

# Notion de bassin versant

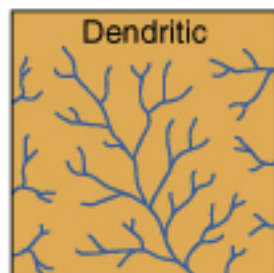


# Limite de bassin versant



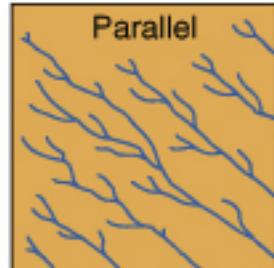
Copyright 1999 John Wiley and Sons, Inc. All rights reserved.

# Morphologie du réseau hydrographique



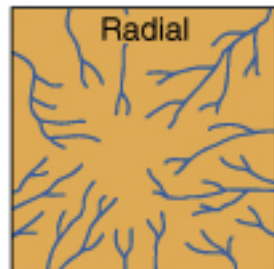
**Dendritic**

*Irregular branching of channels ("treelike") in many directions. Common in massive rock and in flat-lying strata. In such situations, differences in rock resistance are so slight that their control of the directions in which valleys grow headward is negligible.*



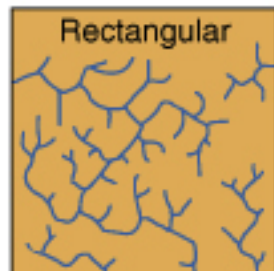
**Parallel**

*Parallel or subparallel channels that have formed on sloping surfaces underlain by homogeneous rocks. Parallel rills, gullies, or channels are often seen on freshly exposed highway cuts or excavations having gentle slopes.*



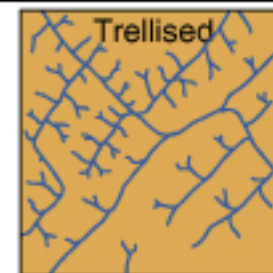
**Radial**

*Channels radiate out, like the spokes of a wheel, from a topographically high area, such as a dome or a volcanic cone.*



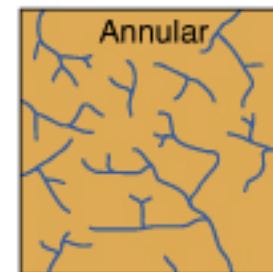
**Rectangular**

*Channel systems marked by right-angle bends. Generally results from the presence of joints and fractures in massive rocks or foliation in metamorphic rocks. Such structures, with their cross-cutting patterns, have guided the directions of valleys.*



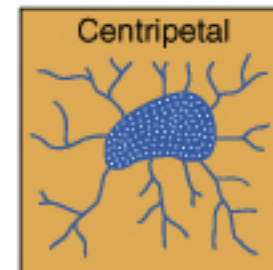
**Trellised**

*Rectangular arrangement of channels in which principal tributary streams are parallel and very long, like vines trained on a trellis. This pattern is common in areas where the outcropping edges of folded sedimentary rocks, both weak and resistant, form long, nearly parallel belts.*



**Annular**

*Streams follow nearly circular or concentric paths along belts of weak rock that ring a dissected dome or basin where erosion has exposed successive belts of rock of varying degrees of erodibility.*

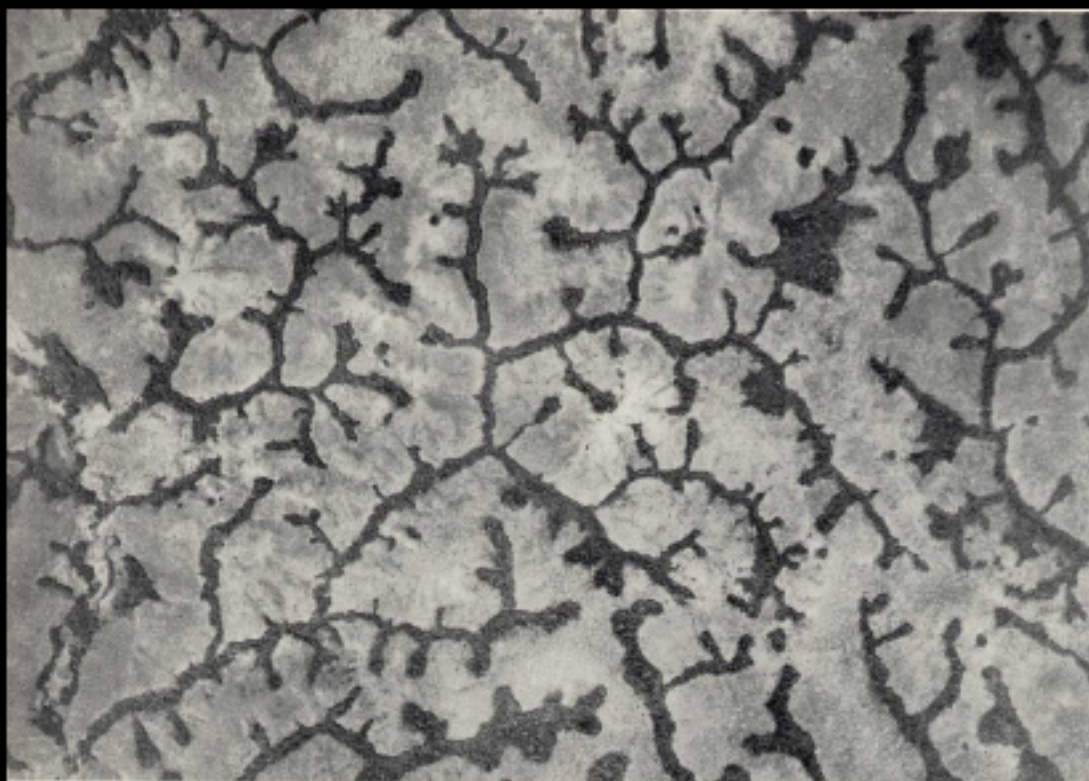


**Centripetal**

*Streams converge toward a central depression, such as a volcanic crater or caldera, a structural basin, a breached dome, or a basin created by dissolution of carbonate rock.*

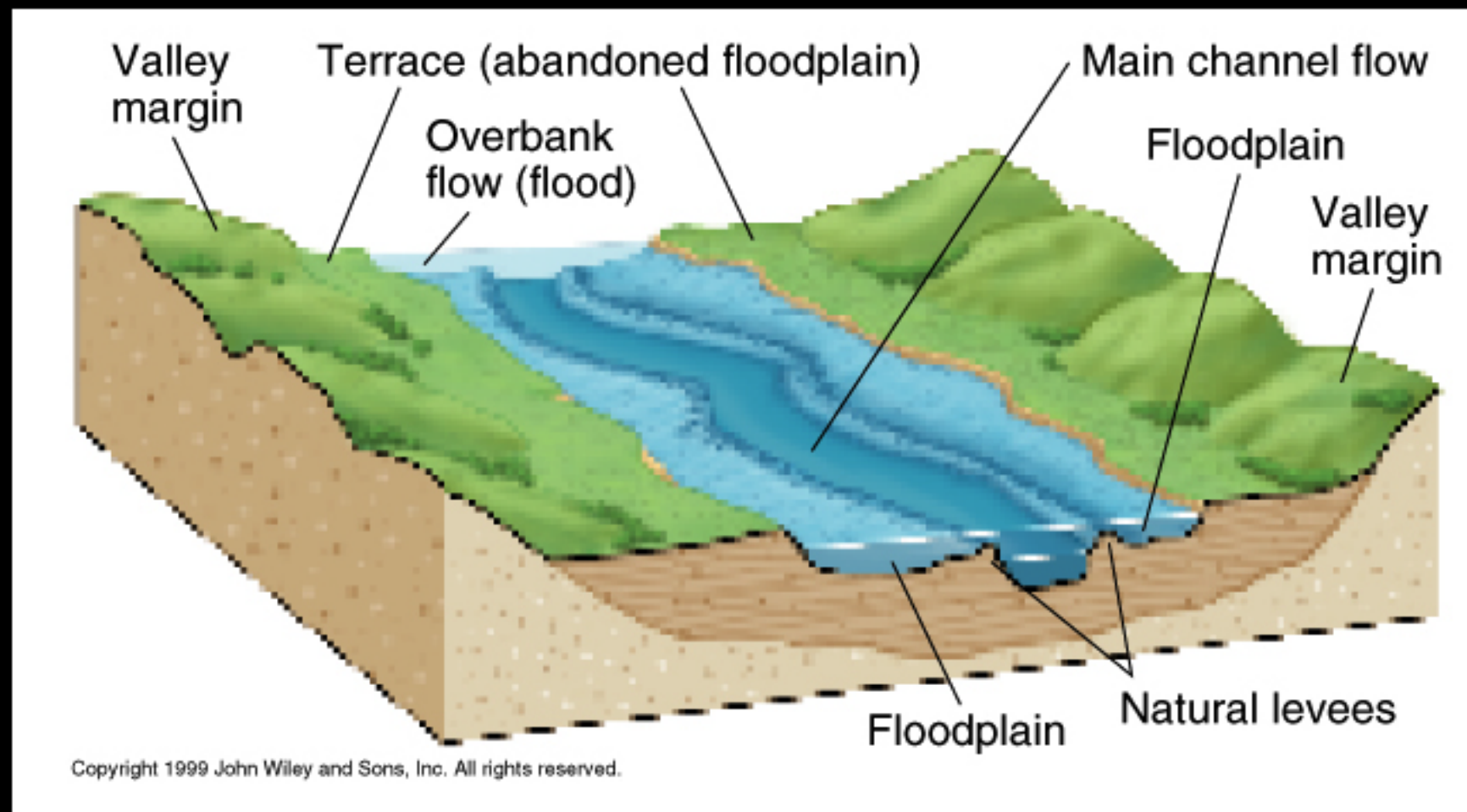
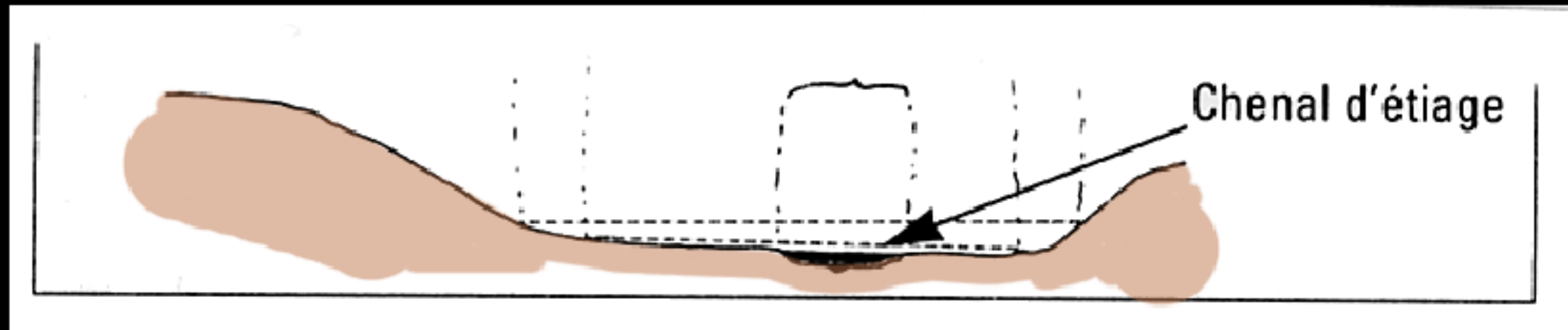
Copyright 1999 John Wiley and Sons, Inc. All rights reserved.







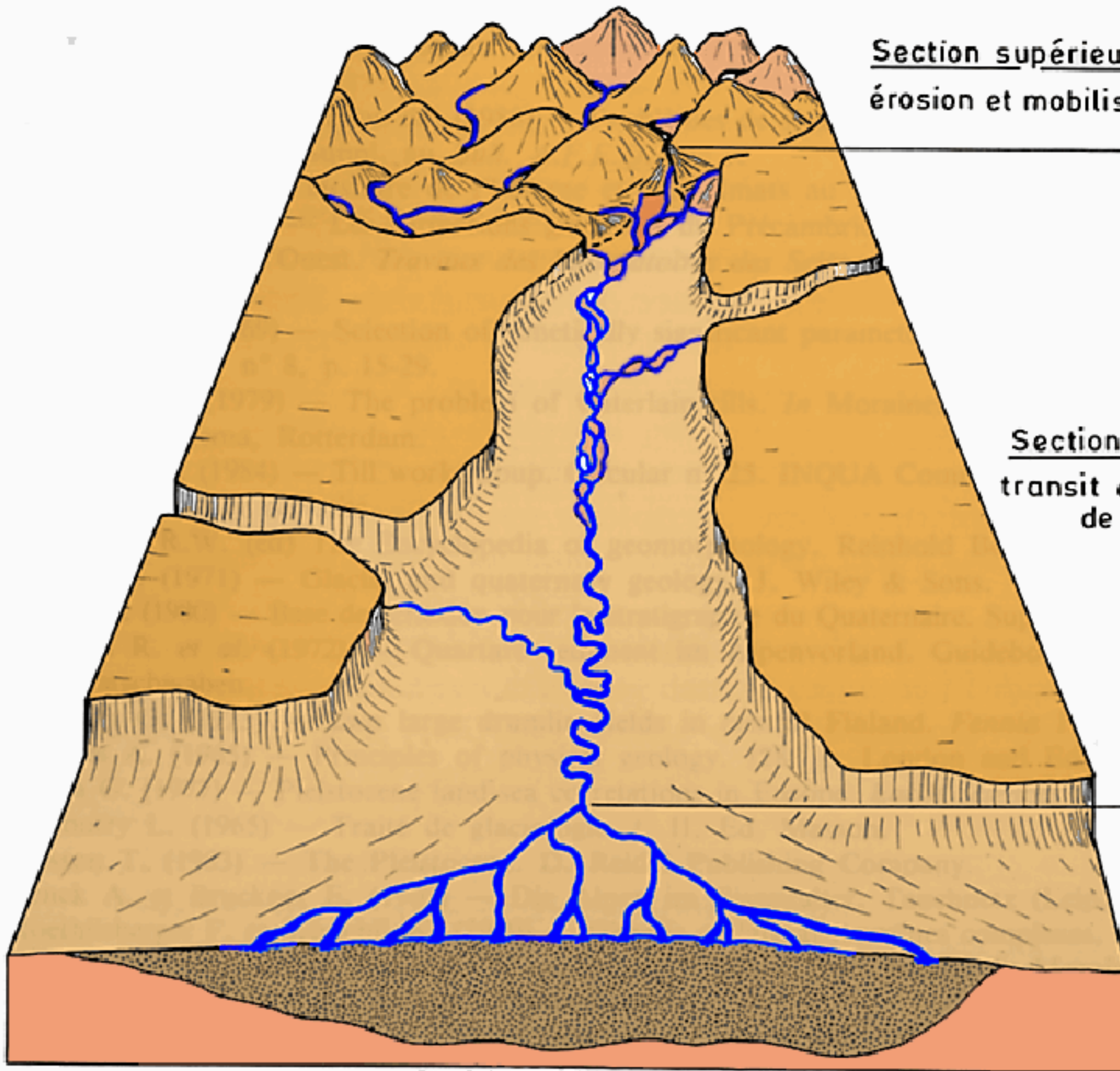
# Le lit d'un cours d'eau



Section supérieure :  
érosion et mobilisation de matériaux

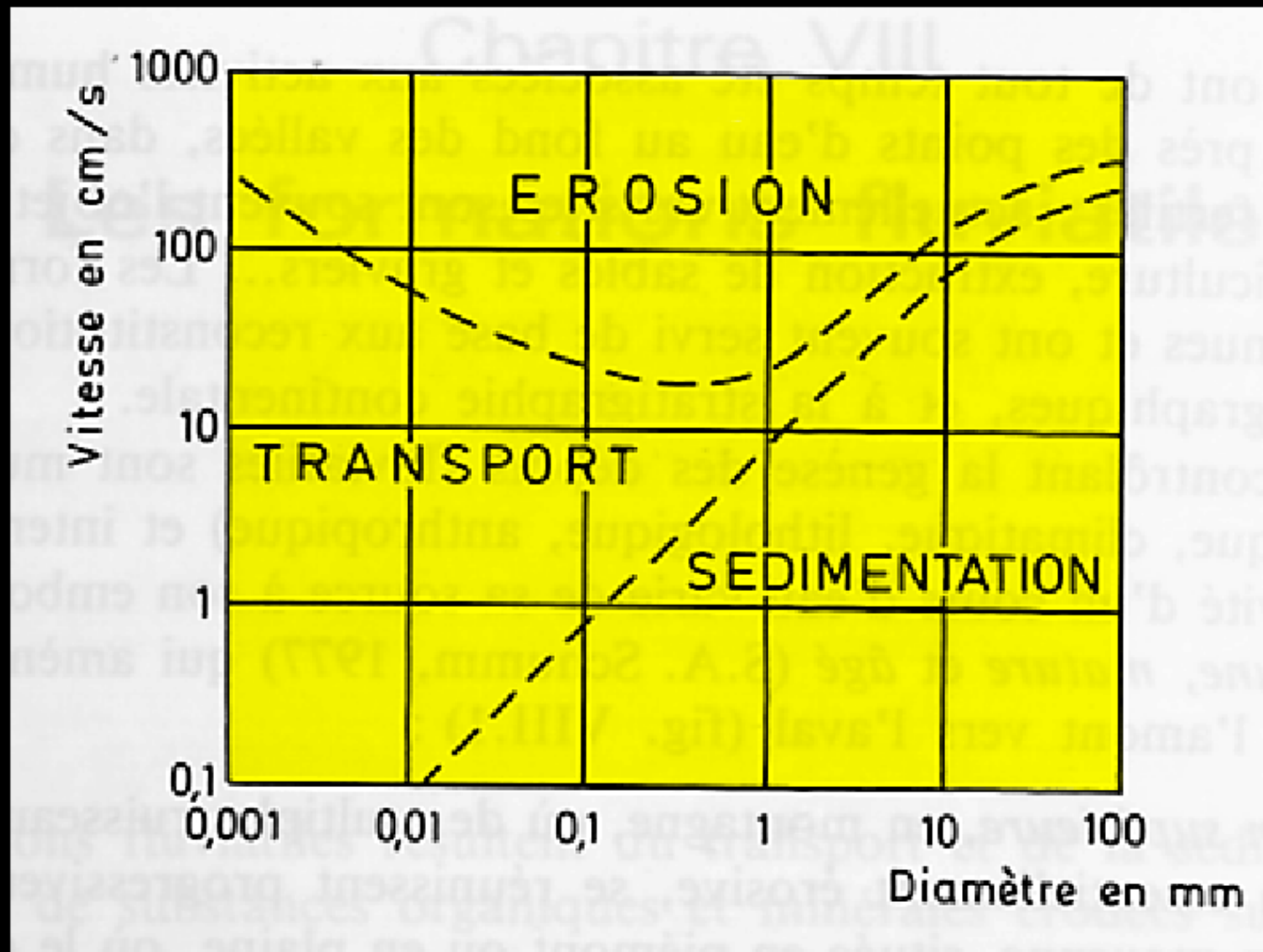
Section moyenne :  
transit et dépôt partiel  
de sédiments

Section inférieure  
accumulation  
de sédiments

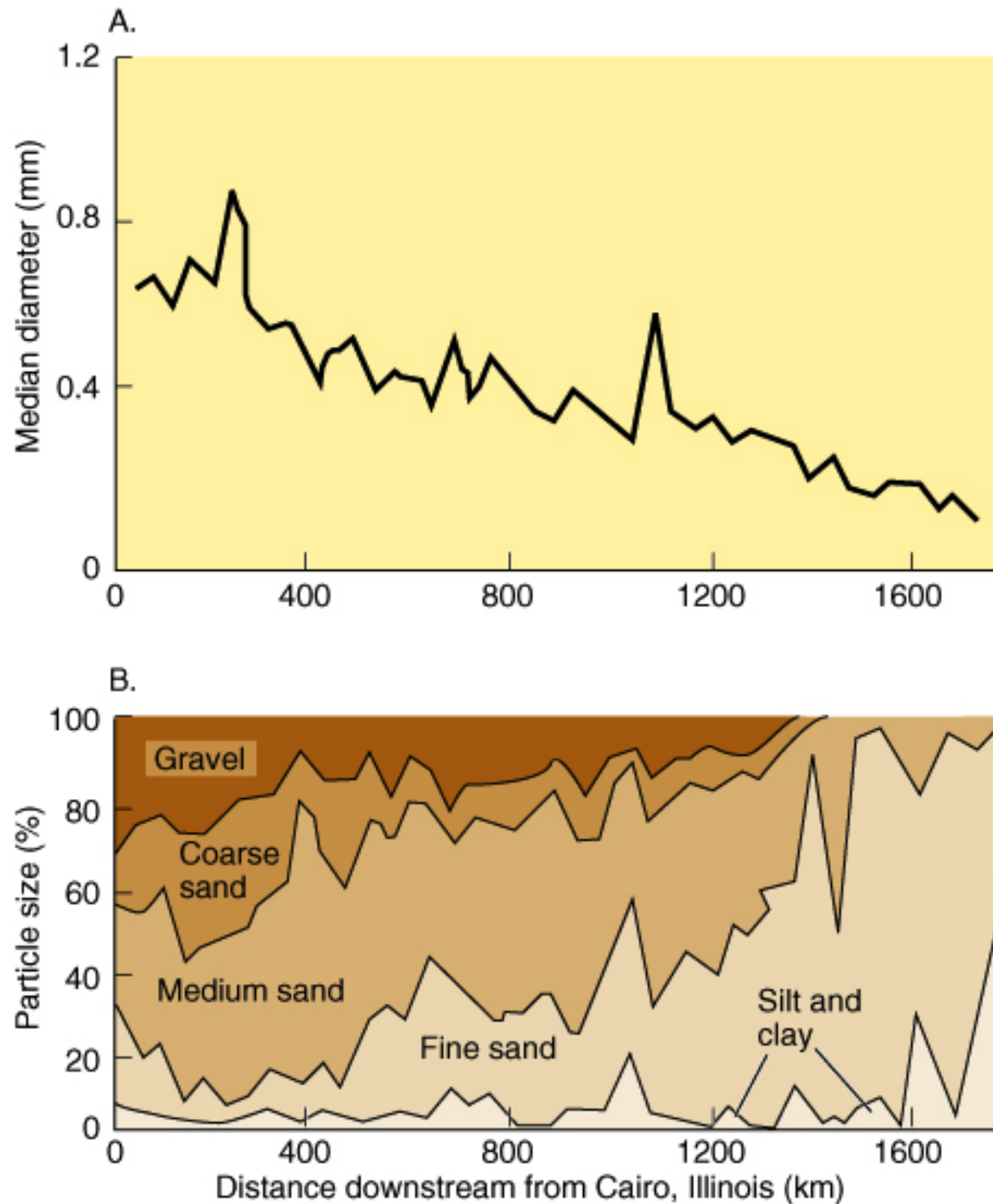




# L'érosion et le transport fluvial



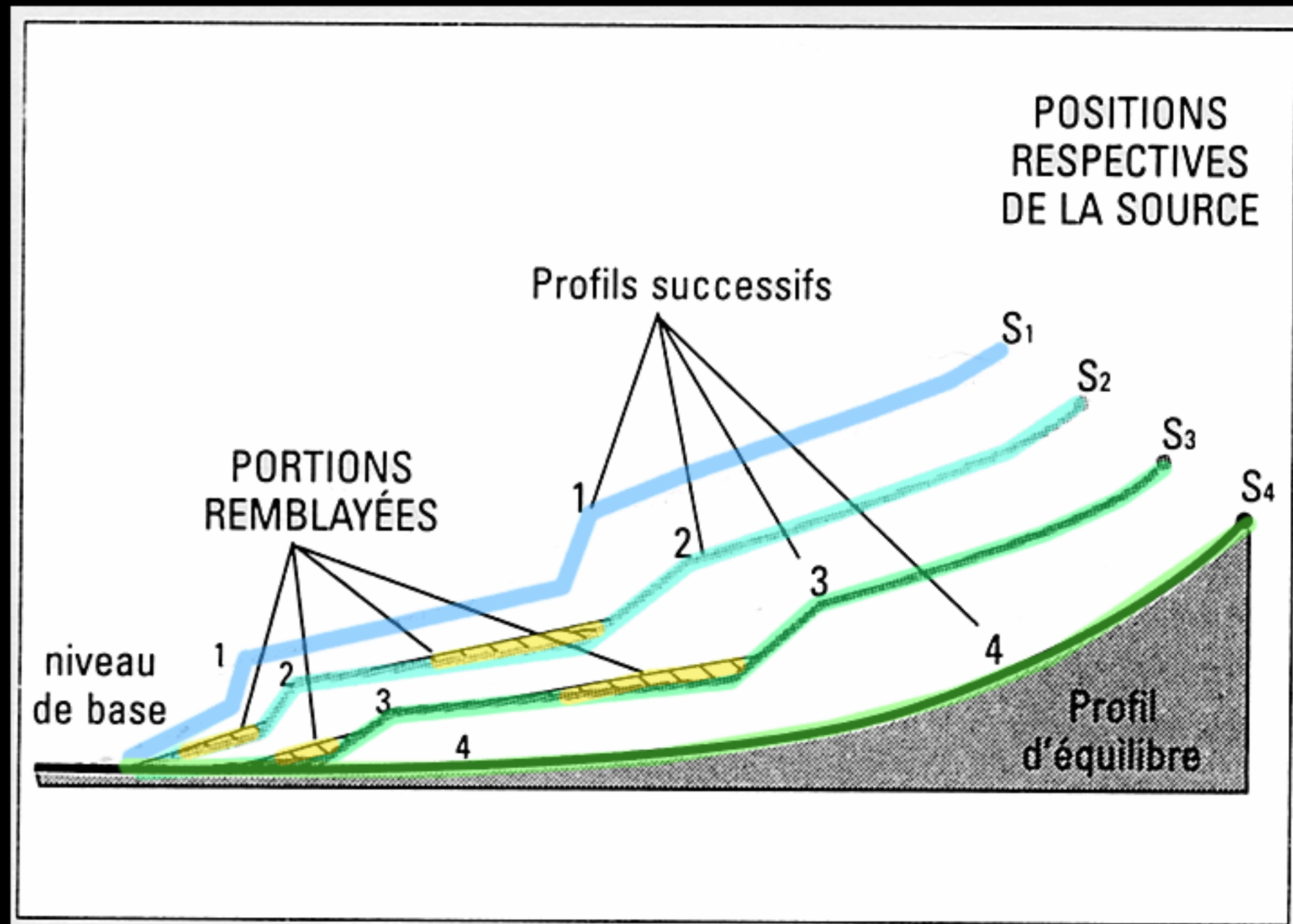
# Granoclassement des matériaux en fonction de la distance

