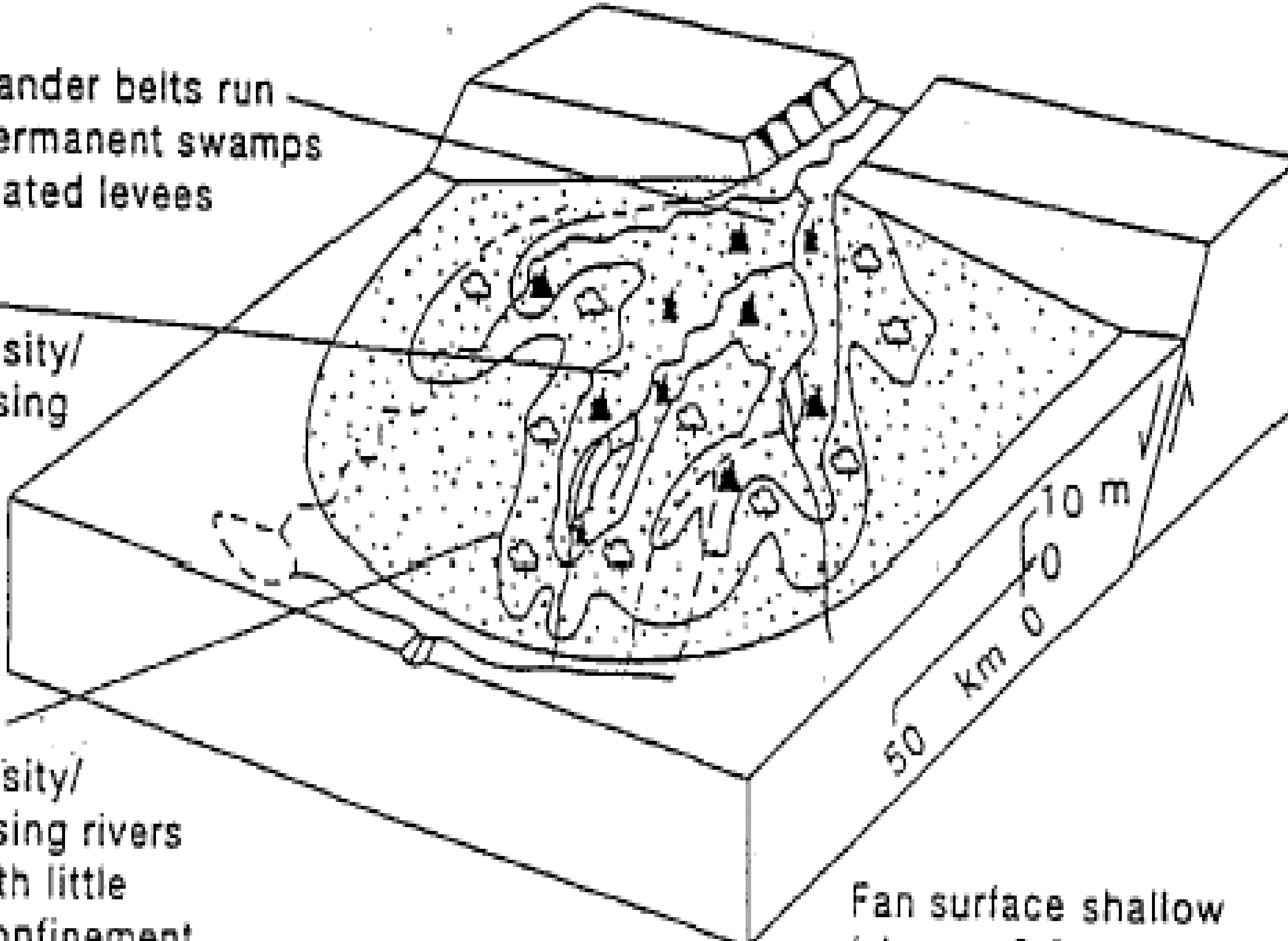

BRAIDED FLUVIAL FAN
INNER FAN:
Longitudinal gravel bars
MID-FAN:
Longitudinal gravel bars and transverse bars
OUTER FAN:
Transverse bars and dunes
50
m
0
30 km 0
Fan surface not steep (slope ~0.06° – 0.02°), some vegetation along channels

channels

LOW-SINUOSITY/MEANDERING FLUVIAL FAN



Anastomosing Stream

A channel that splits into several channels that rejoin irregularly

Canterbury Plains NZ – Google Earth

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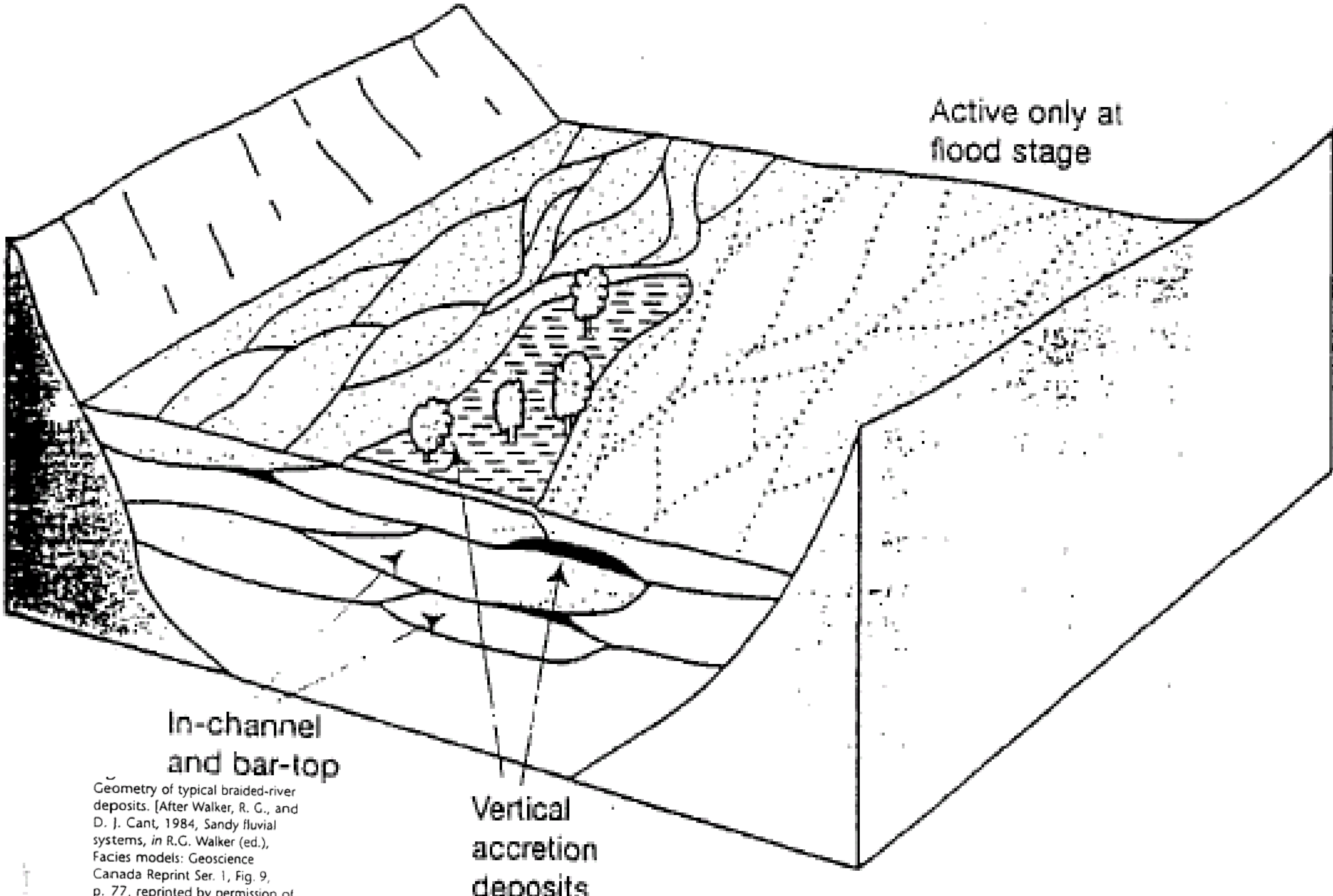

Geometry of typical braided-river deposits. [After Walker, R. G., and D. J. Cant, 1984, Sandy fluvial systems, *in* R.G. Walker (ed.), Facies models: Geoscience Canada Reprint Ser. 1, Fig. 9, p. 77, reprinted by permission of Geological Association of Canada.]

Sea Level Changes

Sea-level change is of interest in geomorphology because:

- The sea surface determines the base level for erosion,
- Relative vertical movements of land and sea can alter the area of land exposed to geomorphic processes,
- It can provide evidence of climatic change, and
- It can give a benchmark for estimating rates of tectonic uplift.

The primary control of global sea level during the Quaternary (1.8 Ma to present) has been fluctuations in ice-sheet volume. As ice-caps waxed and waned, sea-levels rose and fell: glacial maxima were times of lowest sea-level; interglacials were generally warmer and wetter. In the Australian region during the Quaternary there were over 20 glacial-interglacial cycles, each of the last seven being about 100 ka long.