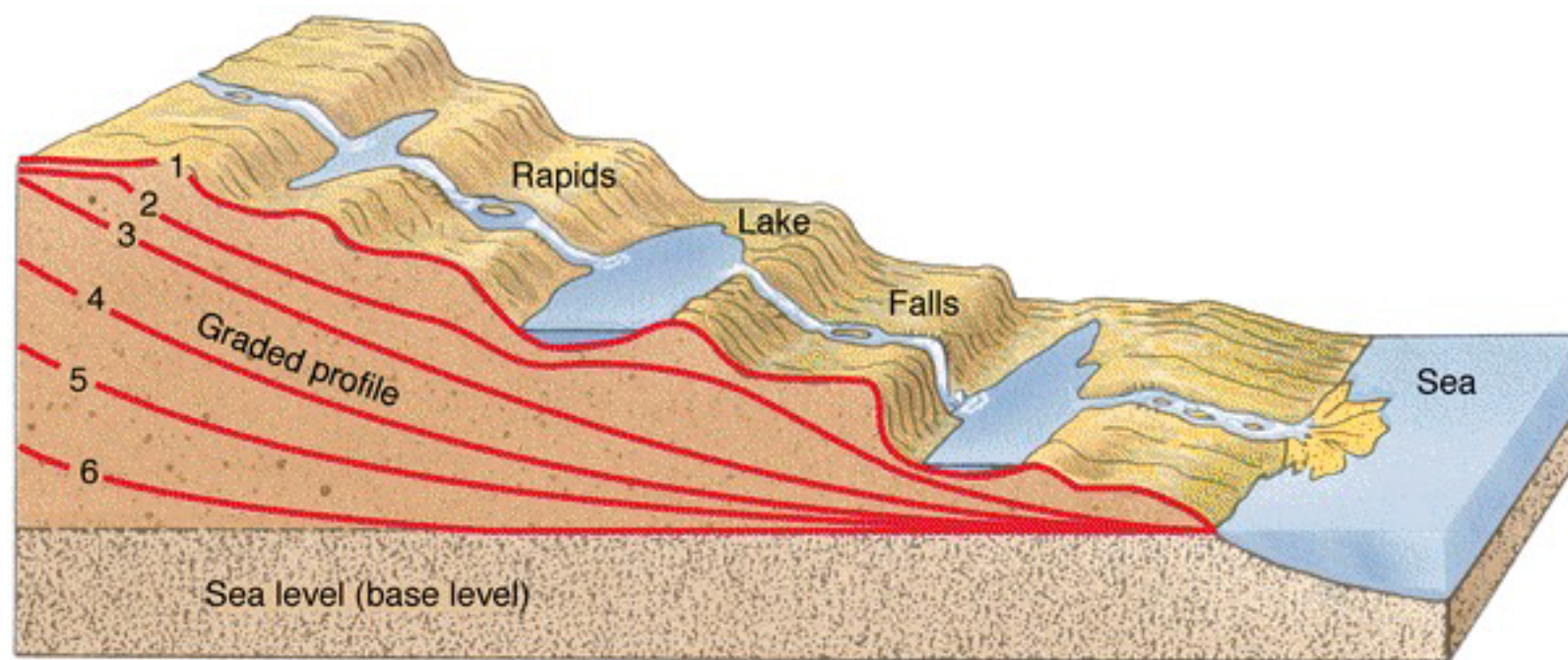


Exemple: Mississippi



# Le profil d'équilibre

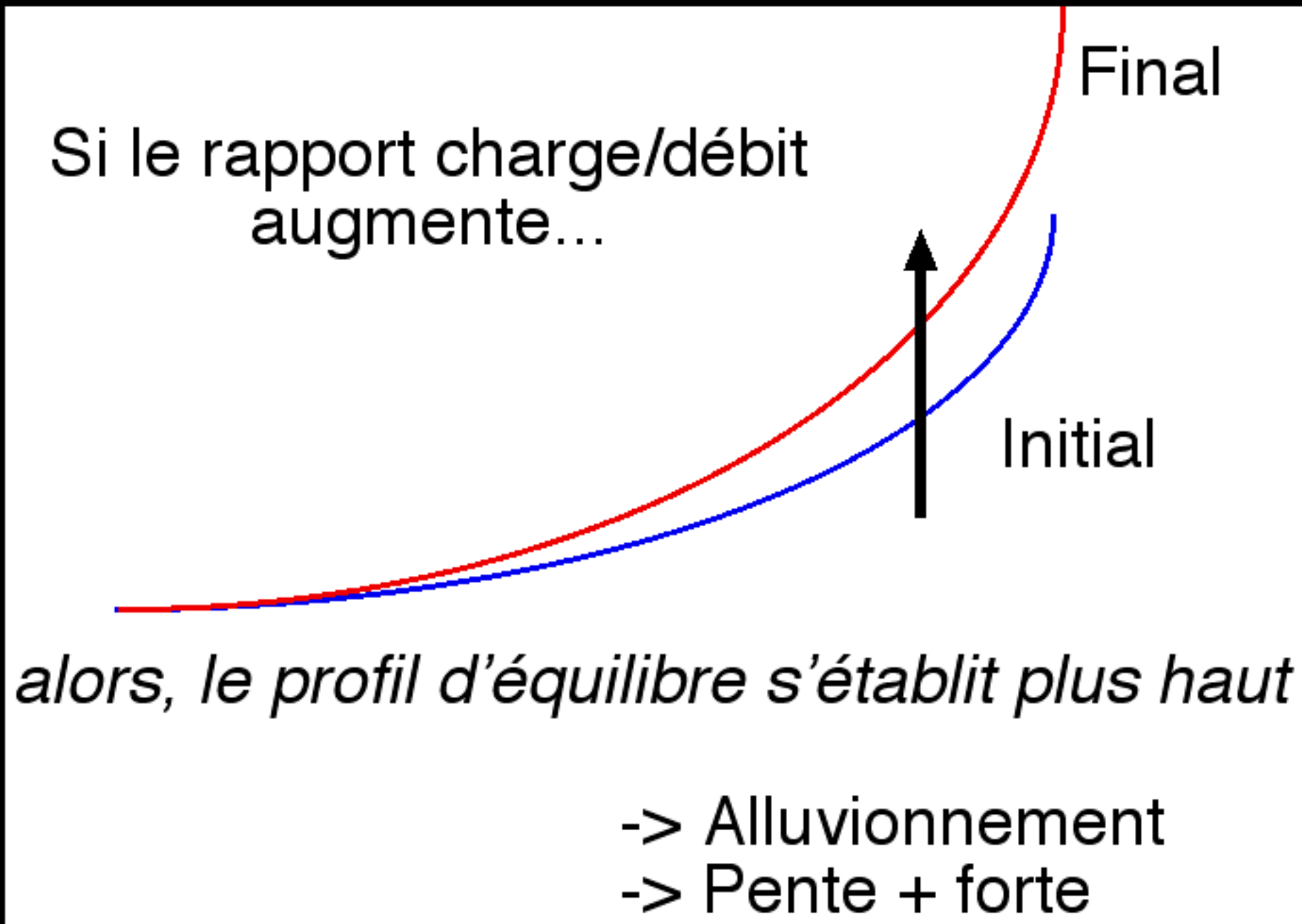




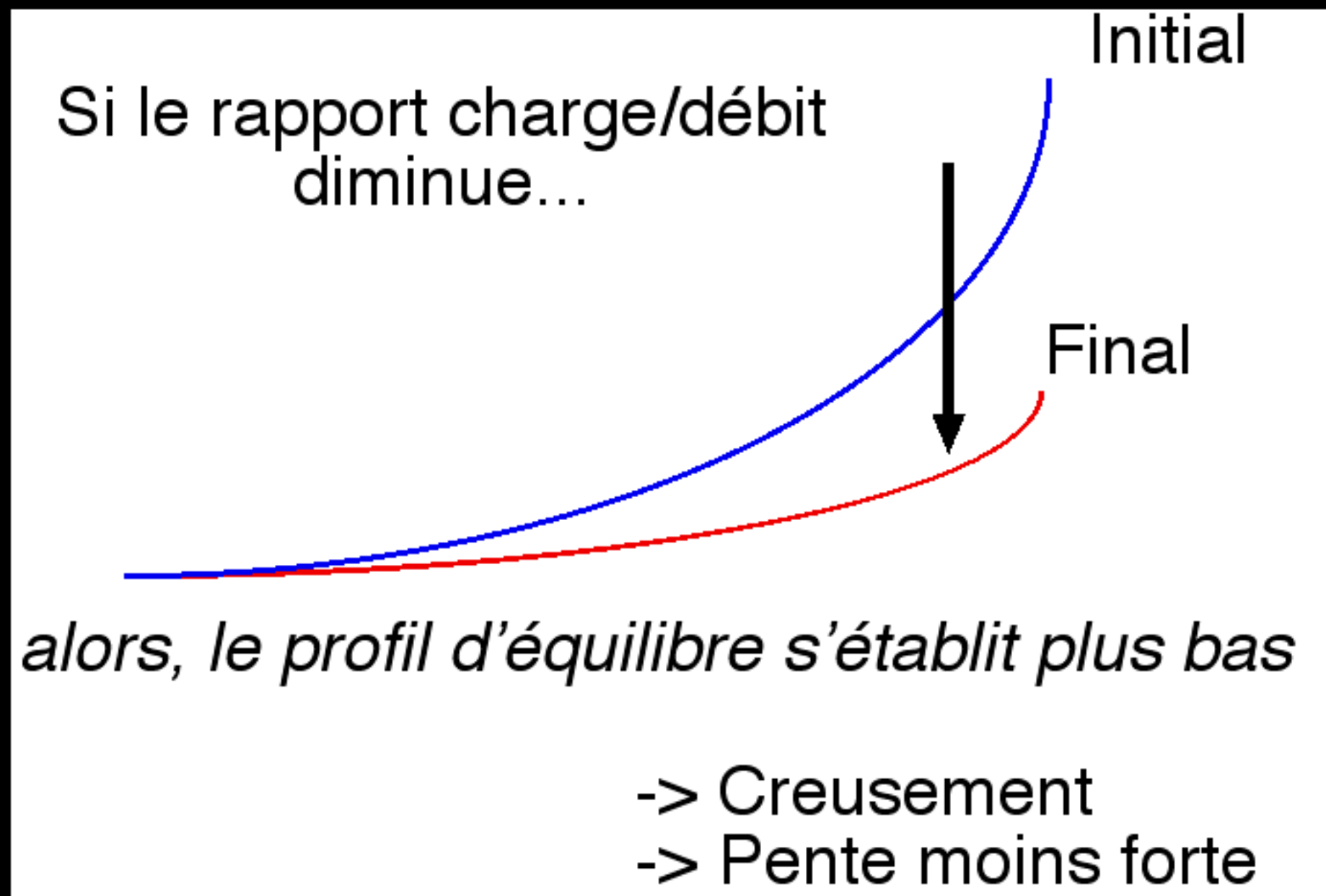
Copyright © A.N. Strahler



si charge importante et faible débit liquide

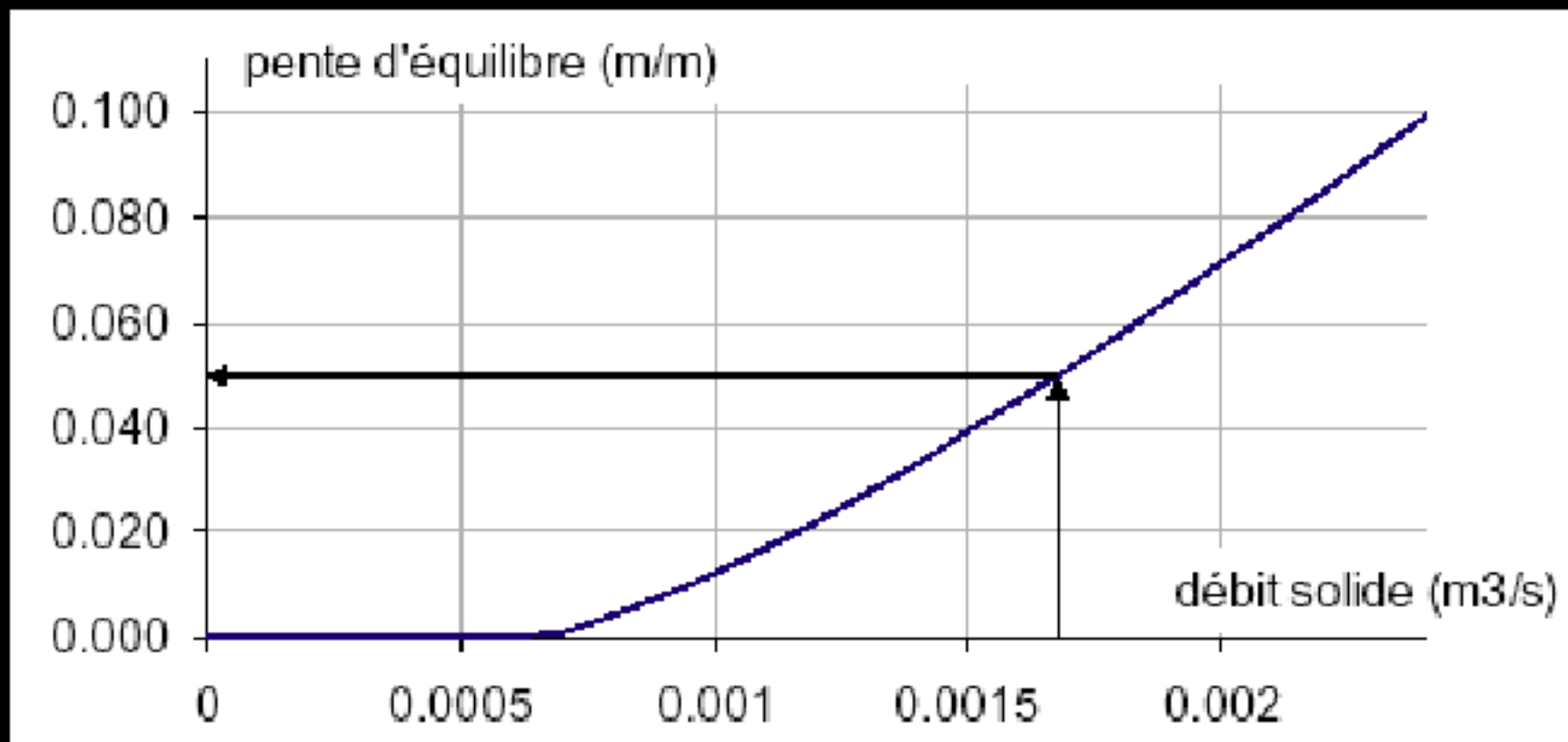


si charge faible, mais important débit liquide



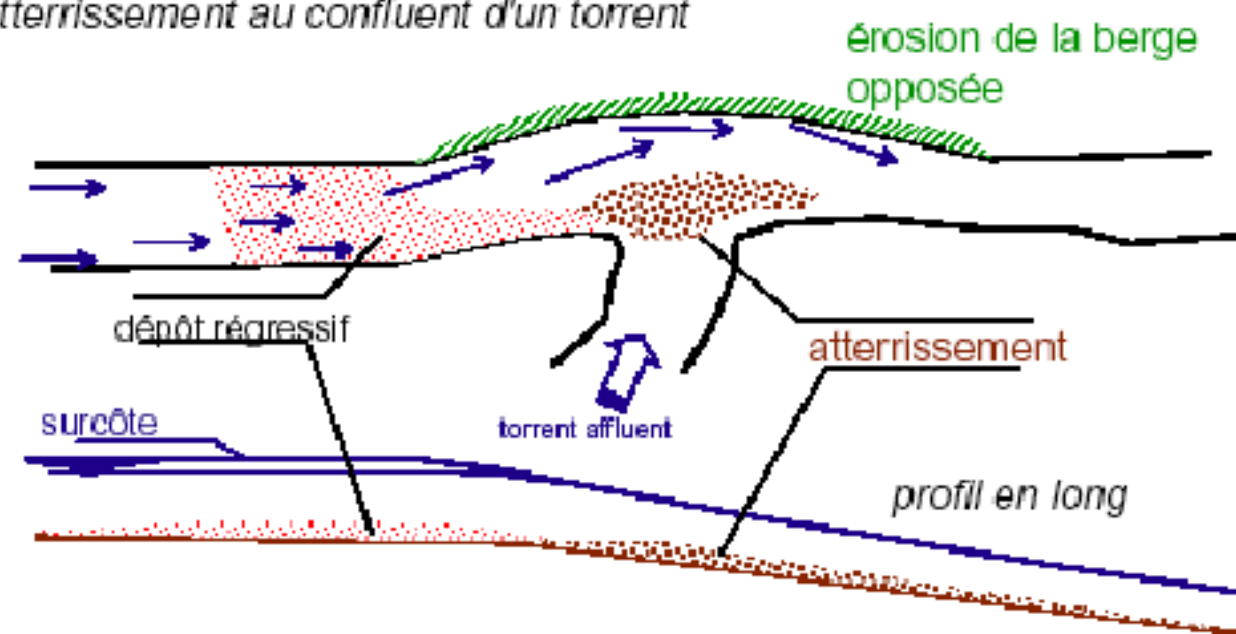


# Relation charge-débit

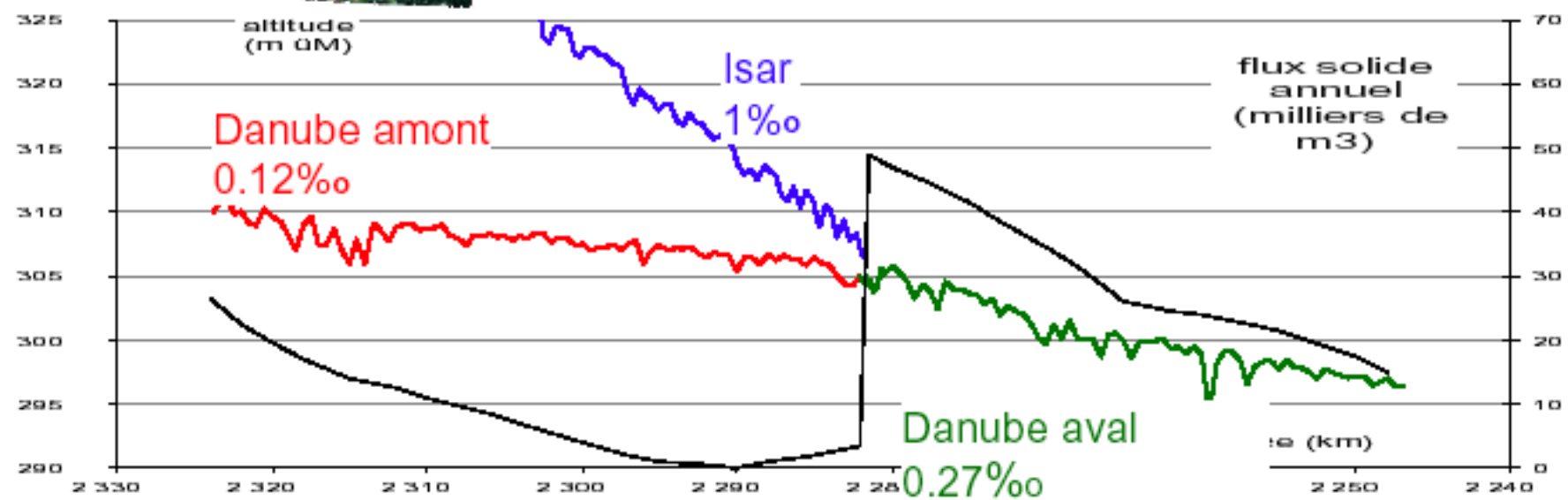




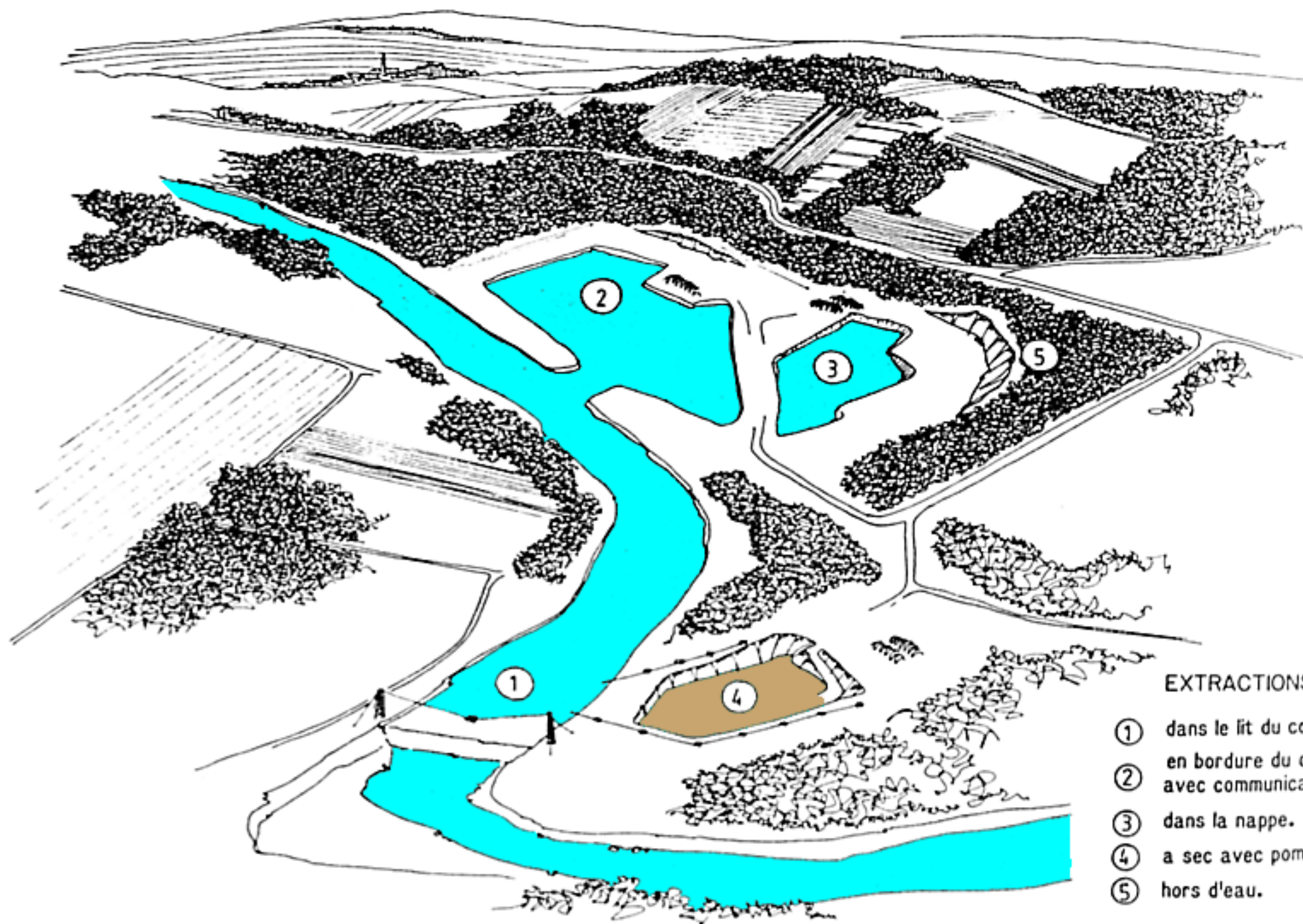
*atterrissement au confluent d'un torrent*



## Cassure de pente avec apport latéral solide, exemple: **Danube et Isar**



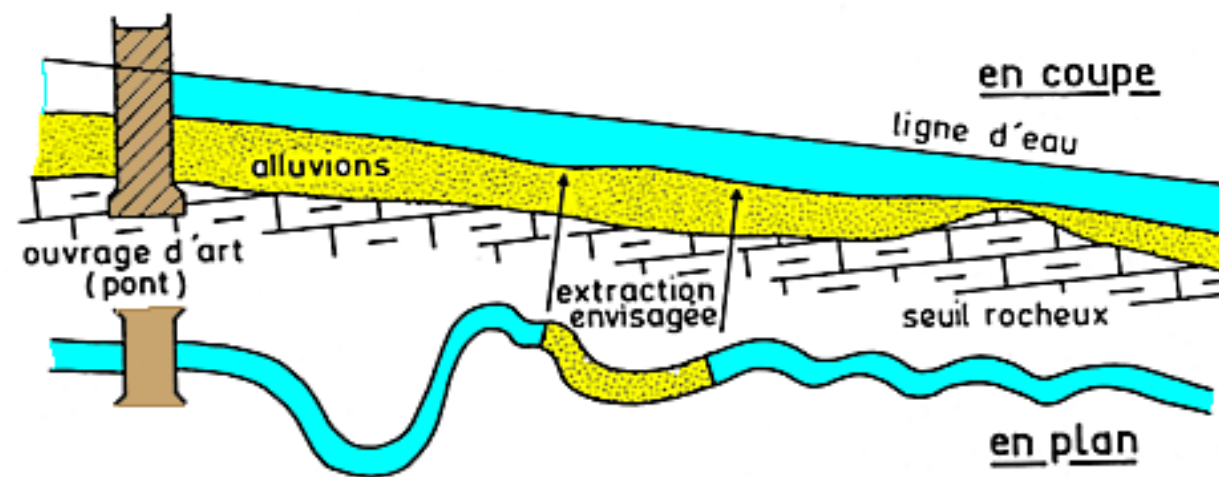




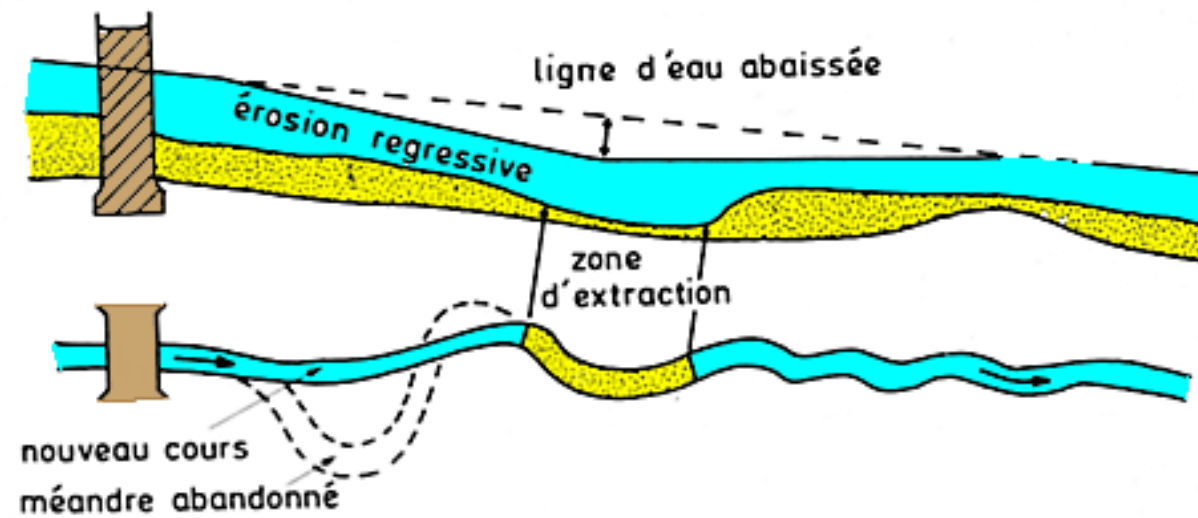
#### EXTRACTIONS

- ① dans le lit du cours d'eau.
- ② en bordure du cours d'eau avec communication.
- ③ dans la nappe.
- ④ a sec avec pompage.
- ⑤ hors d'eau.