Bedded Structures

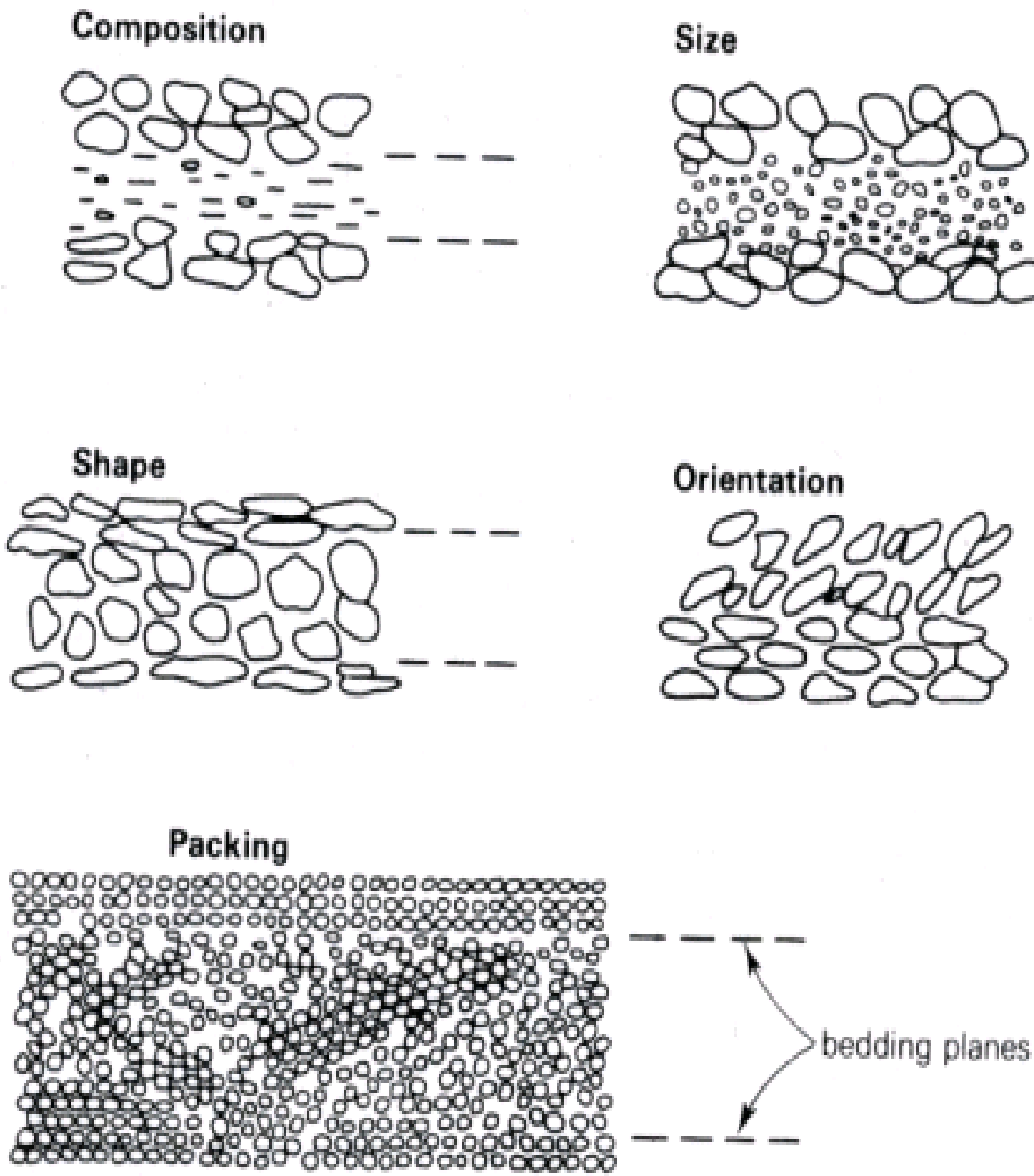

Figure 2.1 Bedding as the product of different combinations of grain composition, size, shape, orientation and packing (modified after Pettijohn, Potter & Siever 1972, and Griffiths 1961).

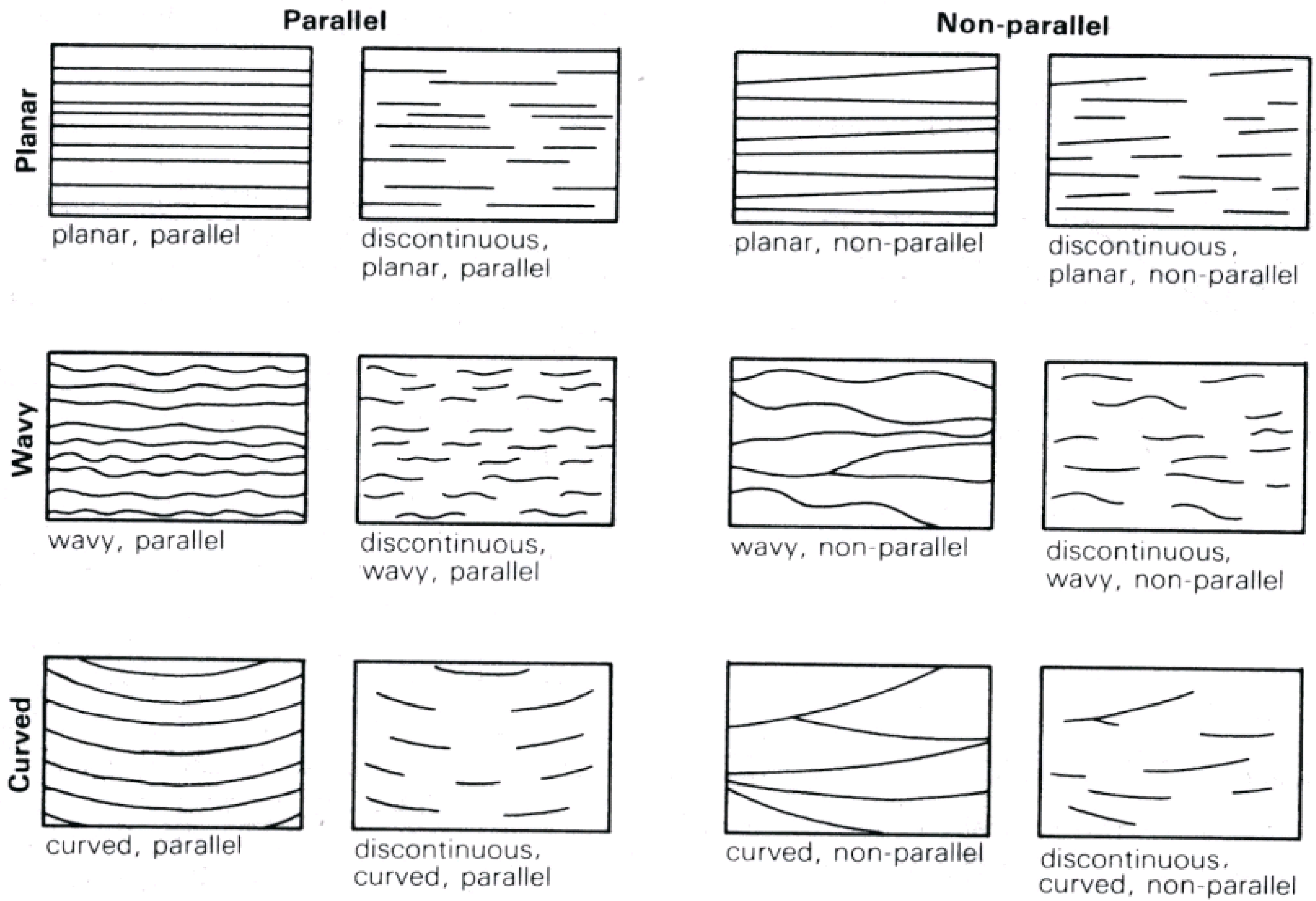

Figure 2.6 Useful bedding–lamination terminology (modified after Campbell 1967 and Reineck & Singh 1973).

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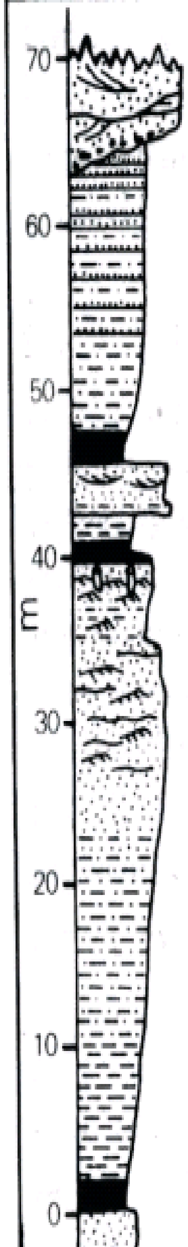
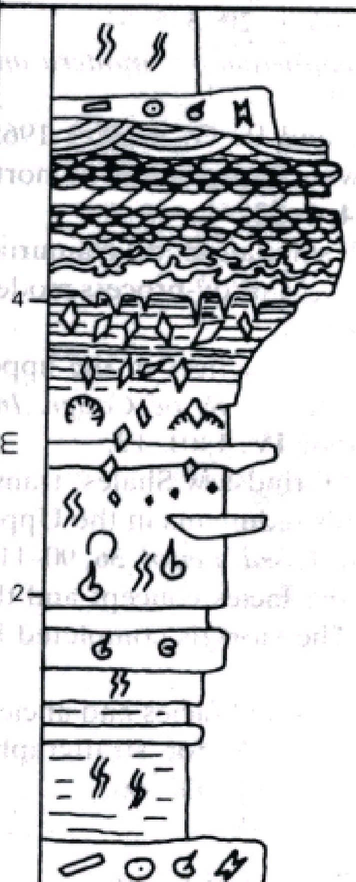
(b)