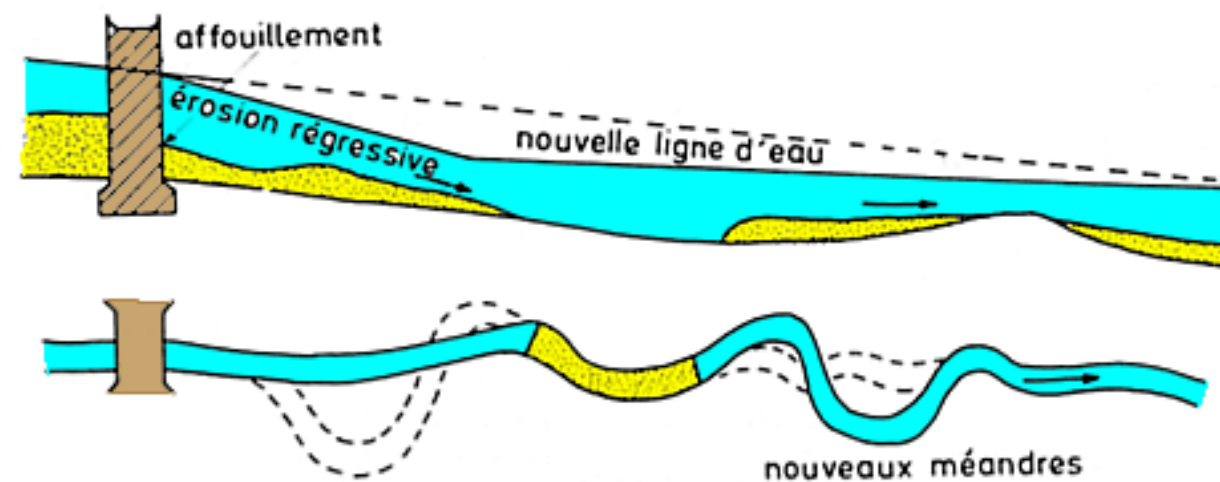
### Etat initial



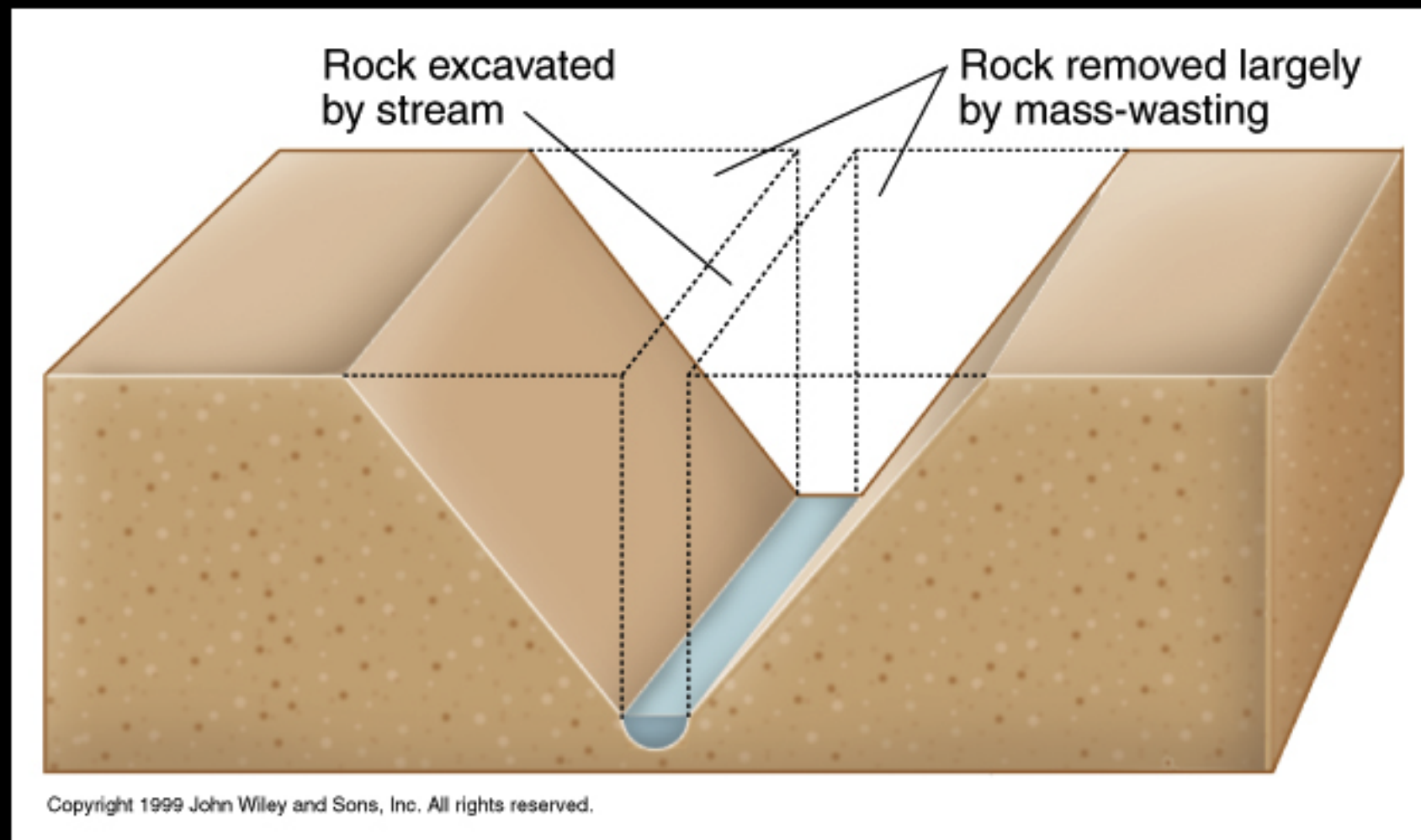
### Stade 1



### Stade 2



# Le creusement des vallées





# Vallée d'Hawai



(vieille de seulement 500 000 ans)

# Plaine d'inondation



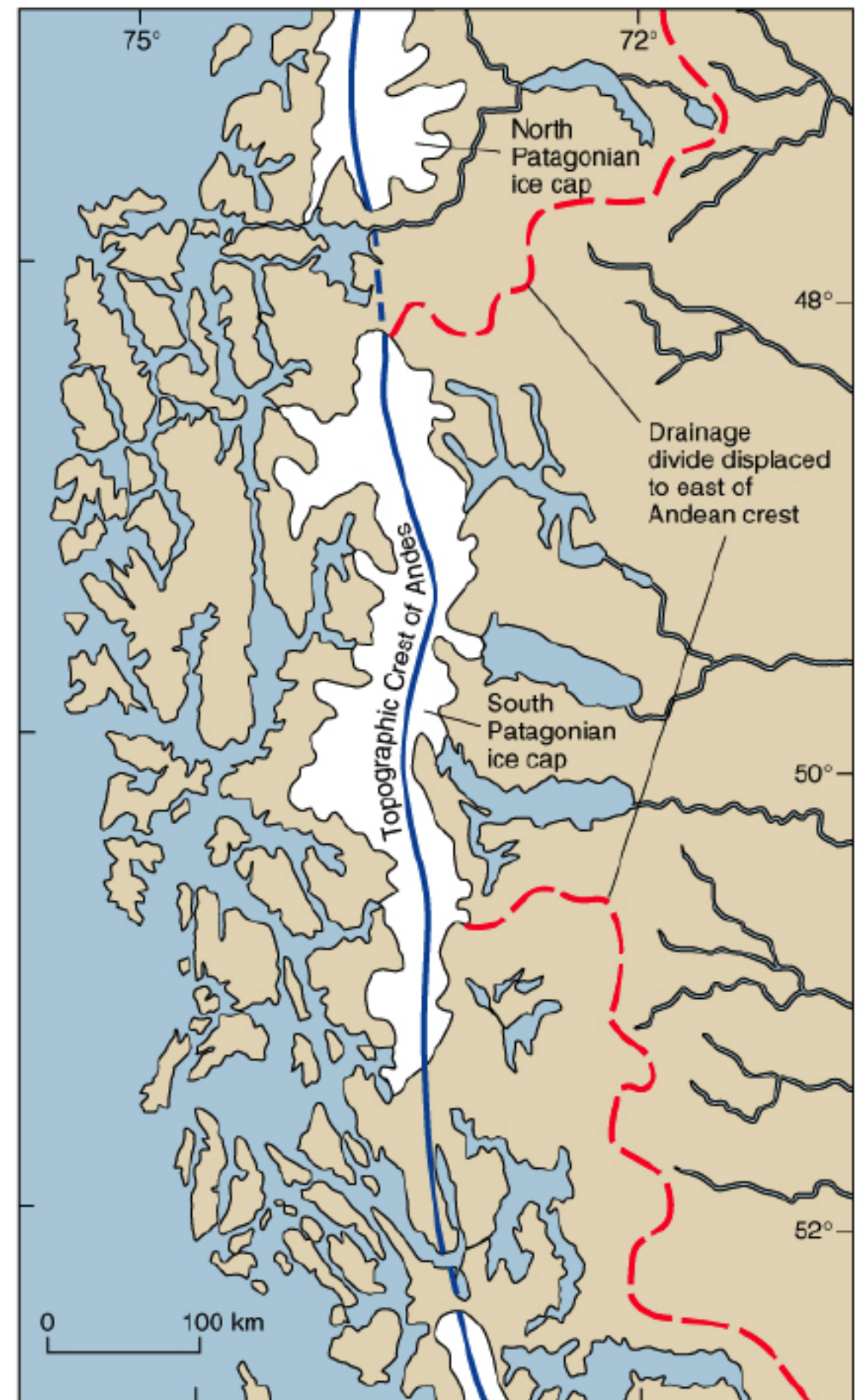
Missouri, image Landsat



# L'érosion régressive

Chili - Argentine

Ligne des crêtes et ligne des cols

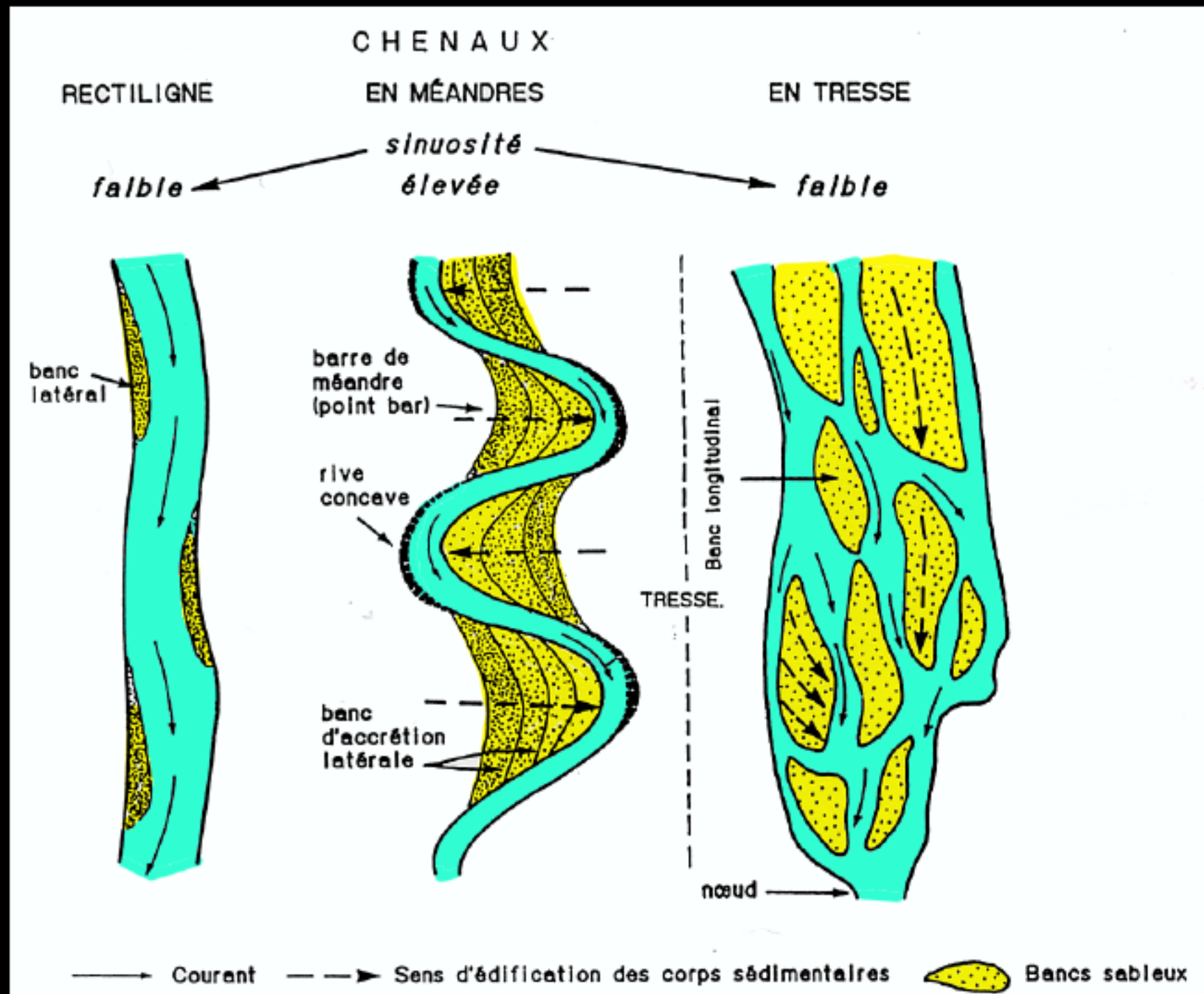


Copyright 1999 John Wiley and Sons, Inc. All rights reserved.

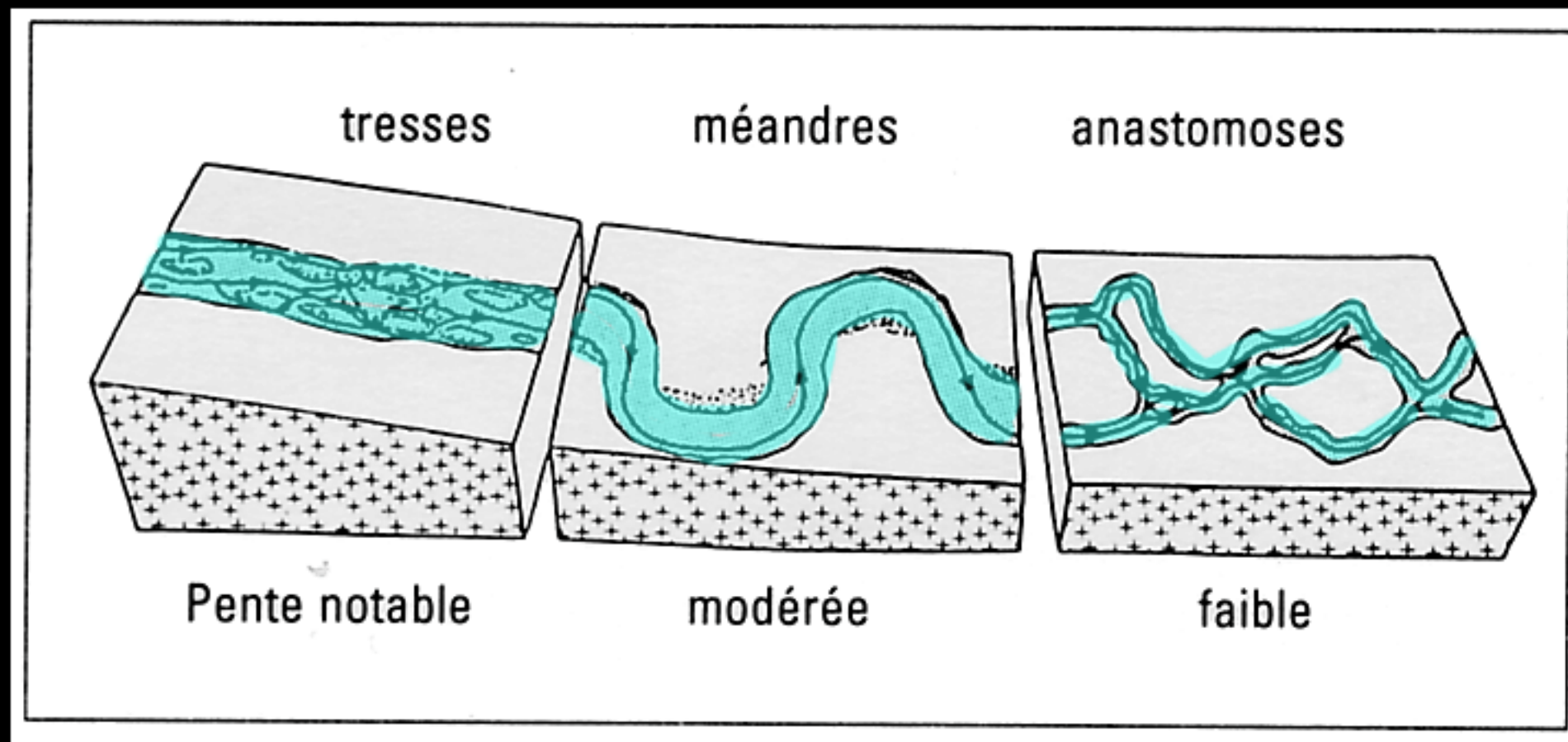
: L'érosion régressive:



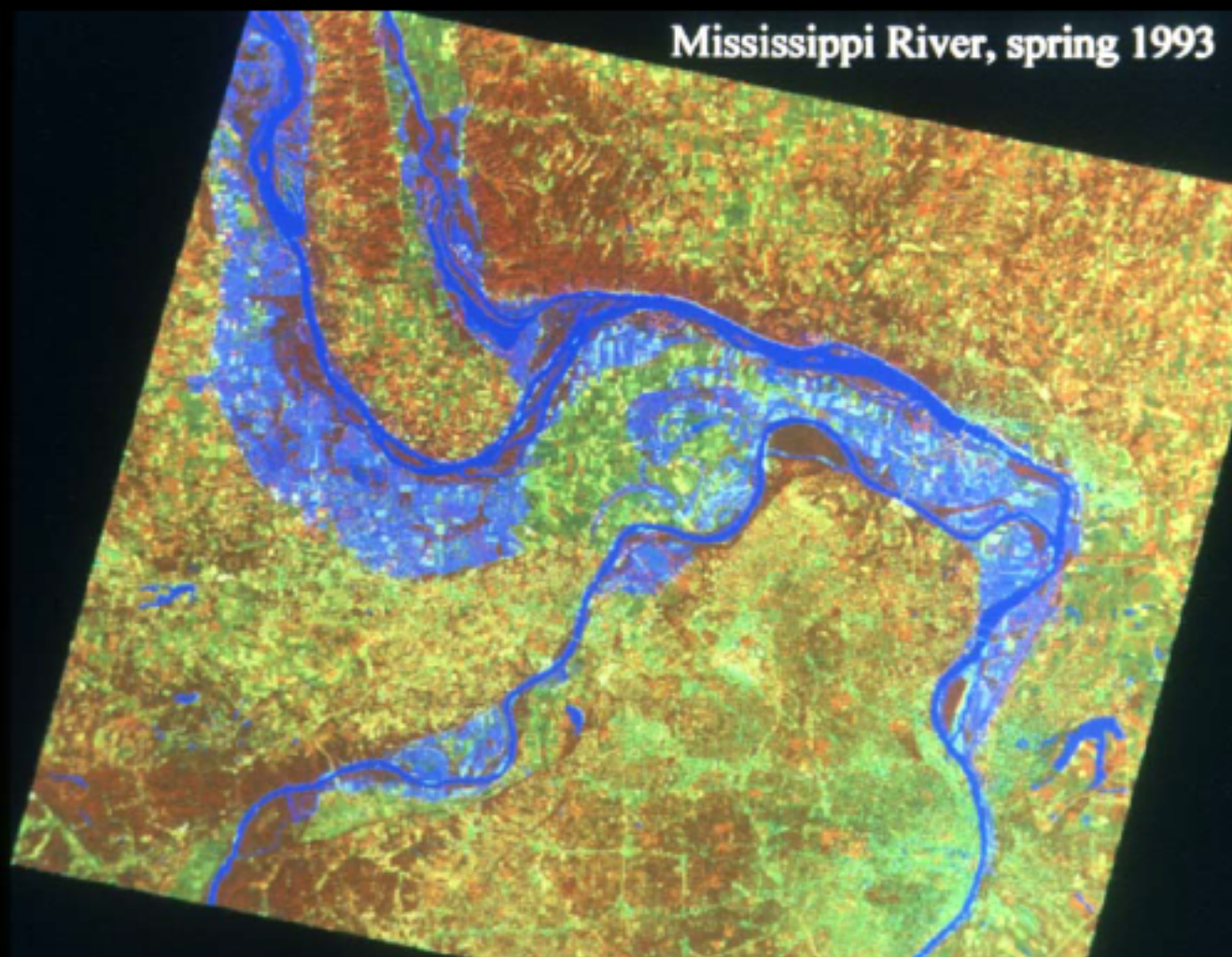
# Les différents types de chenaux



# en fonction de la pente

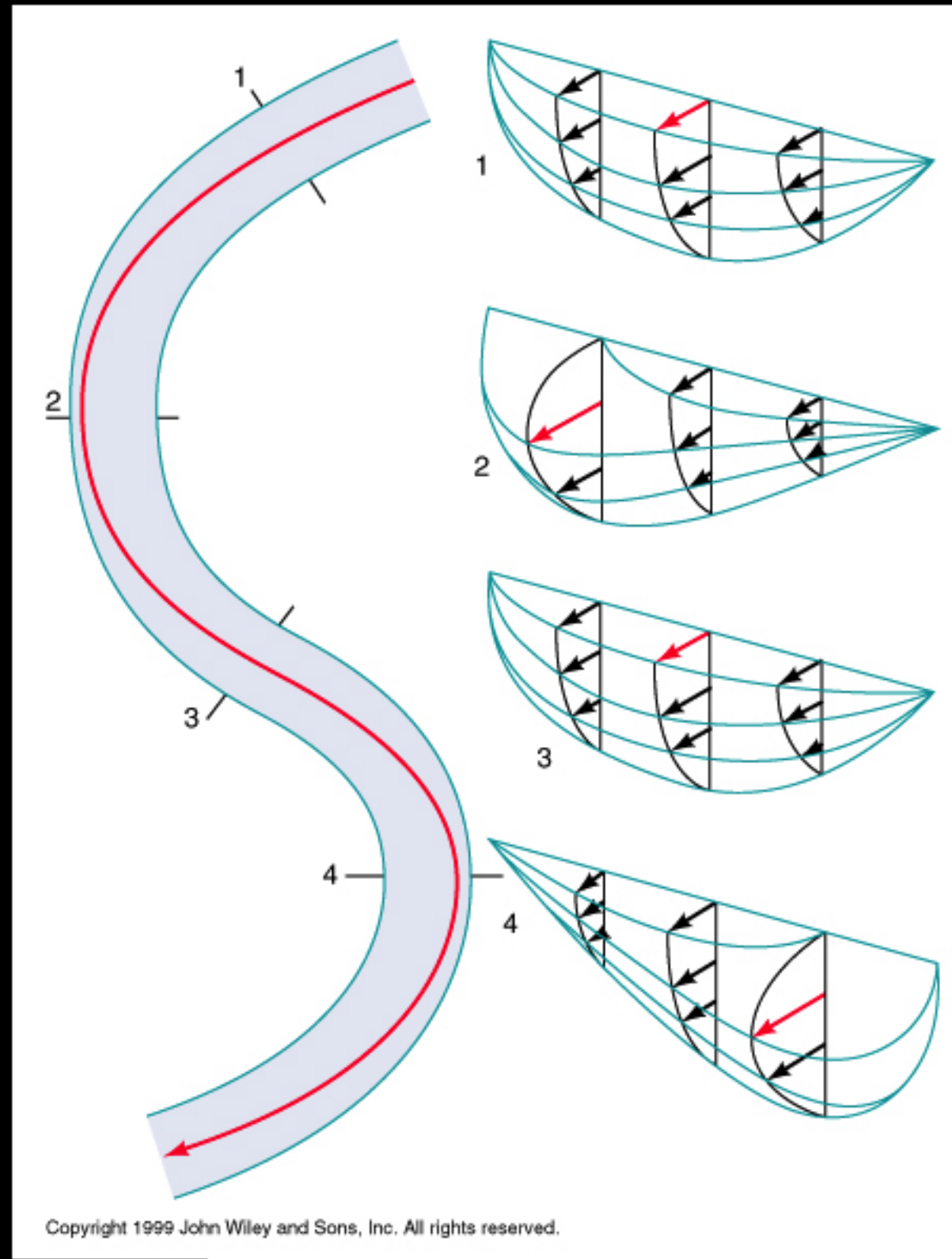


# Les cours d'eau à méandres

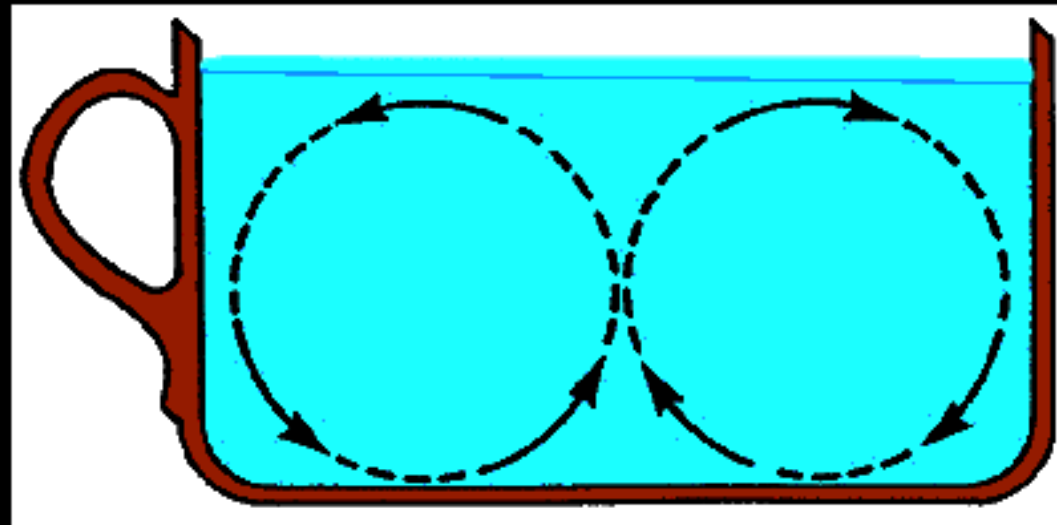




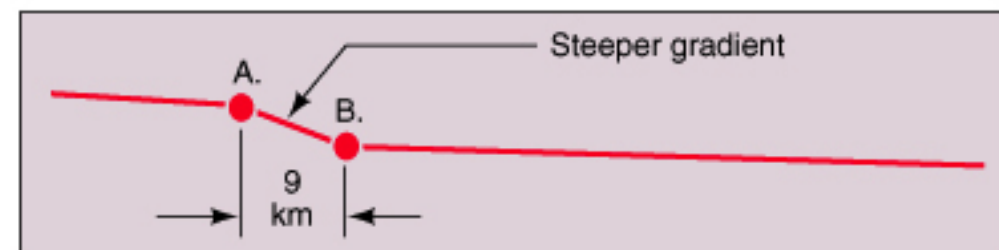
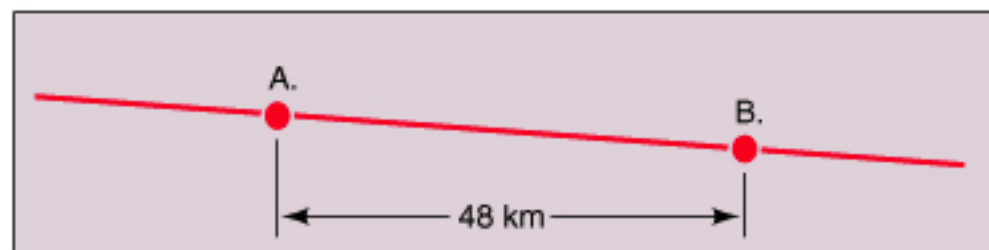
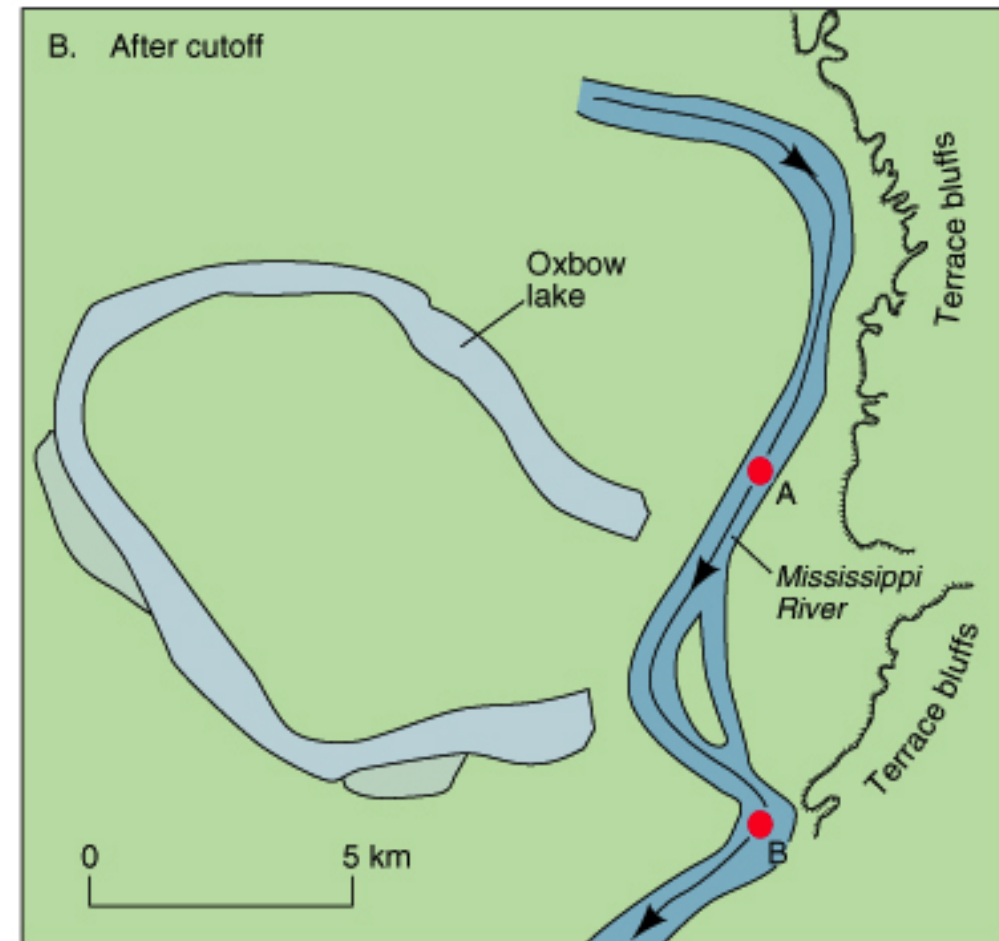
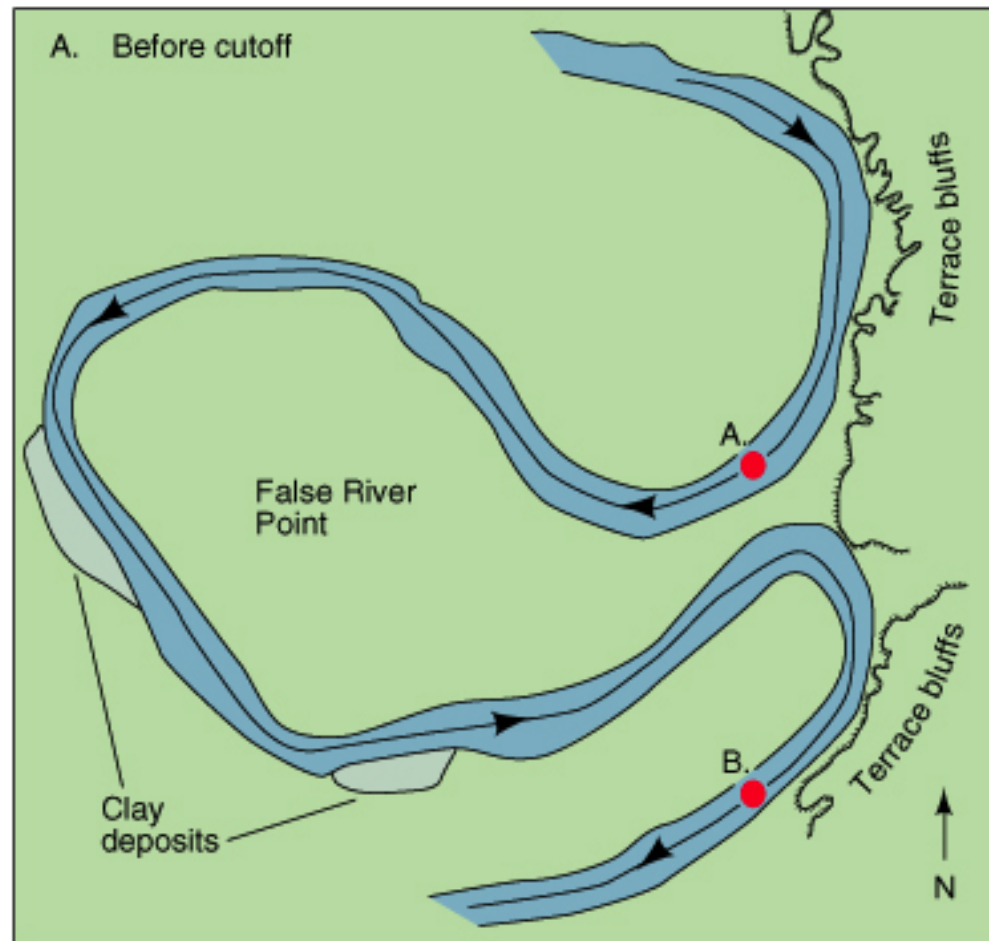
# Creusement des méandres



## Explication des méandres par le modèle de la "tasse touillée" (Einstein)



# Recoupement de méandre



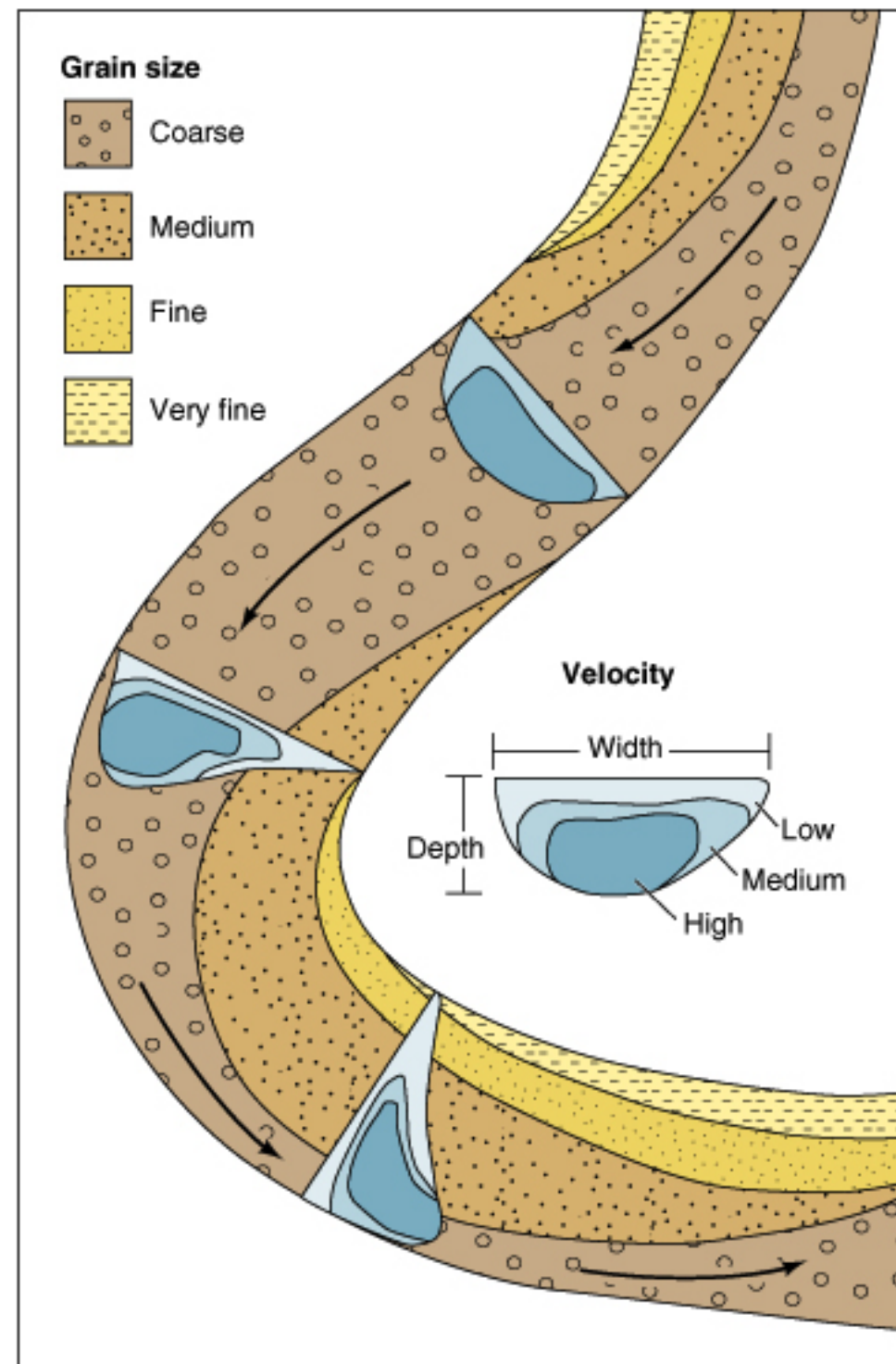
Copyright 1999 John Wiley and Sons, Inc. All rights reserved.



# Méandres morts



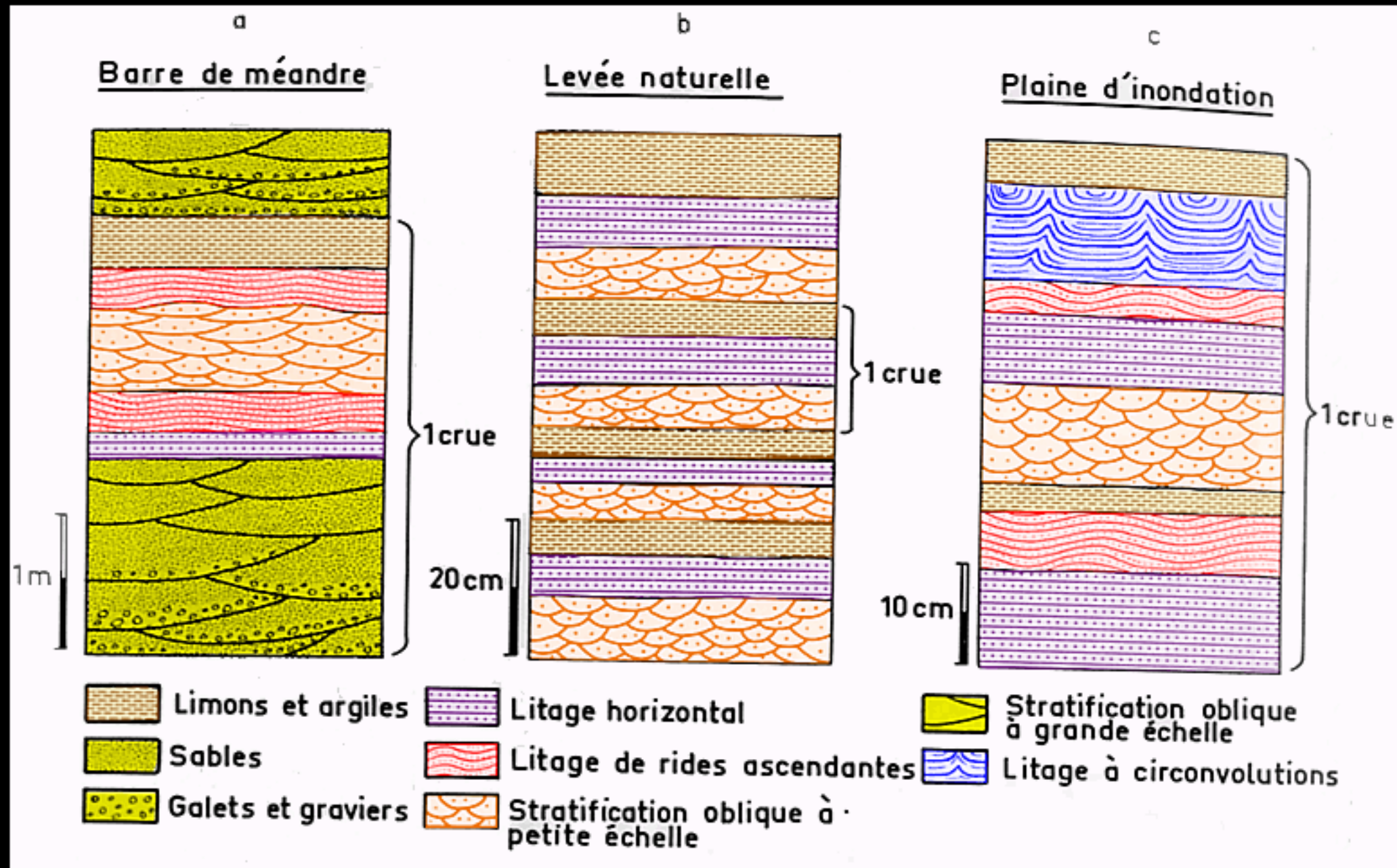
# Dépôts de méandres



Copyright 1999 John Wiley and Sons, Inc. All rights reserved.

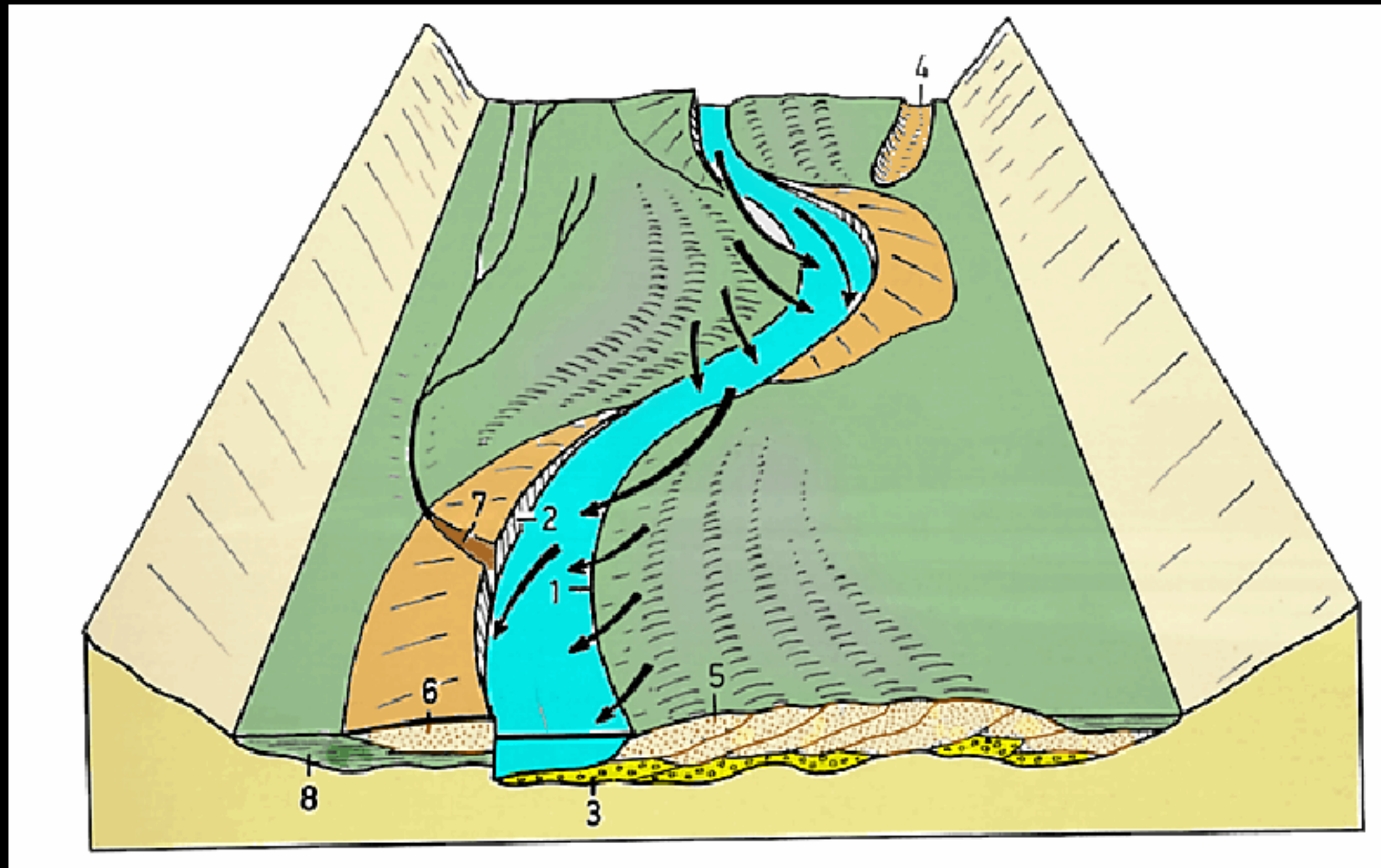


# Les dépôts





# Les barres de méandres



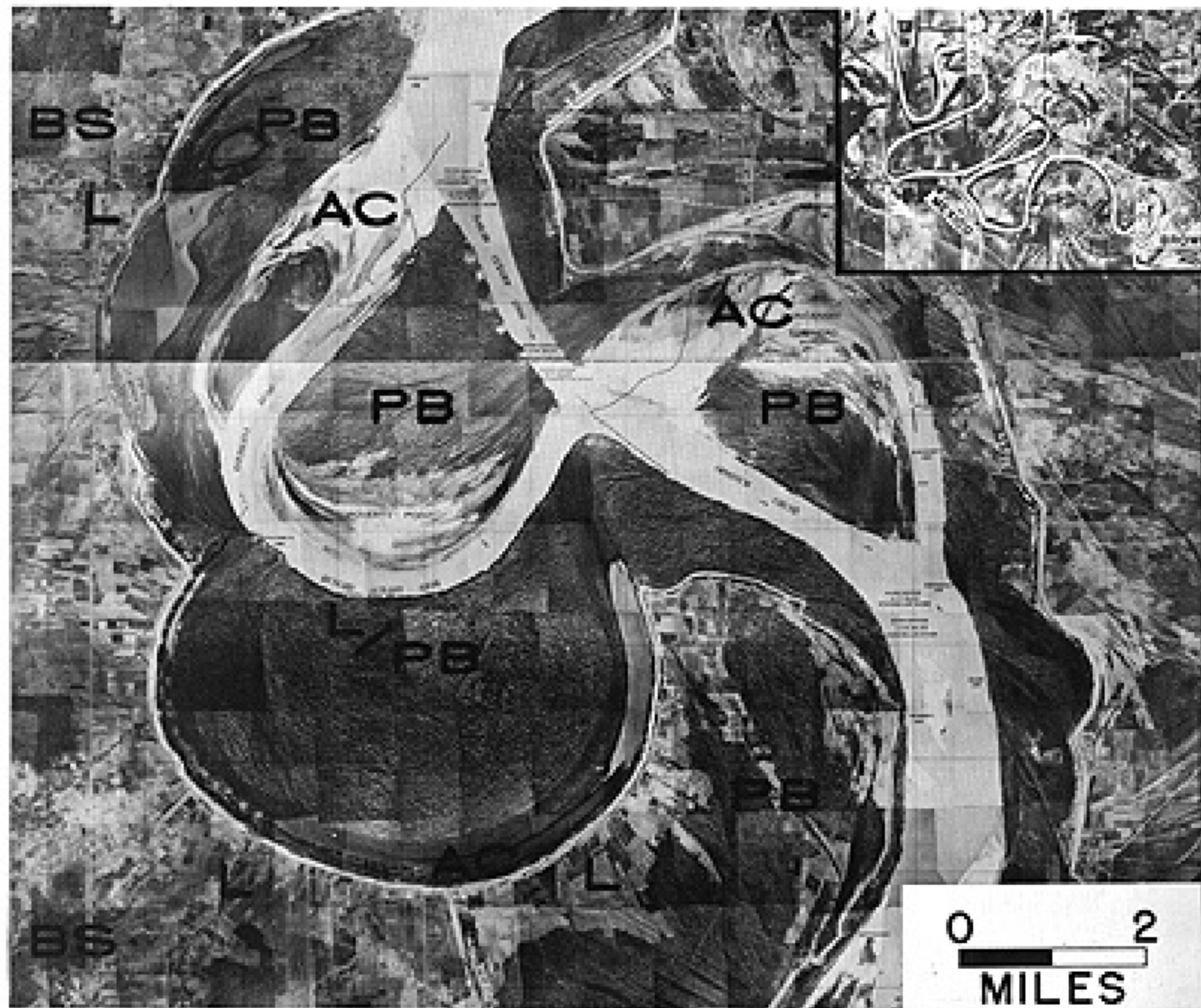


Fig. 5 - Alluvial valley environments: PB = point bar, L = natural levee, AC = abandoned channel or oxbow, BS = bar sand (after LeBlond, 1950).