Main facts			Environment
Cross bedded sandstone.	Dune migration; strong currents.	prograding delta front	Fluvial distributary channel.
Sharp contact with relief and siltstone clasts.	Erosion and winnowing.		
			Mouth bar.
Siltstone with parallel lamination and graded sand beds.	Deposition from suspension, with episodic decelerating flows.		
			Delta slope.
Siltstone.	Deposition from suspension.		
Mudstone with marine fossils.	Deposition from suspension; high salinity.		
Coarsening upwards unit.	Increase in energy; shallowing?		Minor readvance of delta?
Mudstone.	Deposition from suspension.		Abandonment of mouth bar.
Siltstone with current ripples, burrows on top.	Mixture of deposition from suspension and from bedload transport by weak currents.		
Cross laminated sandstone with silty partings.	Bedload transport as ripples with quiet interludes.	prograding delta front	Proximal mouth bar.
Silty mudstone with siltstone laminae.	Deposition from siltstone with fluctuating supply.		Delta slope.
Gradationally striped silty mudstone.			
Mudstone with marine fossils.	Deposition from suspension.		Offshore; pro-delta.



(d) *Main facts*	*Processes*	*Environment*
Lime sand with shells and intraclasts.	High energy erosion and redeposition.	Marine transgression.
Sand with cross bedding.	Strong currents; dune bedforms.	Supratidal flat in arid environment.
Silty dolomite.	Quiet deposition of lime mud. Later alteration to dolomite.	
Lime mud with nodular anhydrite. Enterolithic anhydrite.	Quiet deposition and displacive growth of anhydrite; high evaporation.	
Lime mud with algal lamination, crystals and nodules of anhydrite.	Trapping of lime mud by algal mat. High evaporation and emergence. Displacive and poikilitic growth of evaporite within sediment.	Algal mat zone at about high tide level.
Lime sands. Marine fossils.	Currents of variable strength in marine setting.	Nearshore marine possibly intertidal.
Lime muds with burrows and marine fossils.	Generally quiet conditions. Occasional high energy events. Slow deposition allows burrowing.	Offshore shallow marine; calm fair weather with storms.
Lime mud.	Quiet conditions.	
Lime sand with shells and intraclasts.	High energy erosion and redeposition.	Transgressive beach.

prograding carbonate shoreline to give emergent conditions

Figure 9.2 Vertical section through load-casted, interbedded sandstones and mudstones. The loads on the base of the sandstone have 'flames' of mudstone squeezed upwards between them. Bude Formation, Upper Carboniferous, North Cornwall.

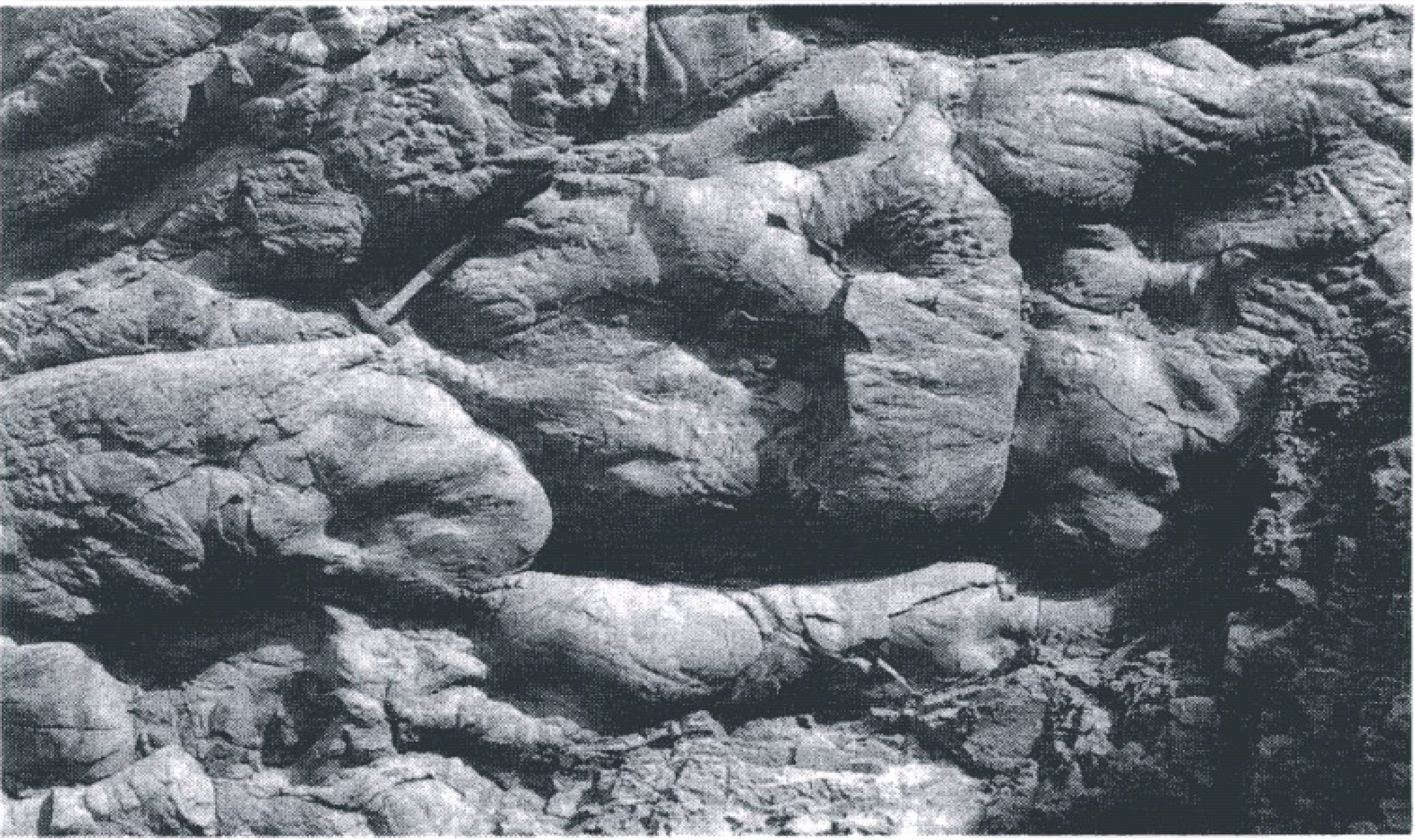
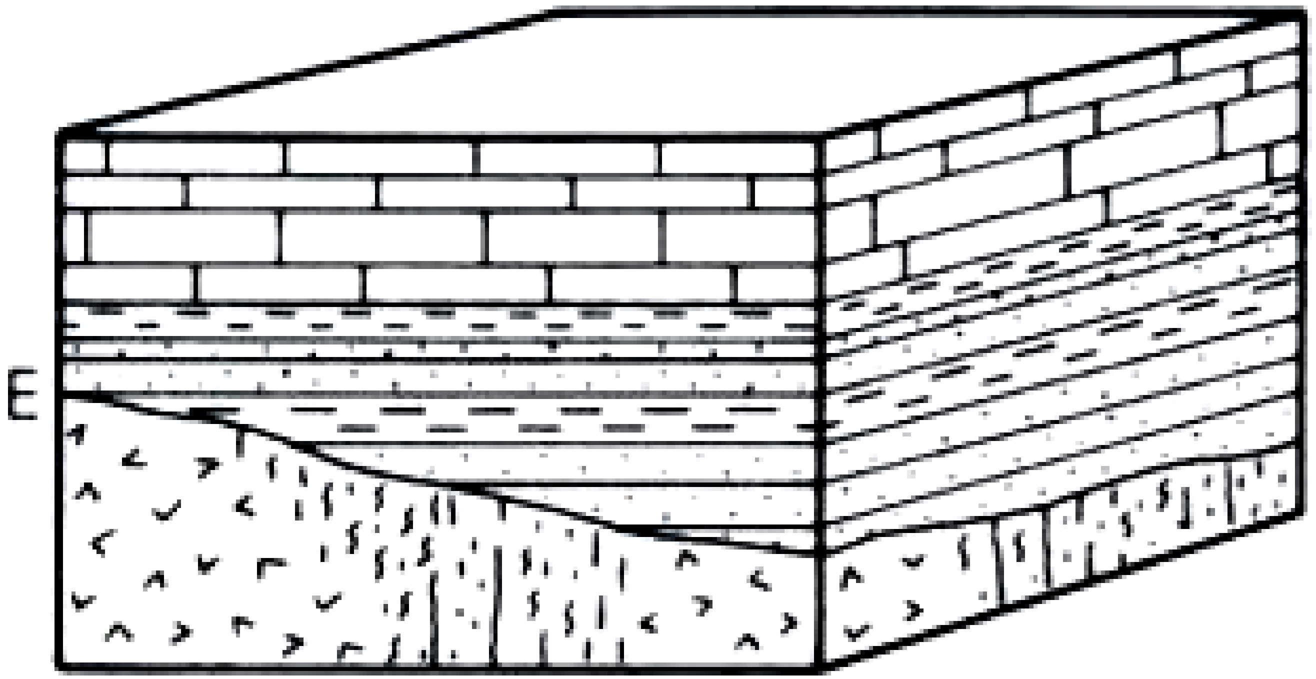