: Cours d'eau à méandres: Barres de méandres: Photo aérienne:





: Cours d'eau à méandres: Barres de méandres: Cliché dépôt de barre de méandre:





: Cours d'eau à méandres: Barres de méandres: Cliché barres de méandres - bord de mer:

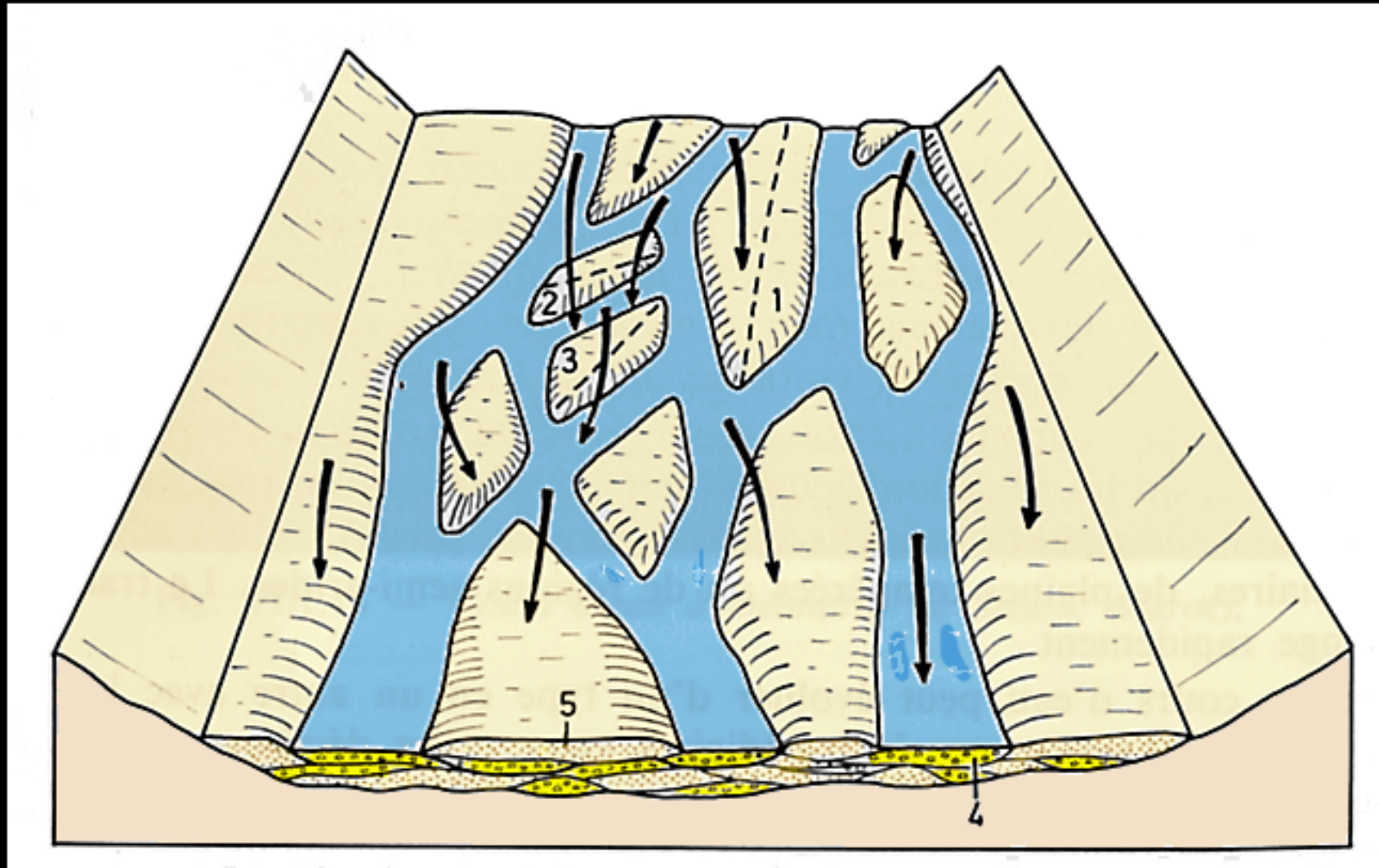




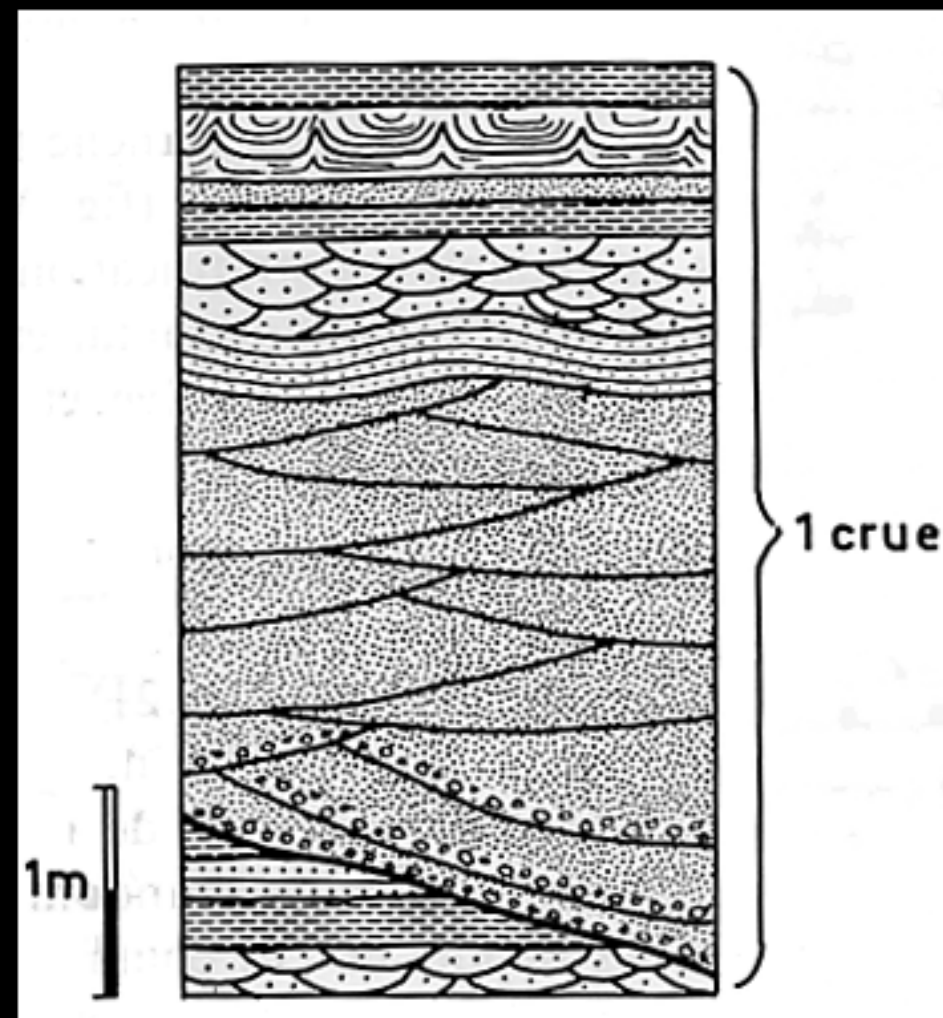
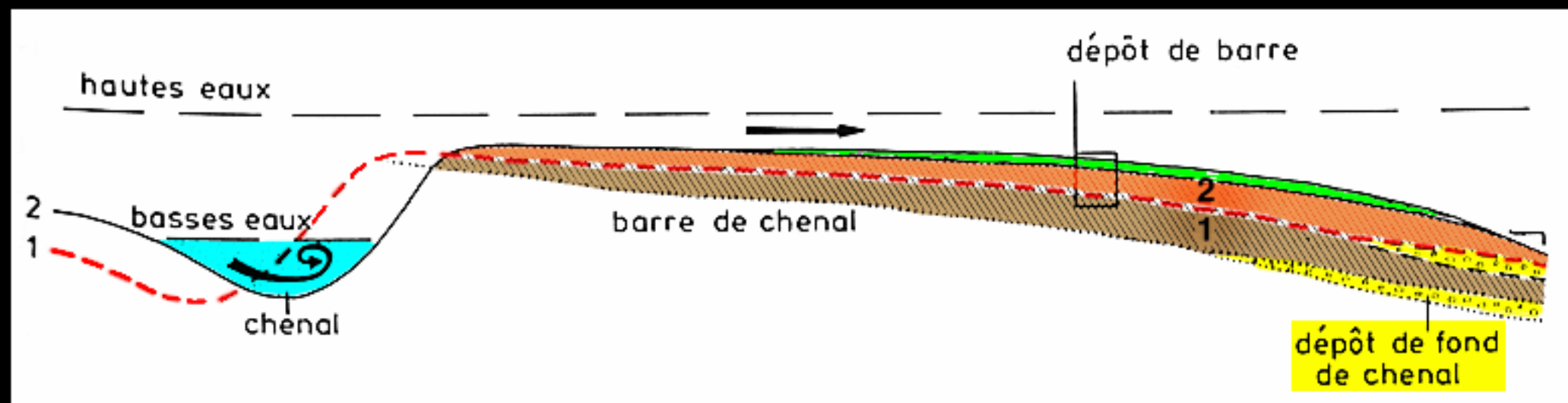
: Cours d'eau à méandres: Barres de méandres: Cliché barres de méandres - bord de mer:



# Les cours d'eau à chenaux en tresse









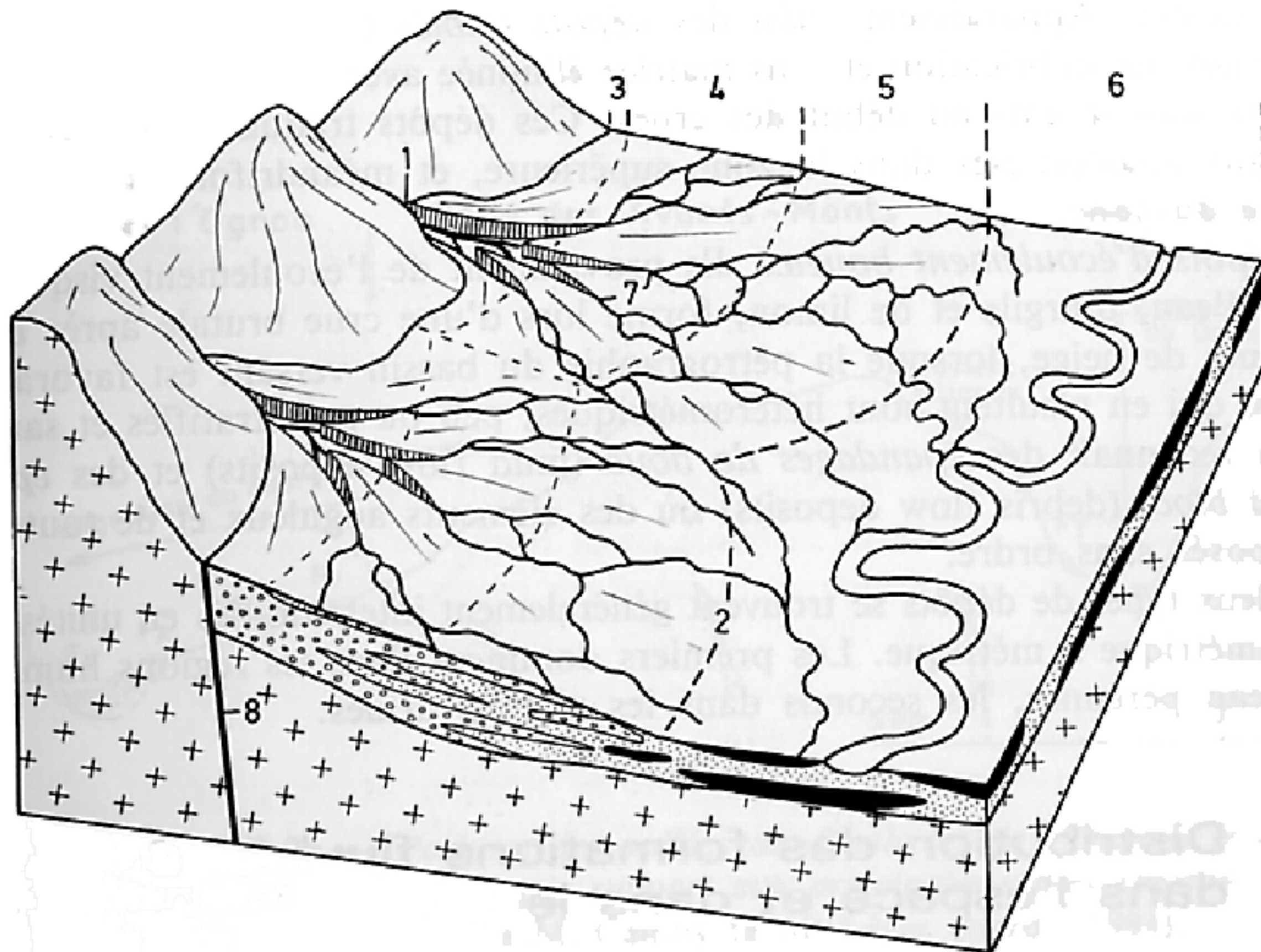




# Les cônes alluviaux







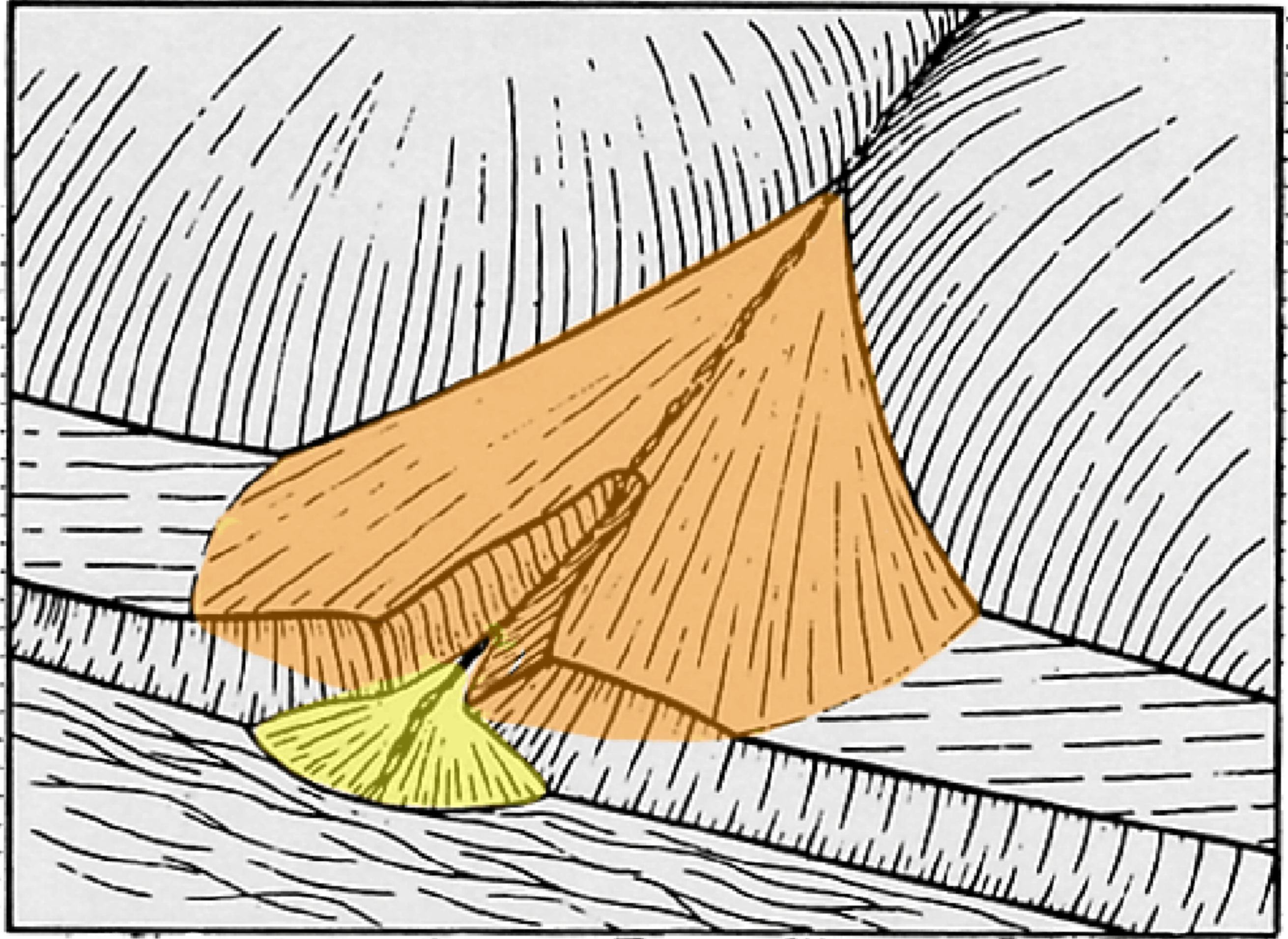
Limons et argiles



Sables et graviers



Blocs et galets



: Cônes alluviaux: Bloc-diagramme simplifié:



# Terrasses et nappes alluviales





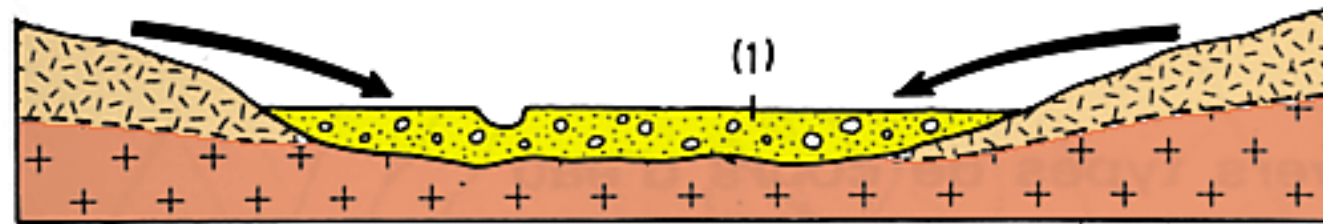




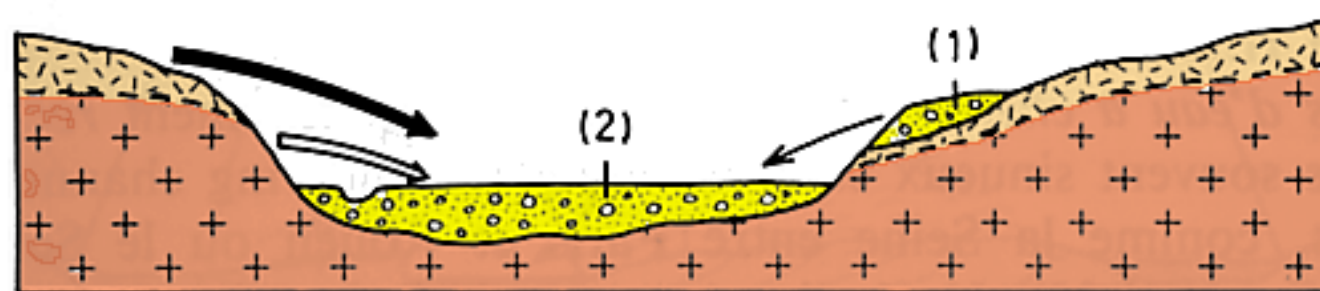


: Terrasses et nappes alluviales: Carte de la vallée de l'Isère:

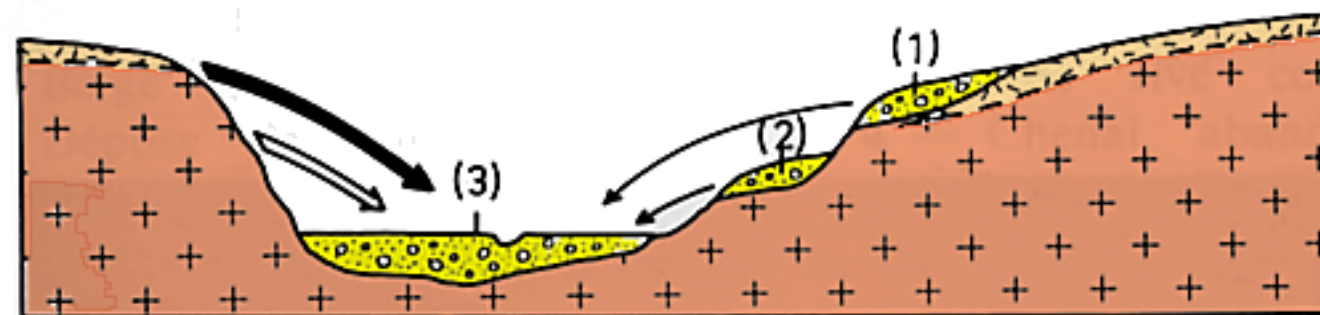
### a) Pliocène



### b) Quaternaire ancien

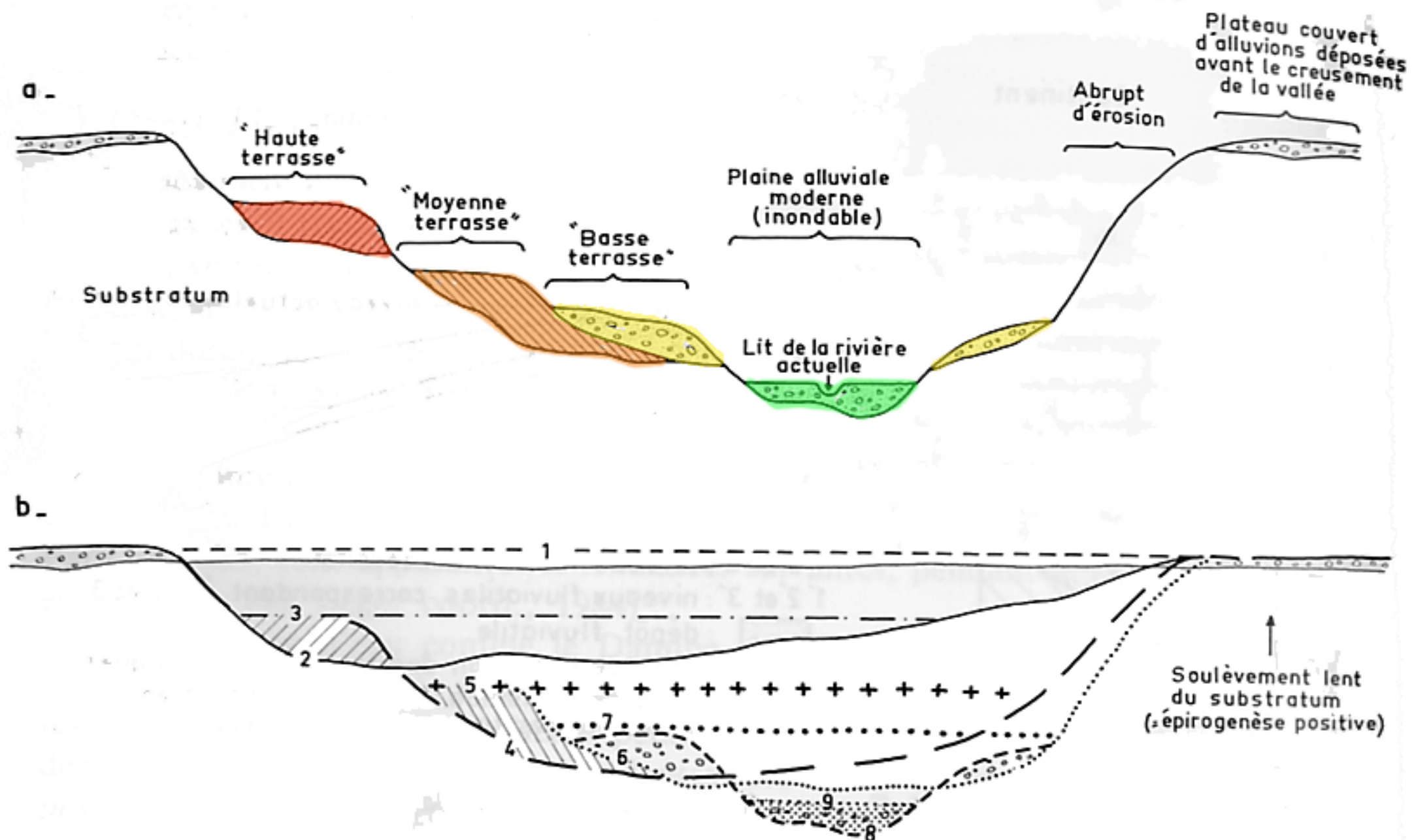


### c) Quaternaire récent



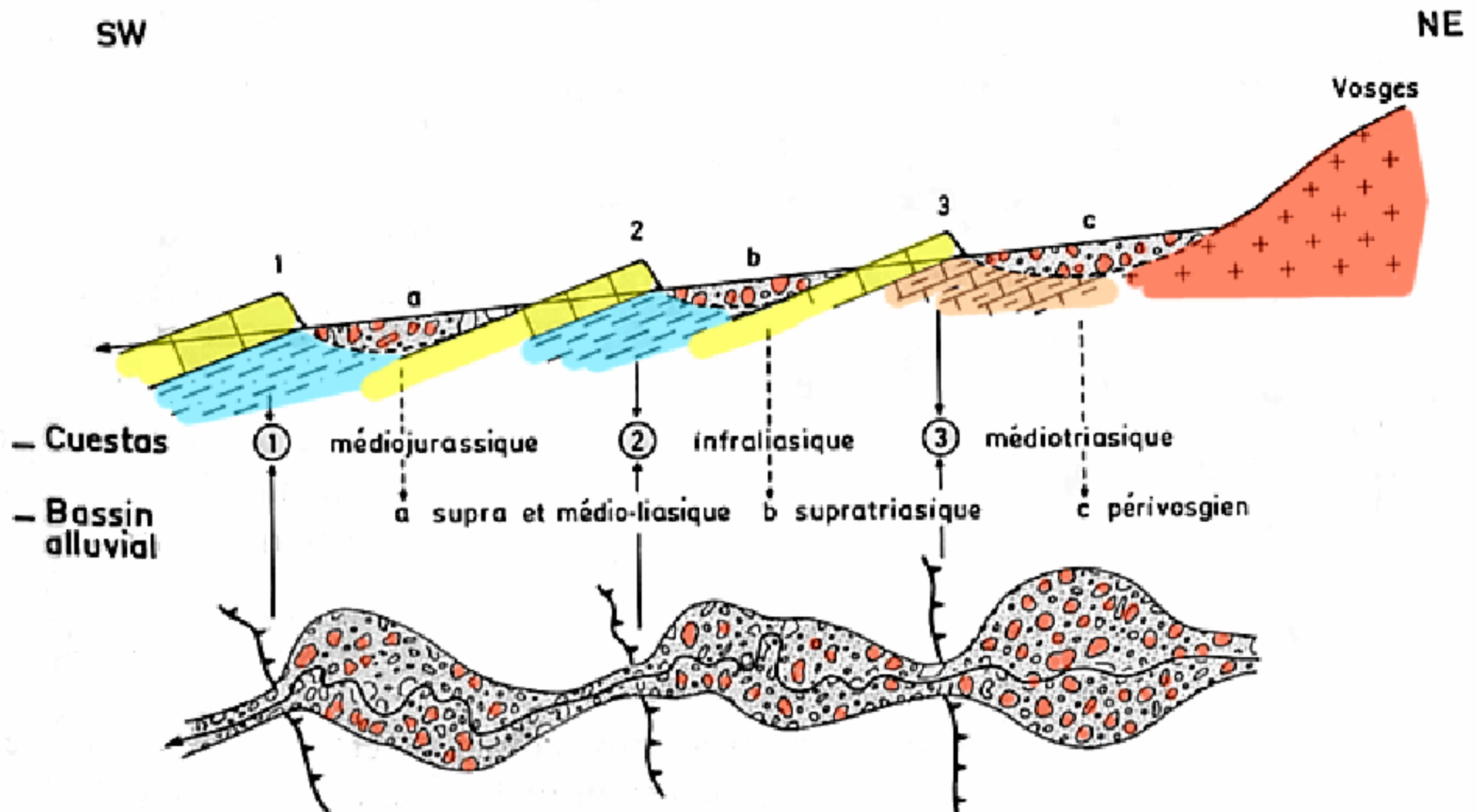
 Altérites (arènes, gores,...) 
  Alluvions fluviales  
 Substratum cristallin



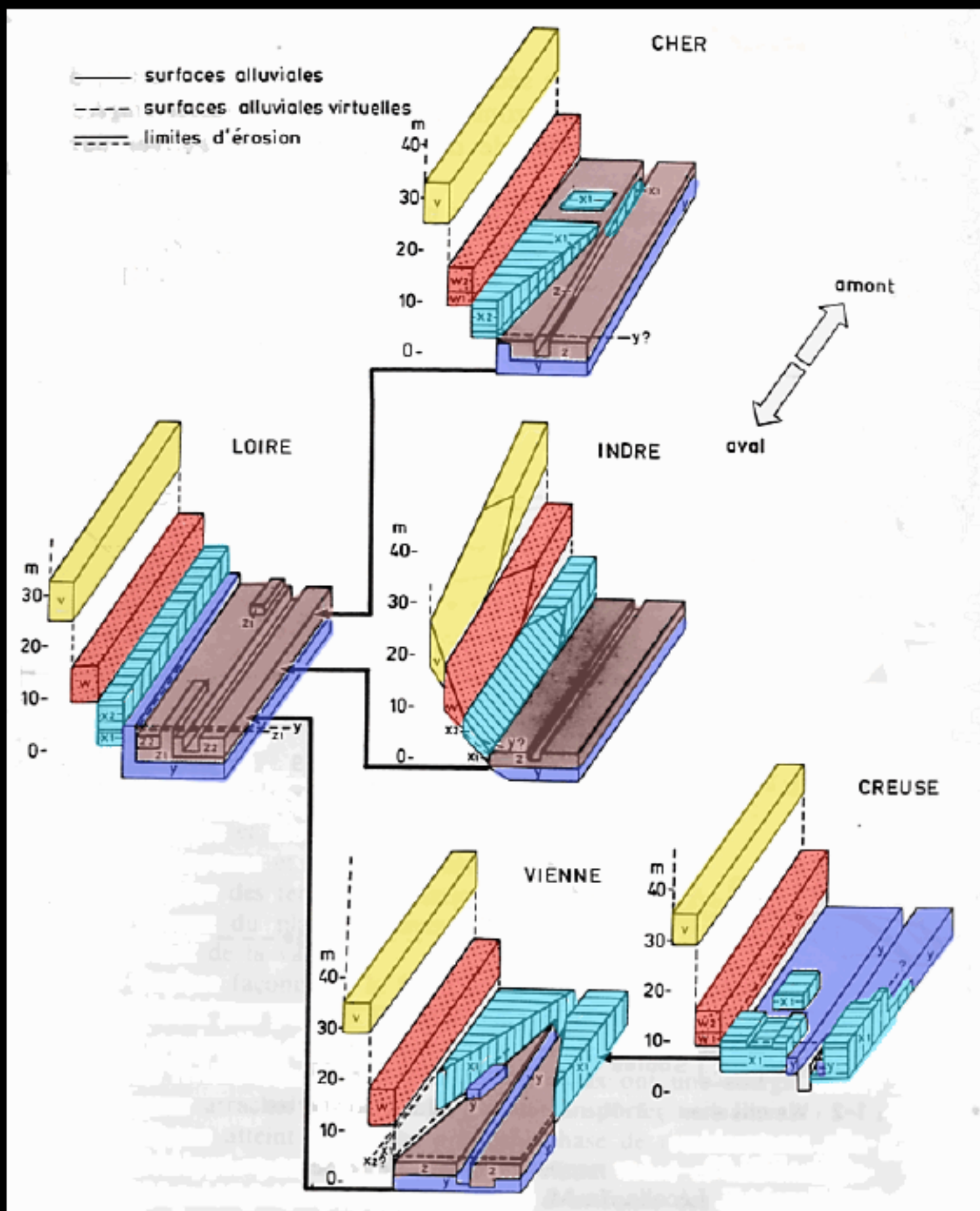


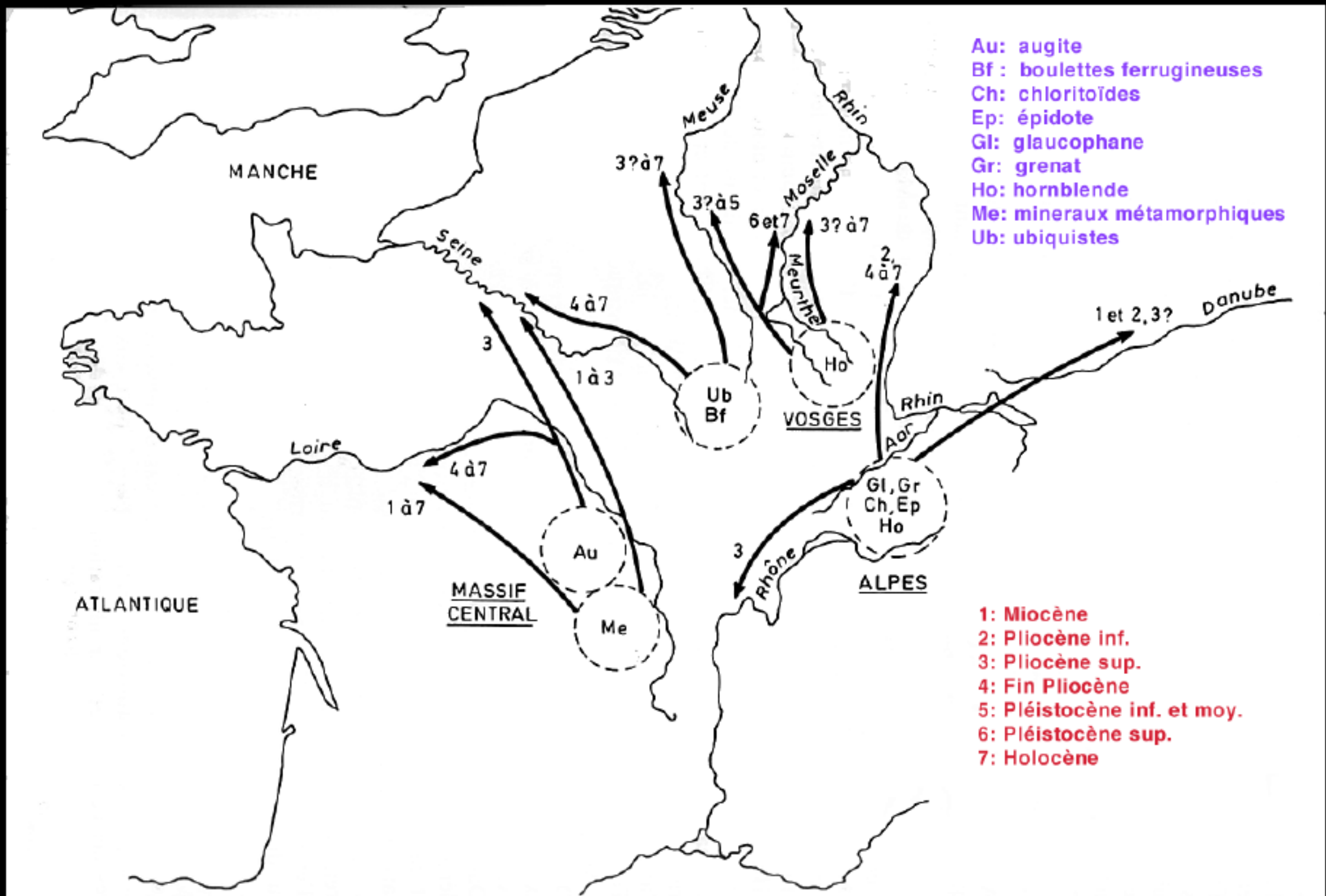
# Vallée de l'Ognon

(Haute-Saône)