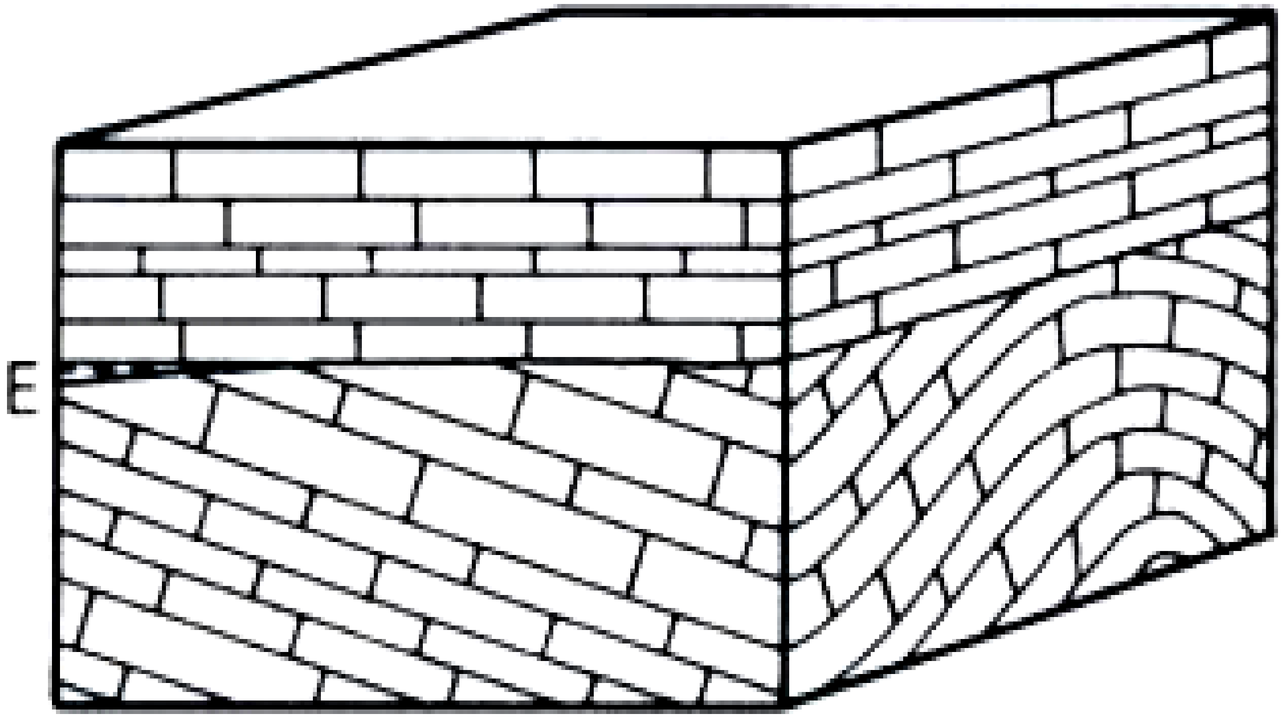
Figure 9.1 Loadcasts on the base of a sandstone bed from an interbedded sandstone/mudstone sequence. Bude Formation, Upper Carboniferous, North Cornwall.