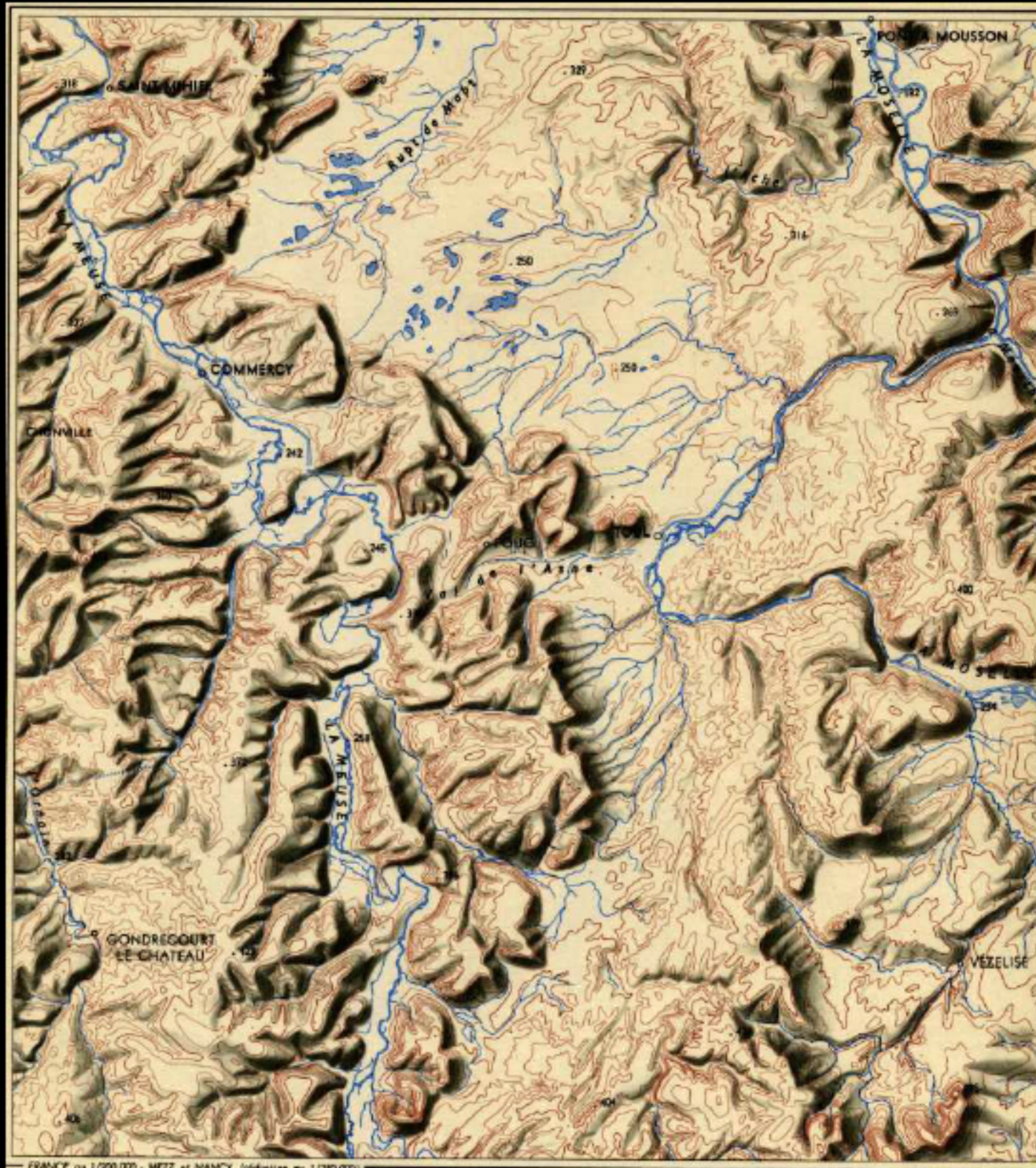






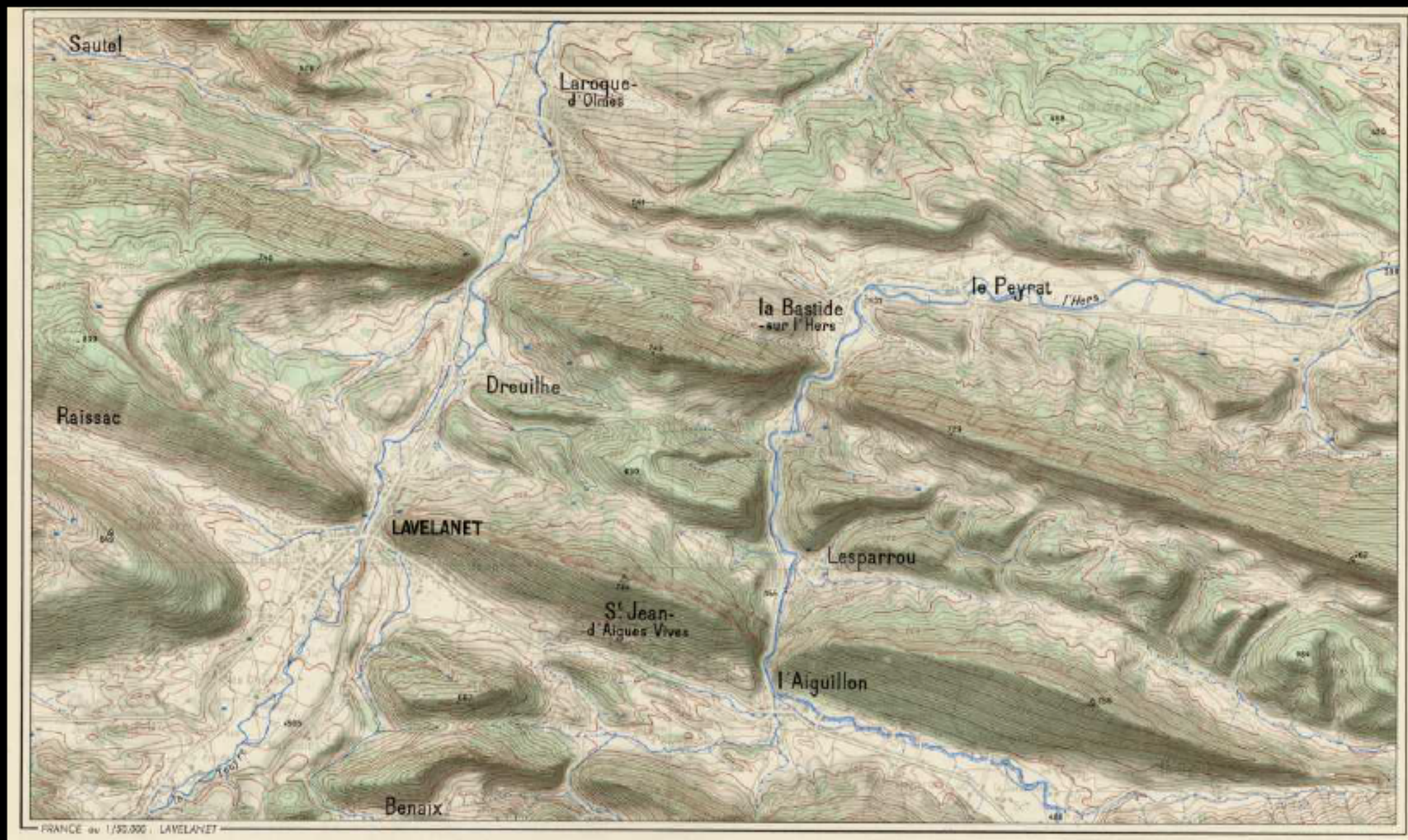


# Capture, surimposition et antécédence

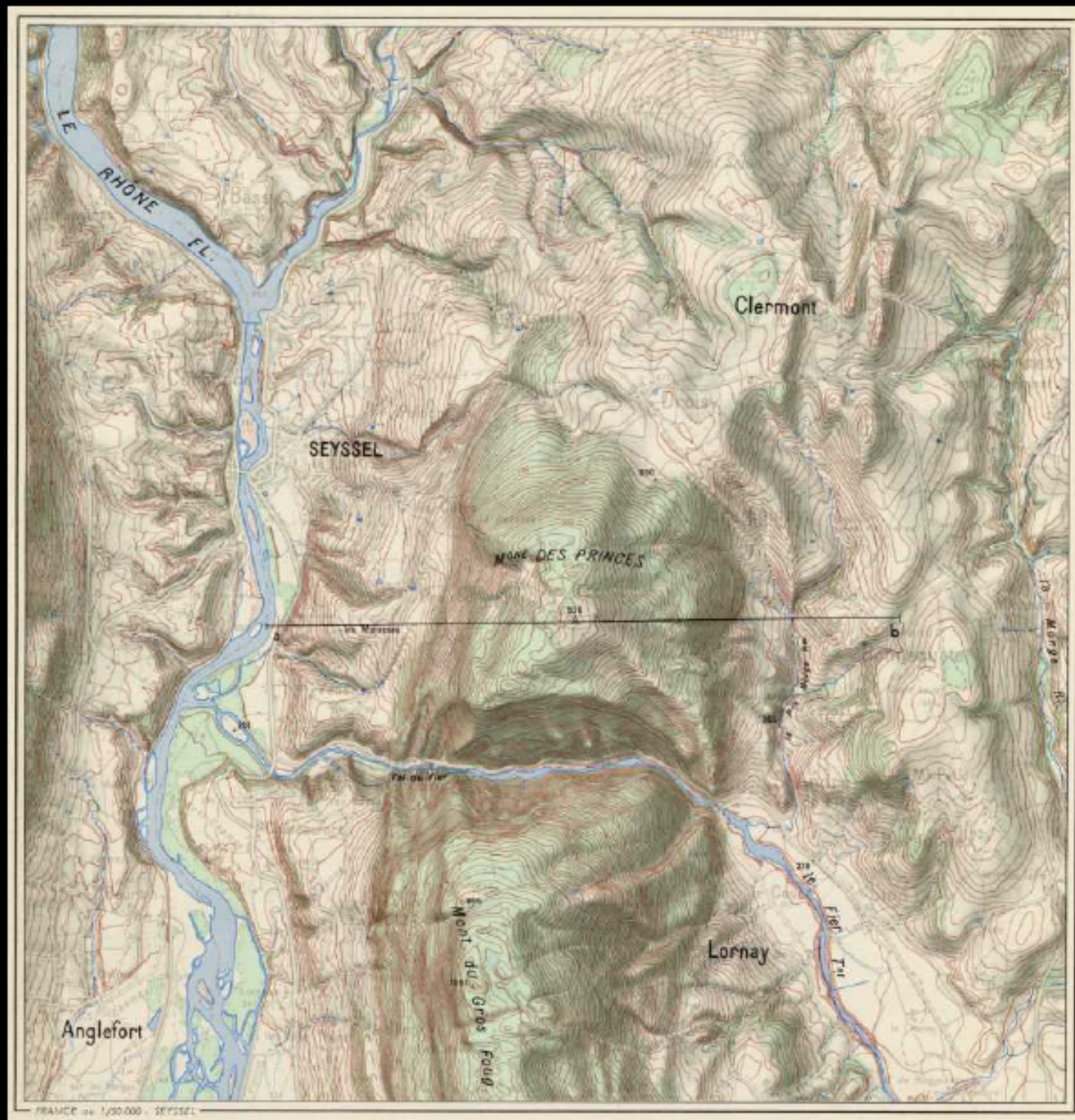


Exemple:  
capture du val  
de l'Âne



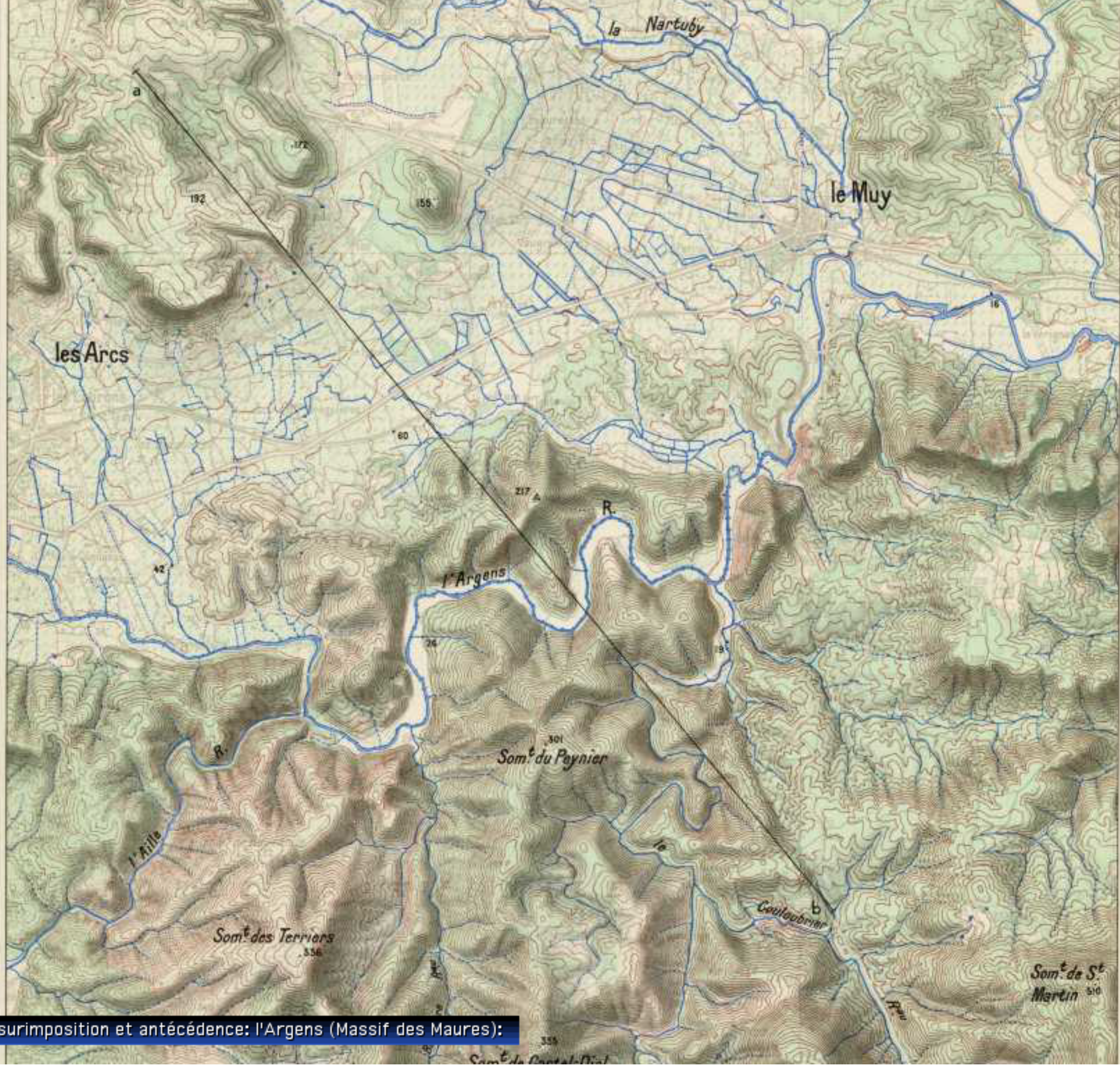






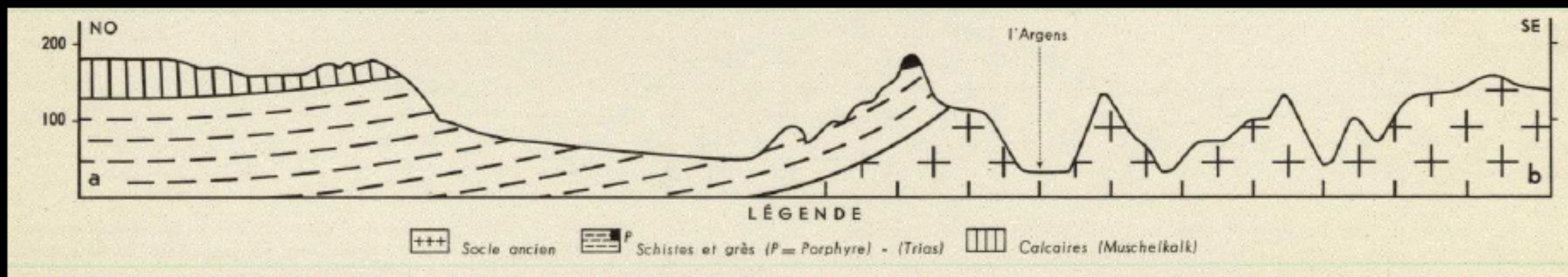
: Capture, surimposition et antécédence: Surimposition ou antécédence de la Fier:





: Capture, surimposition et antécédence: l'Argens (Massif des Maures):





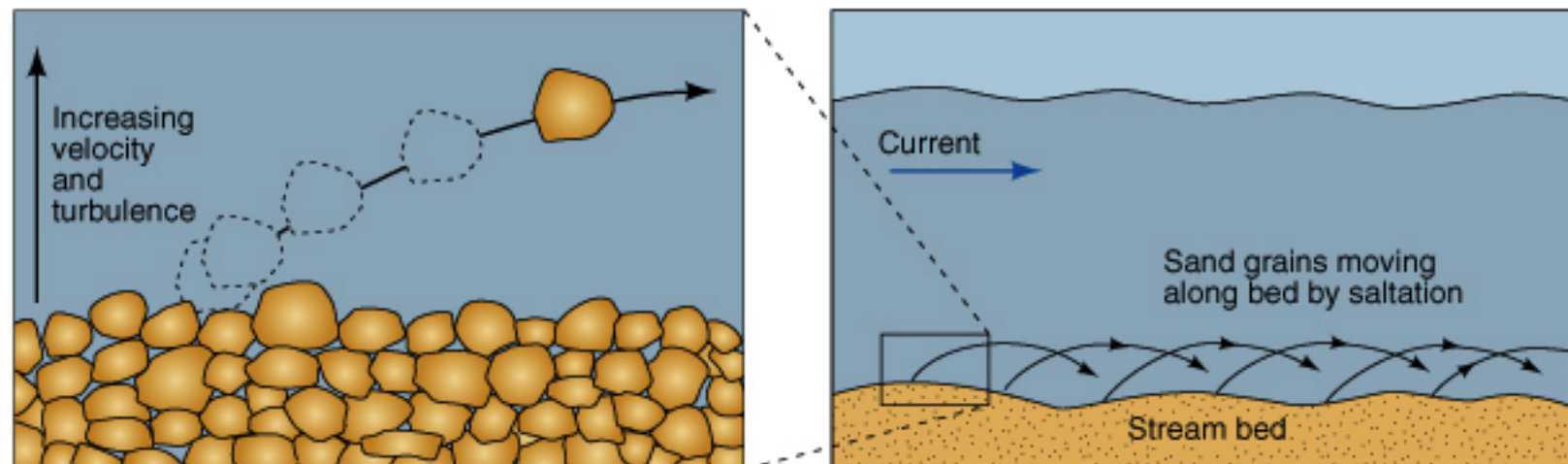
# Les alluvions

## Caractères généraux

- ◆ dépôts bien **stratifiés**
- ◆ éléments détritiques **émoussés**: galets
- ◆ bon **granoclassement**
- ◆ **structures sédimentaires**



# Saltation



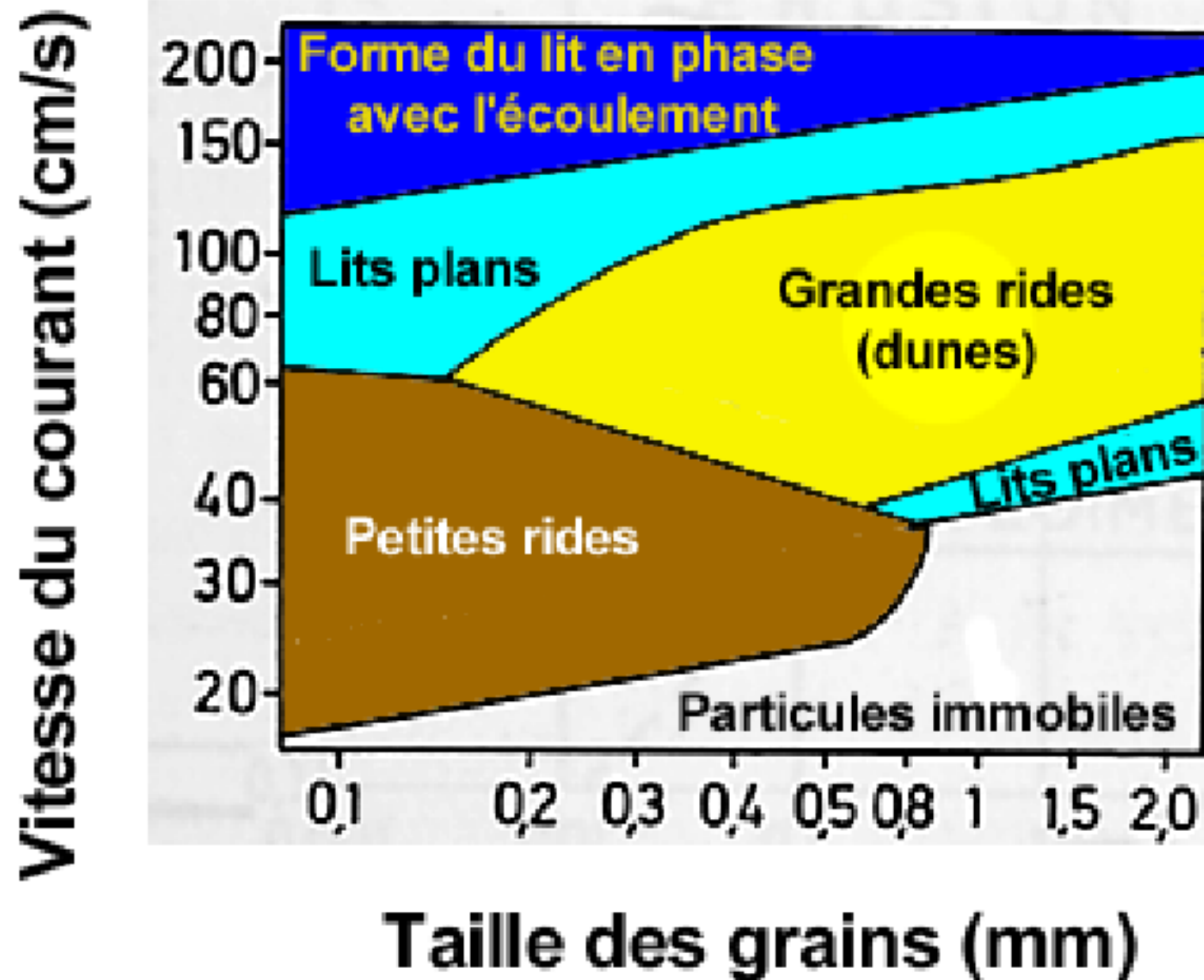
Copyright 1999 John Wiley and Sons, Inc. All rights reserved.

# Les structures sédimentaires

- ◆ Litage horizontal
- ◆ Litage oblique
- ◆ Litage de rides ascendantes
- ◆ Structures de déformation



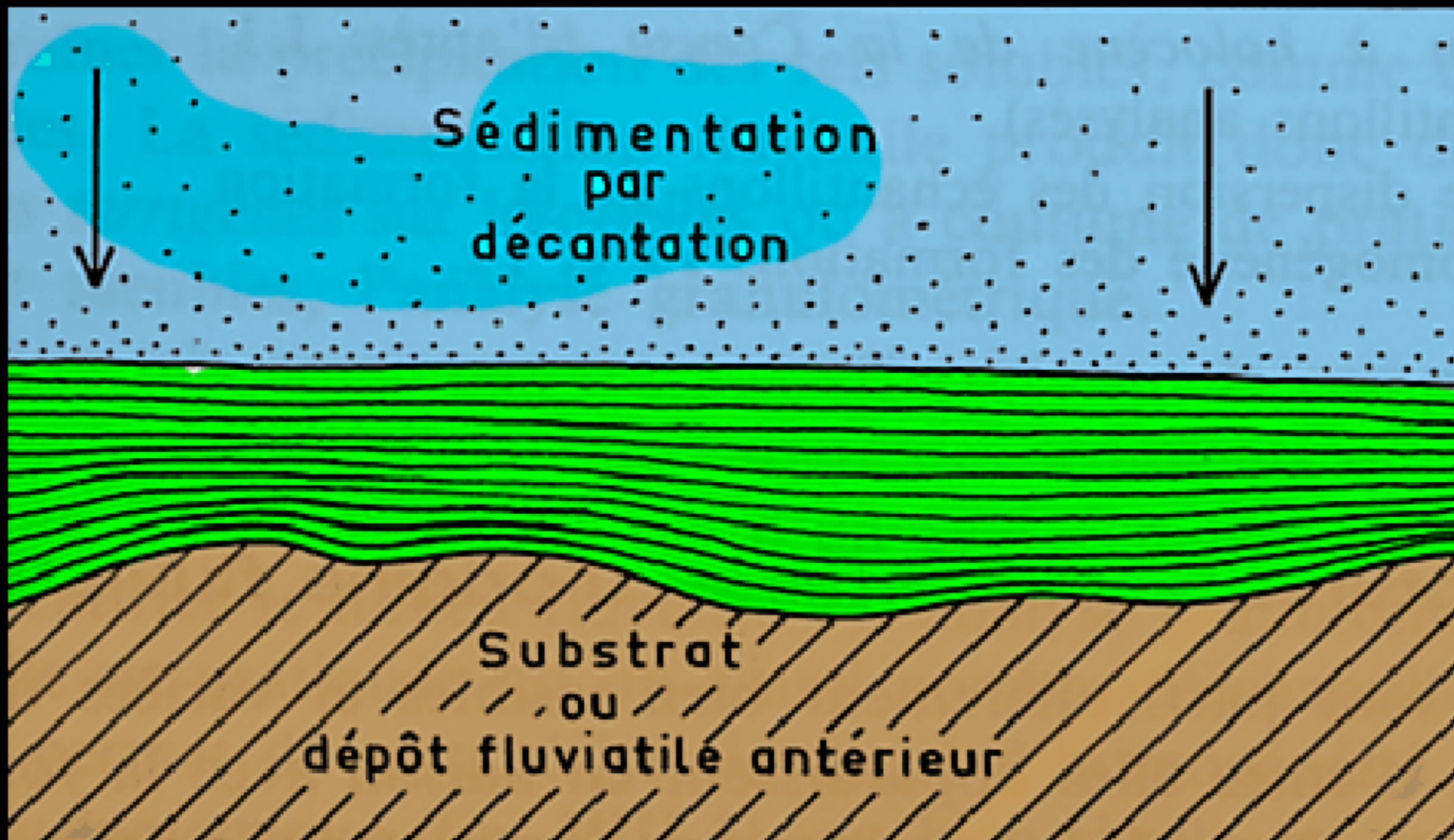
# De l'influence de la granulométrie et de la vitesse du courant



# Le litage horizontal







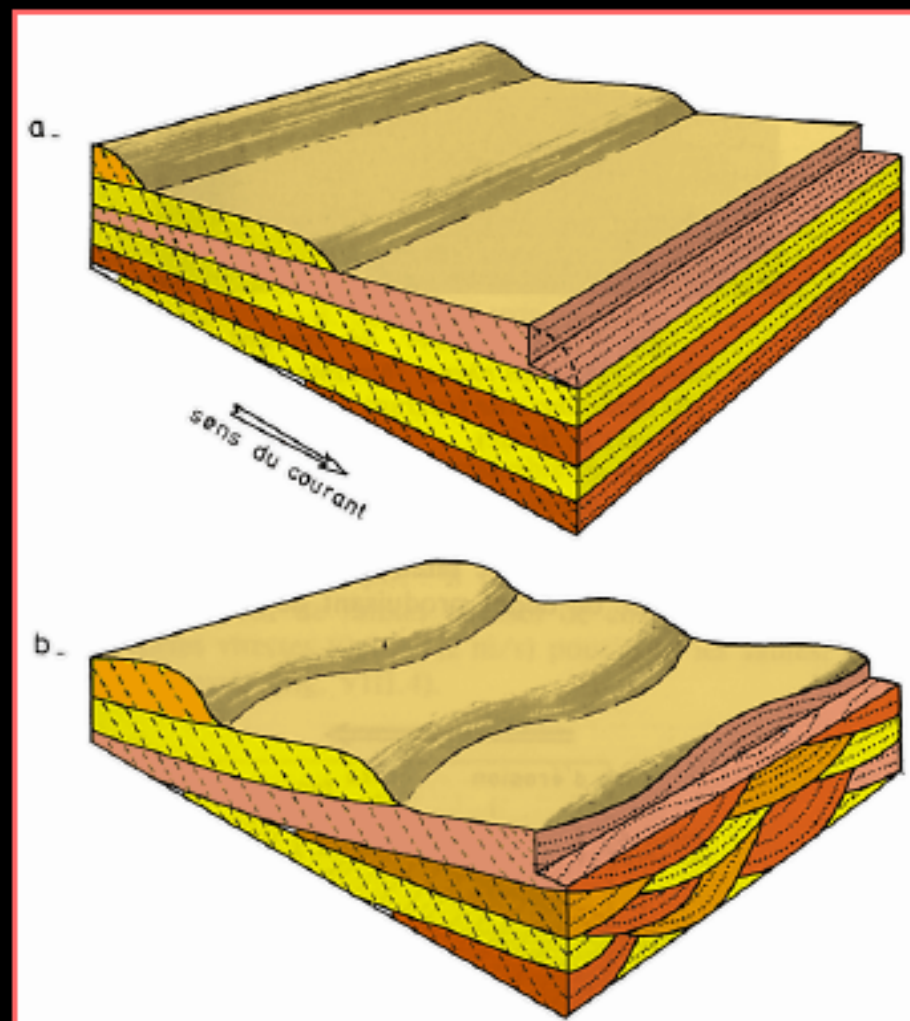




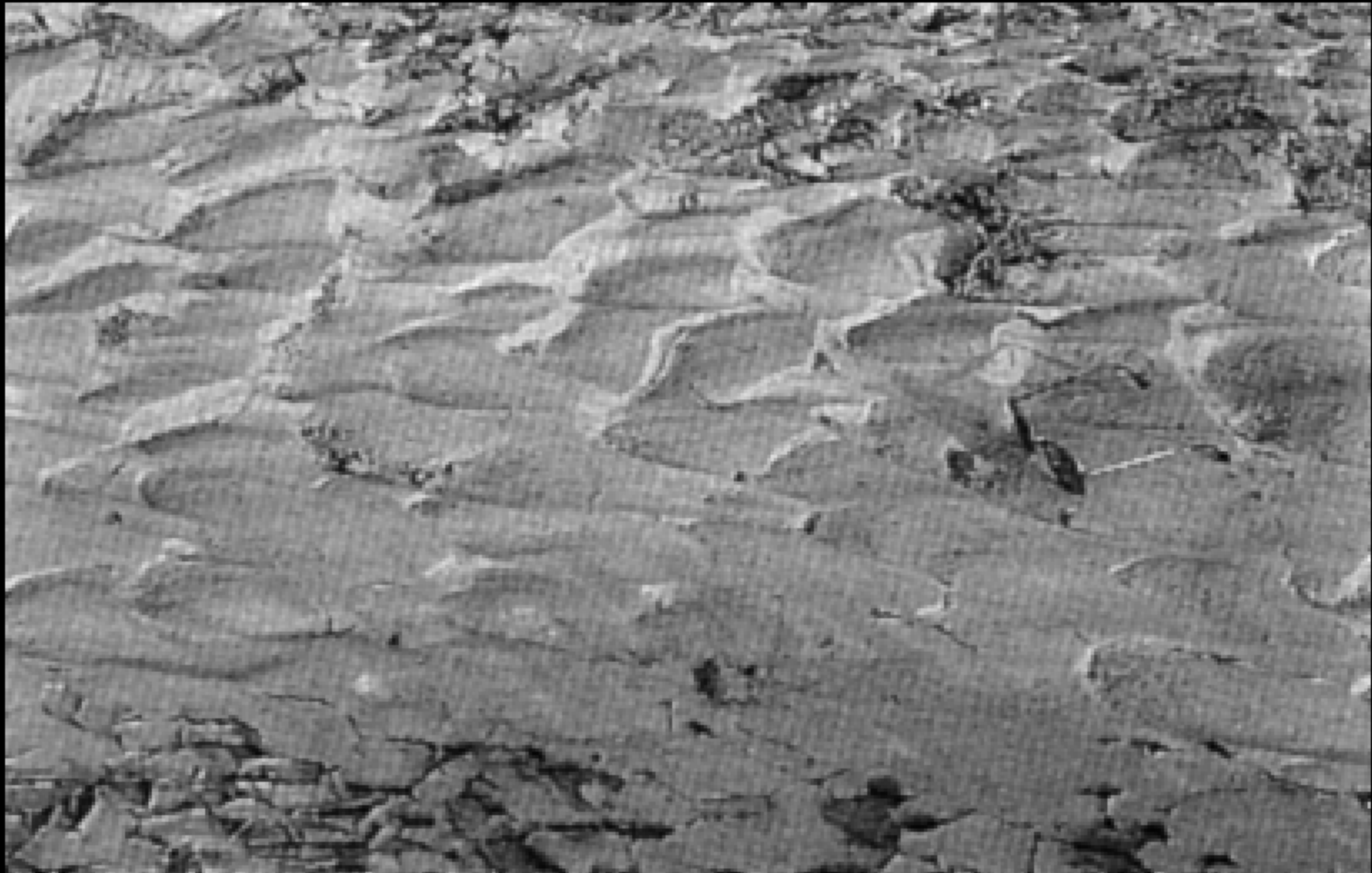
: Alluvions: Structures sédimentaires: Litage horizontal: :



# Le litage oblique



# Rides de courant



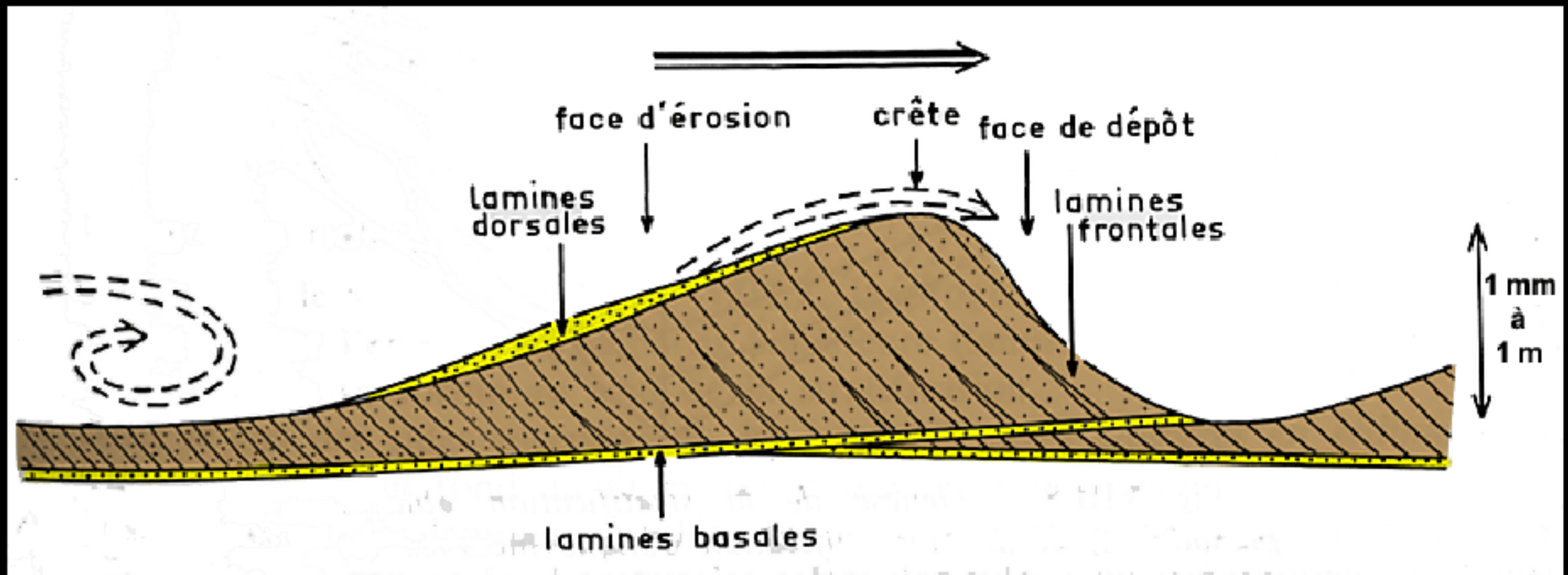


# Rides (ripple marks) créées par une inondation catastrophique.



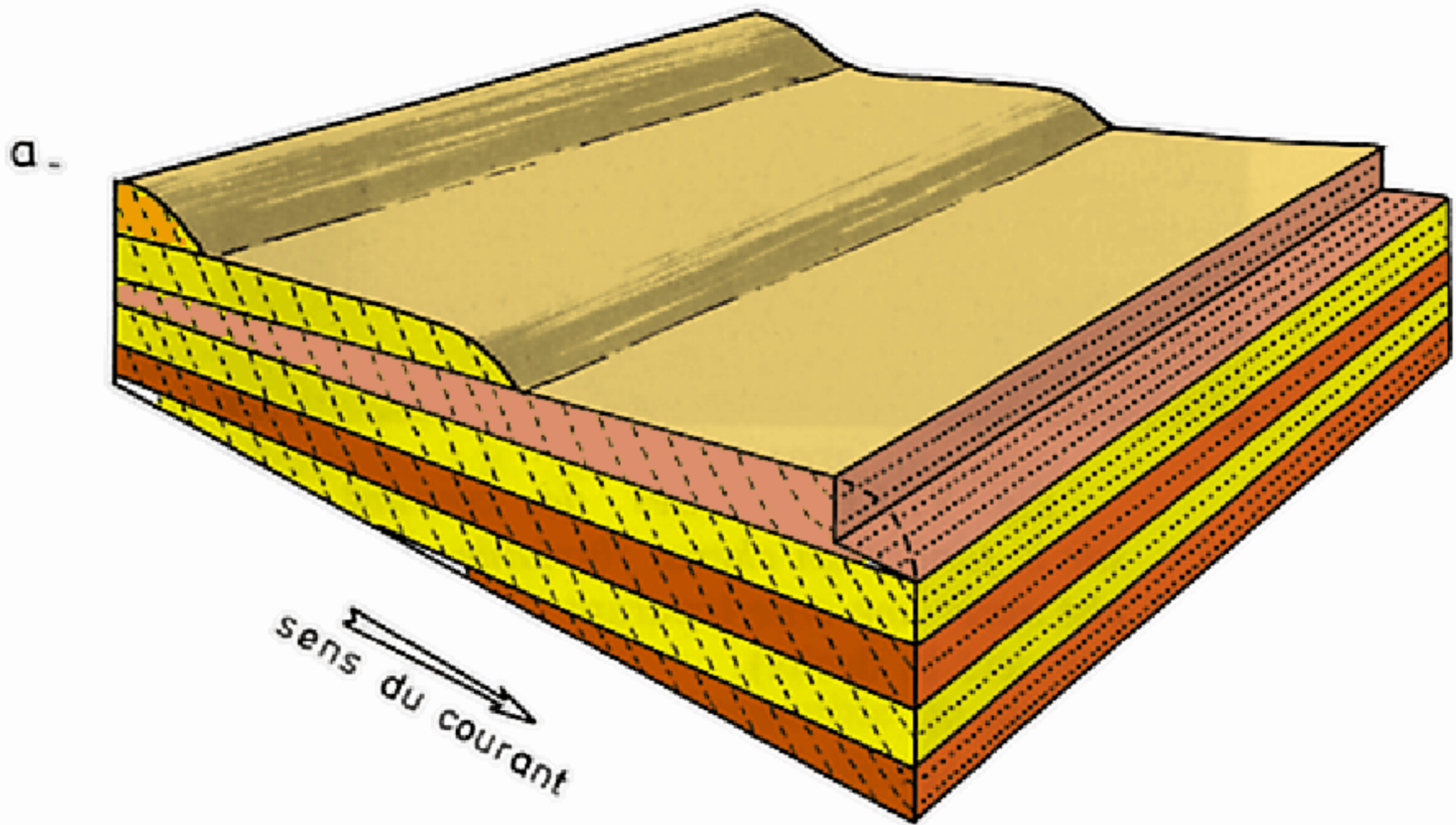
Plusieurs m de haut, crêtes distantes d'une centaine de m.