Unconformities



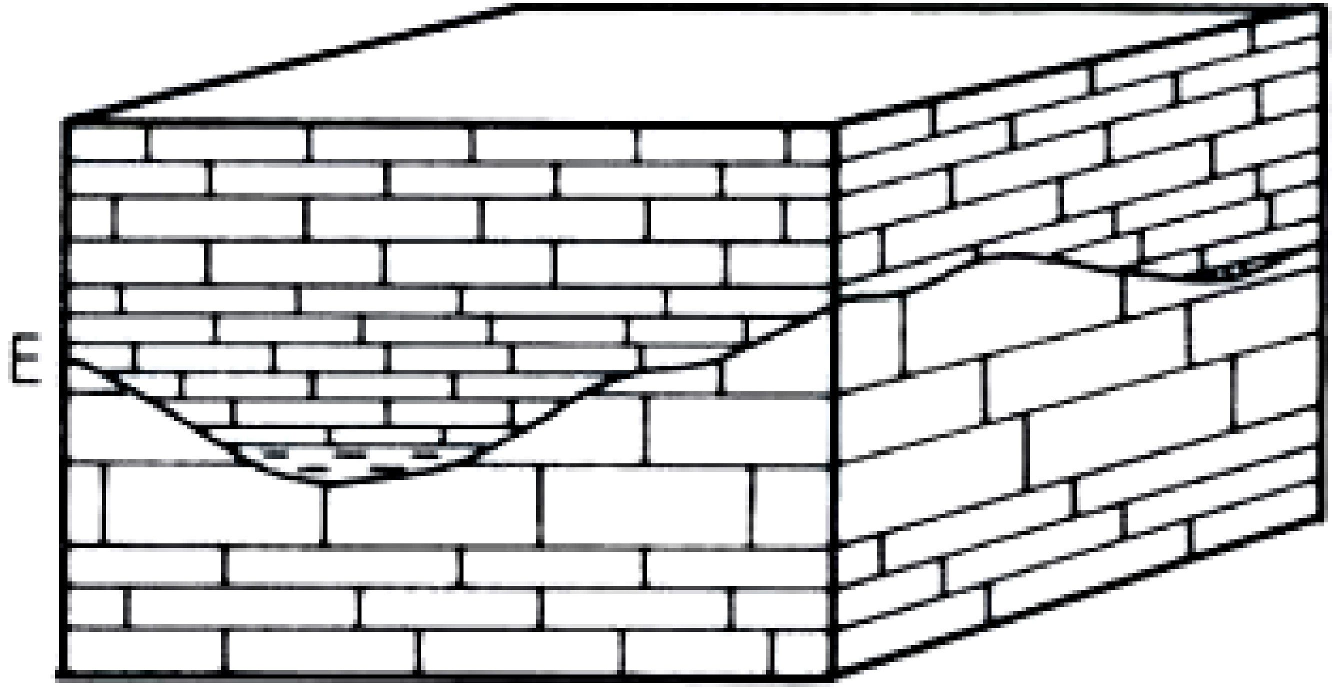
(a) Non–conformity

Unconformities



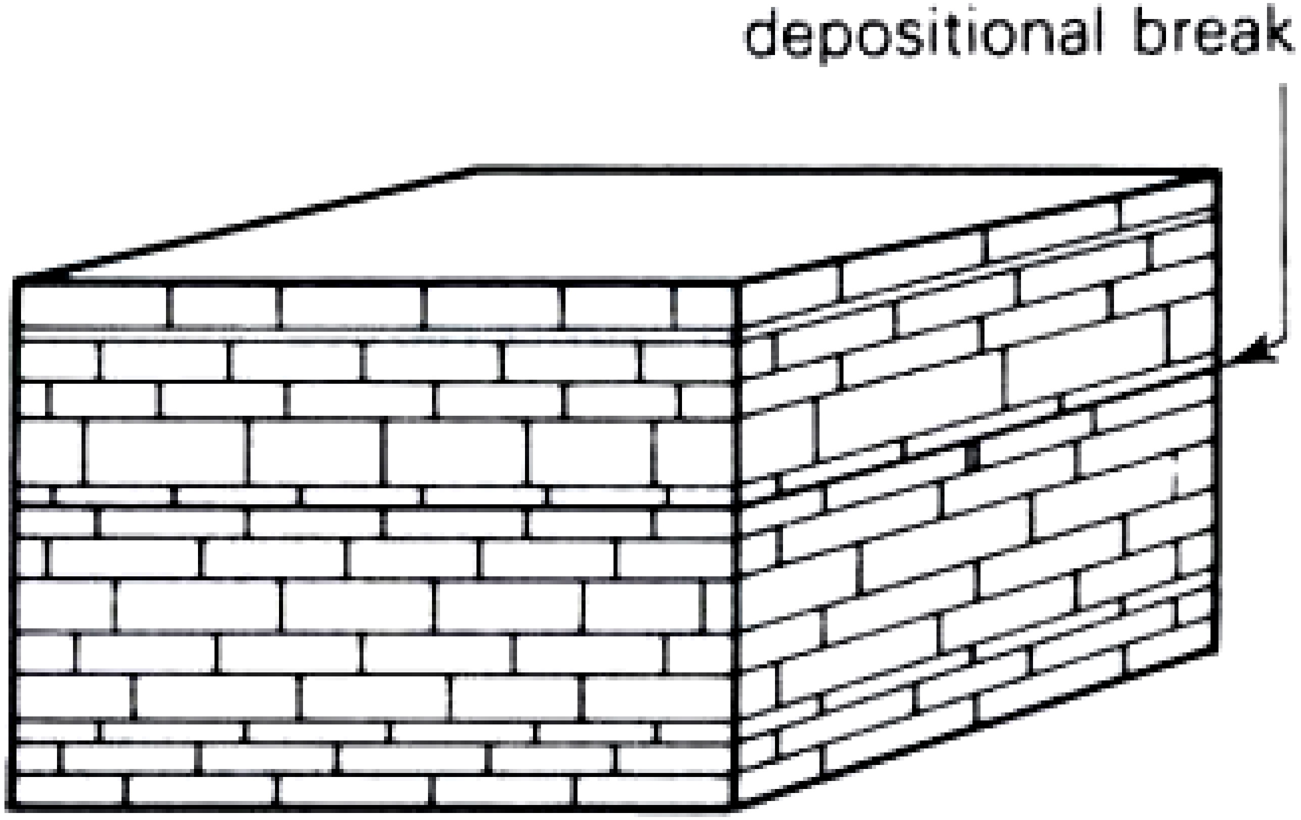
(b) Angular unconformity

Unconformities



(c) Disconformity

Unconformities



(d) Paraconformity