# Rides de courant

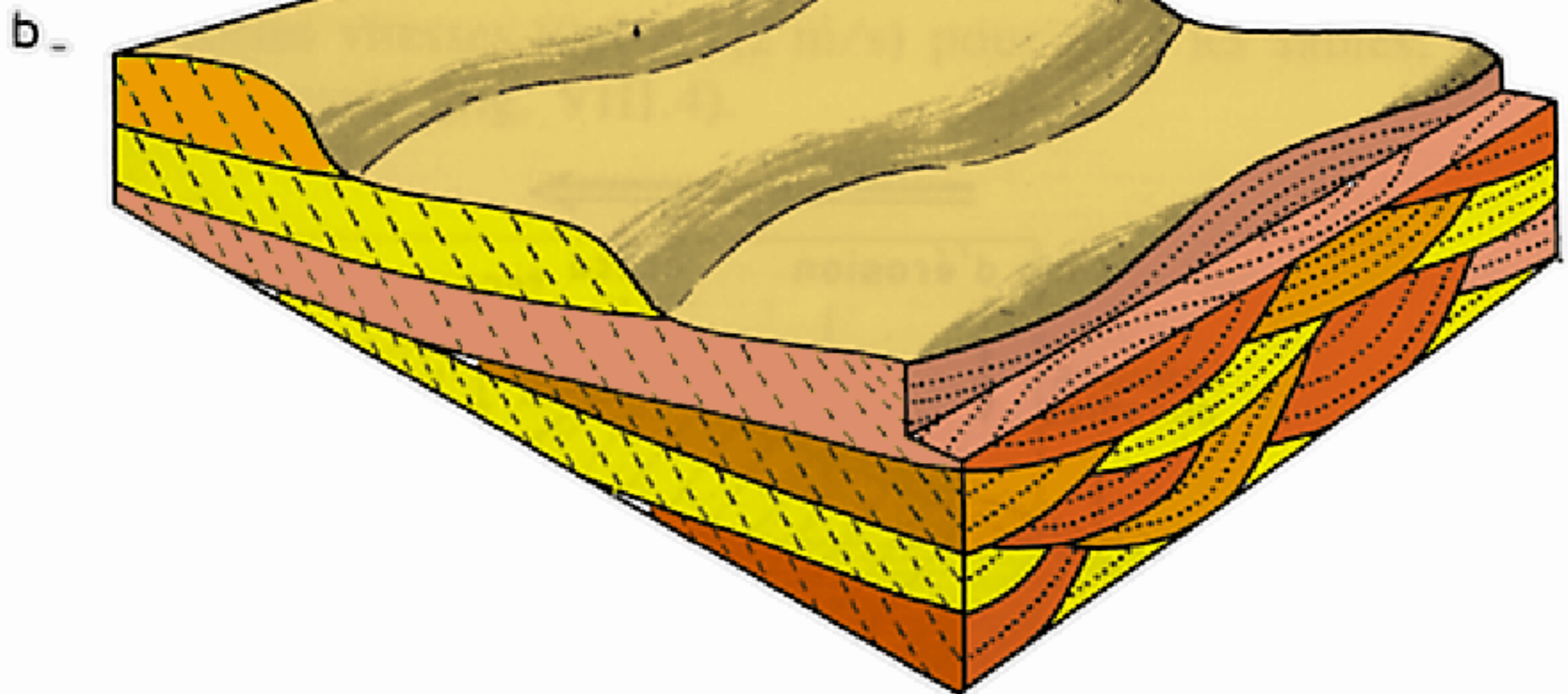




# Structure oblique **plan**aire



# Stratifications obliques entrecroisées





# Stratifications obliques planaires



: Alluvions: Structures sédimentaires: Litage oblique: Stratifications obliques planaires:





: Alluvions: Structures sédimentaires: Litage oblique: :

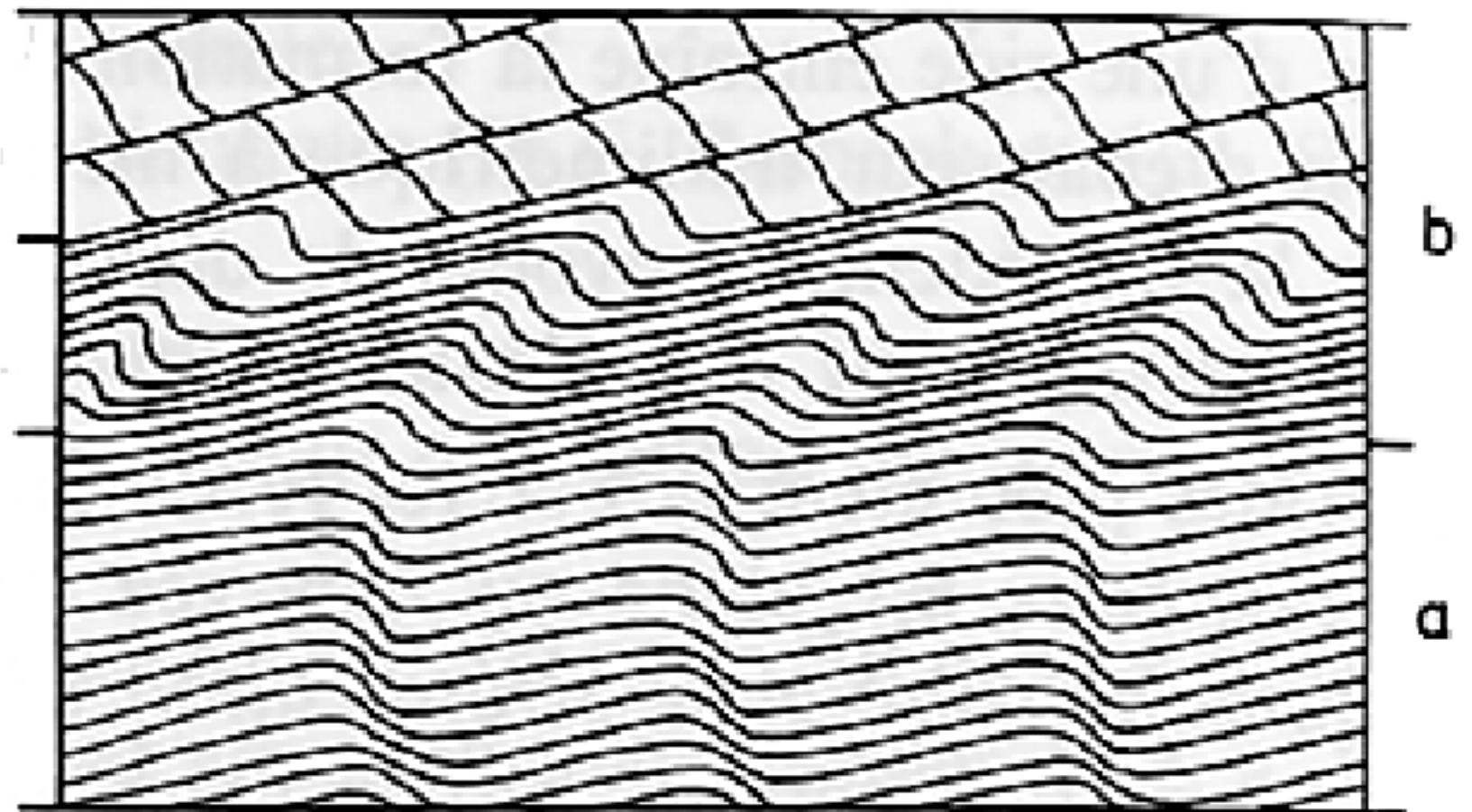


# Le litage de rides ascendantes



Directions de migration  
des rides

sens du courant



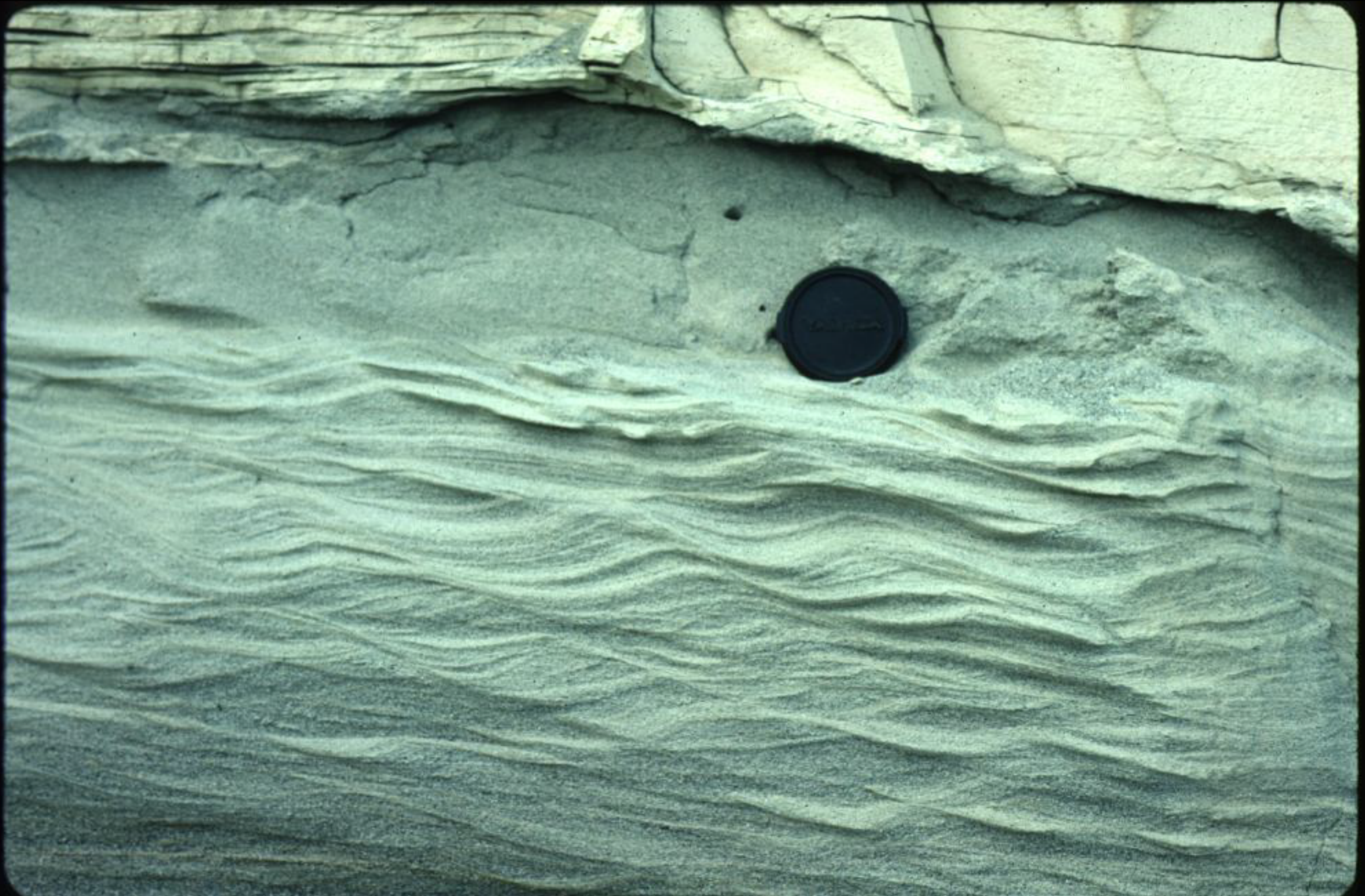
a : en phase , b : en dérive



# Litage de rides ascendantes en dérive



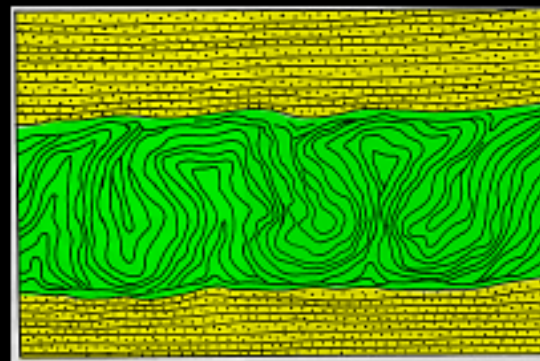
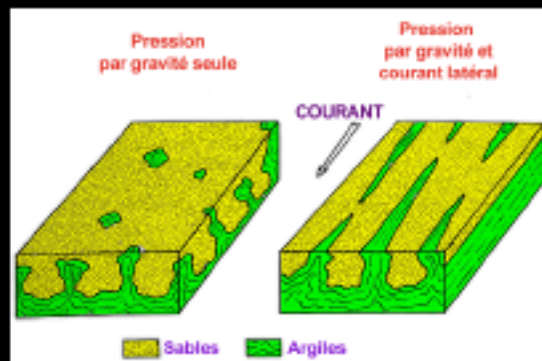




: Alluvions: Structures sédimentaires: Litage de rides ascendantes: :

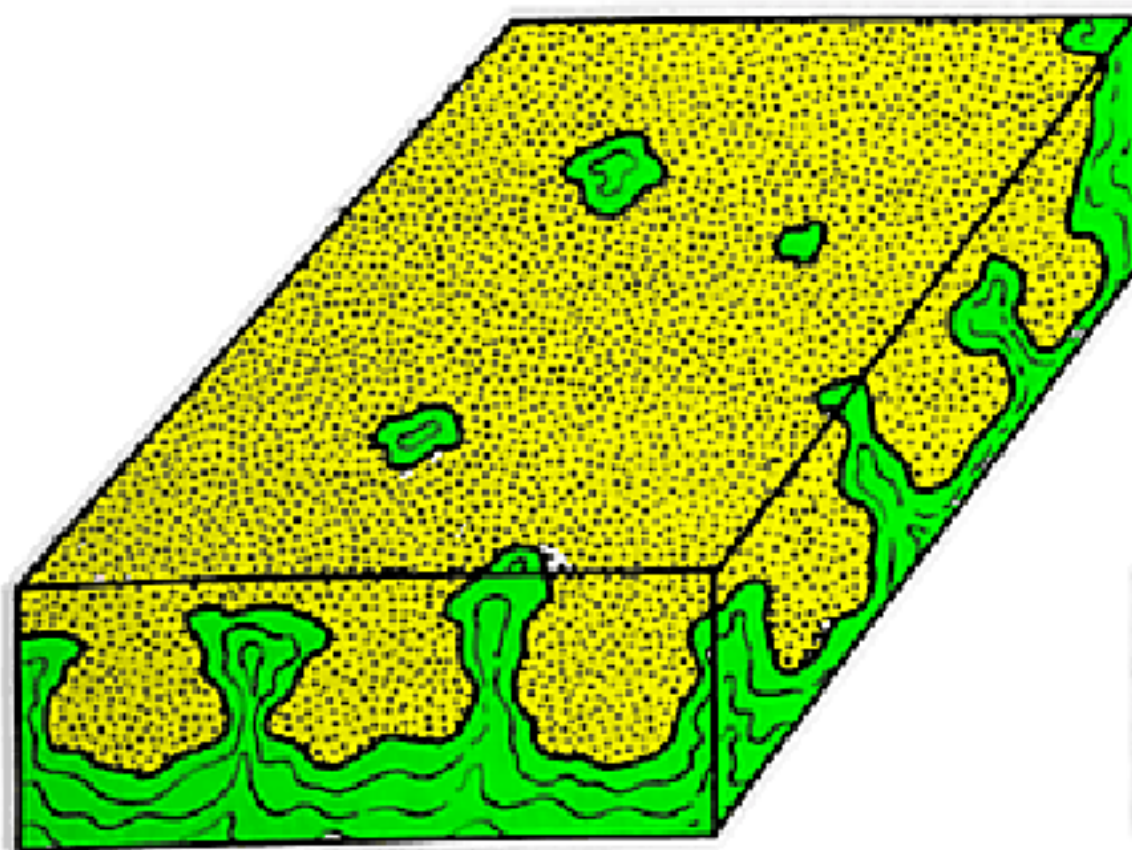


# Les déformations



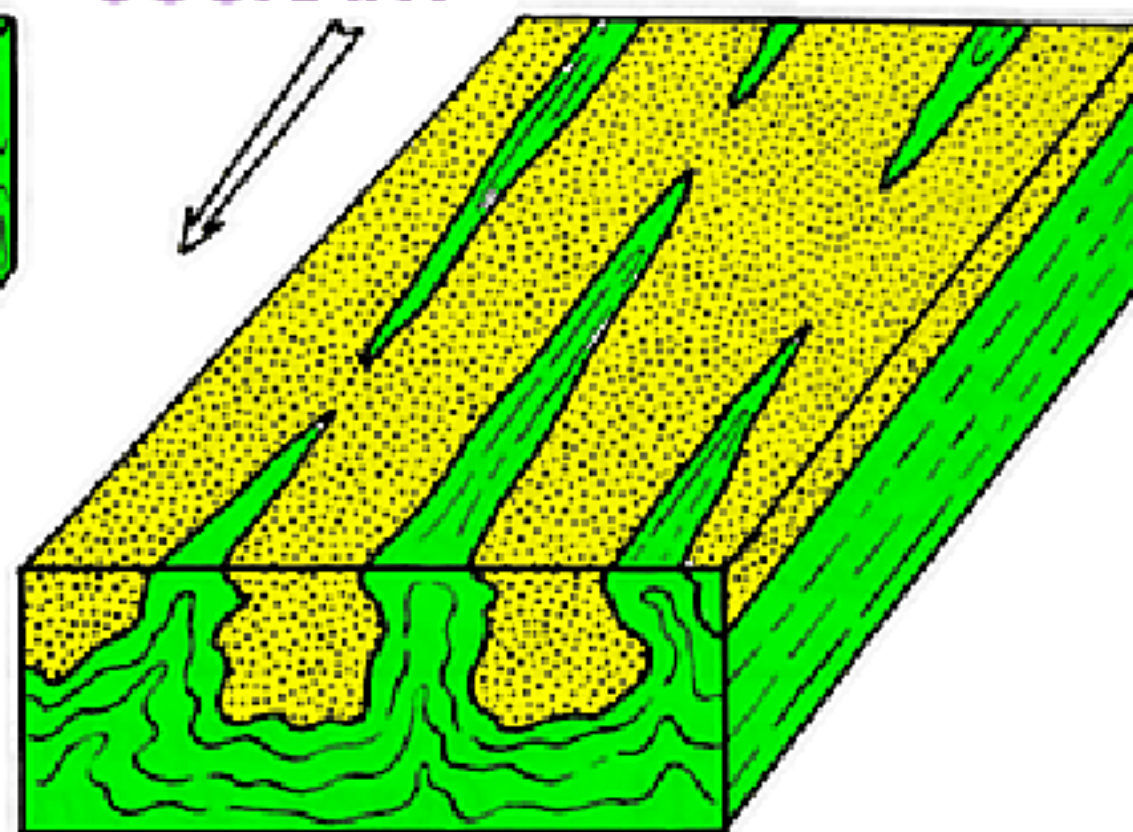
# Injections d'argiles

Pression  
par gravité seule



Pression  
par gravité et  
courant latéral

COURANT



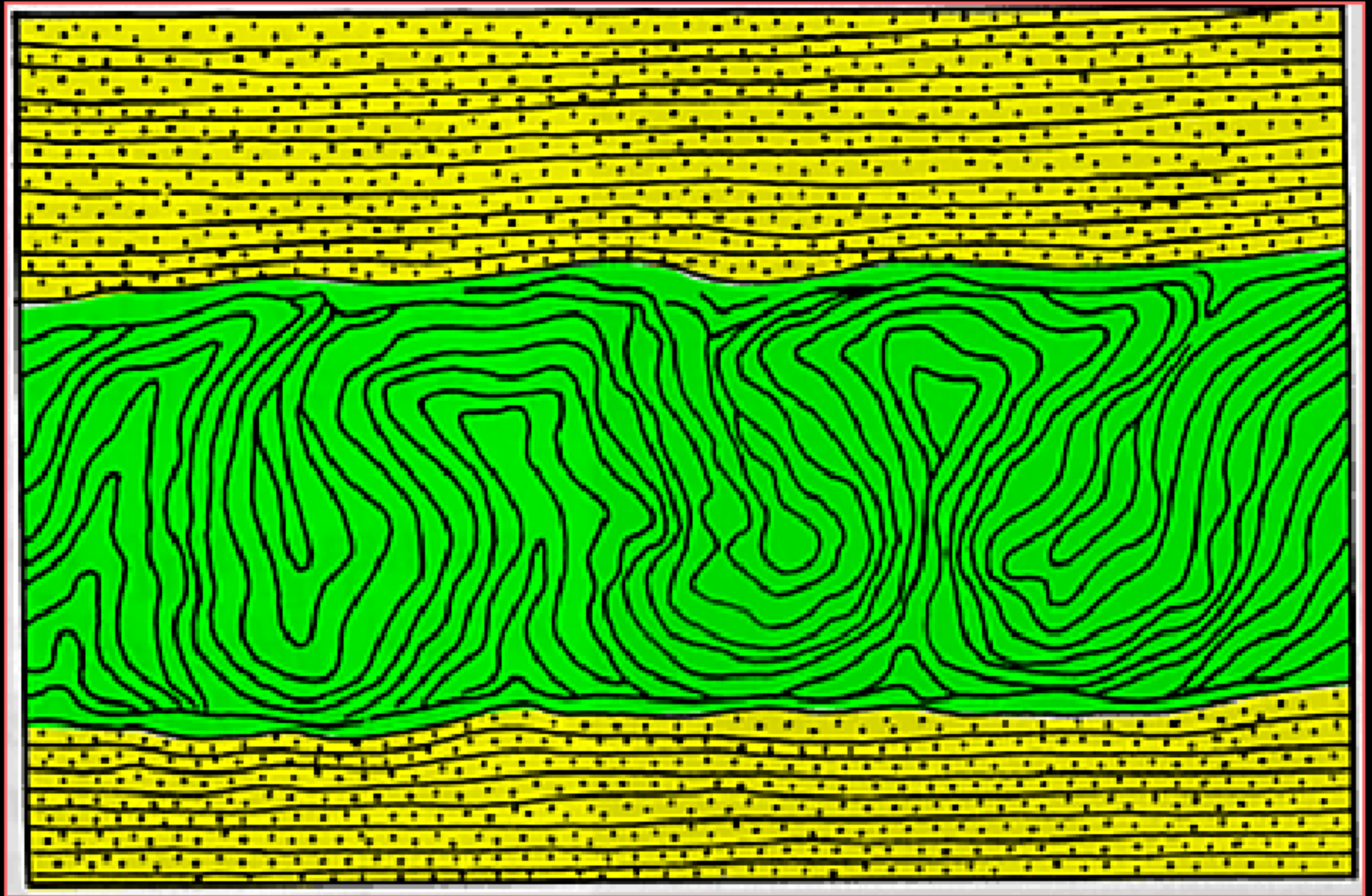
Sables

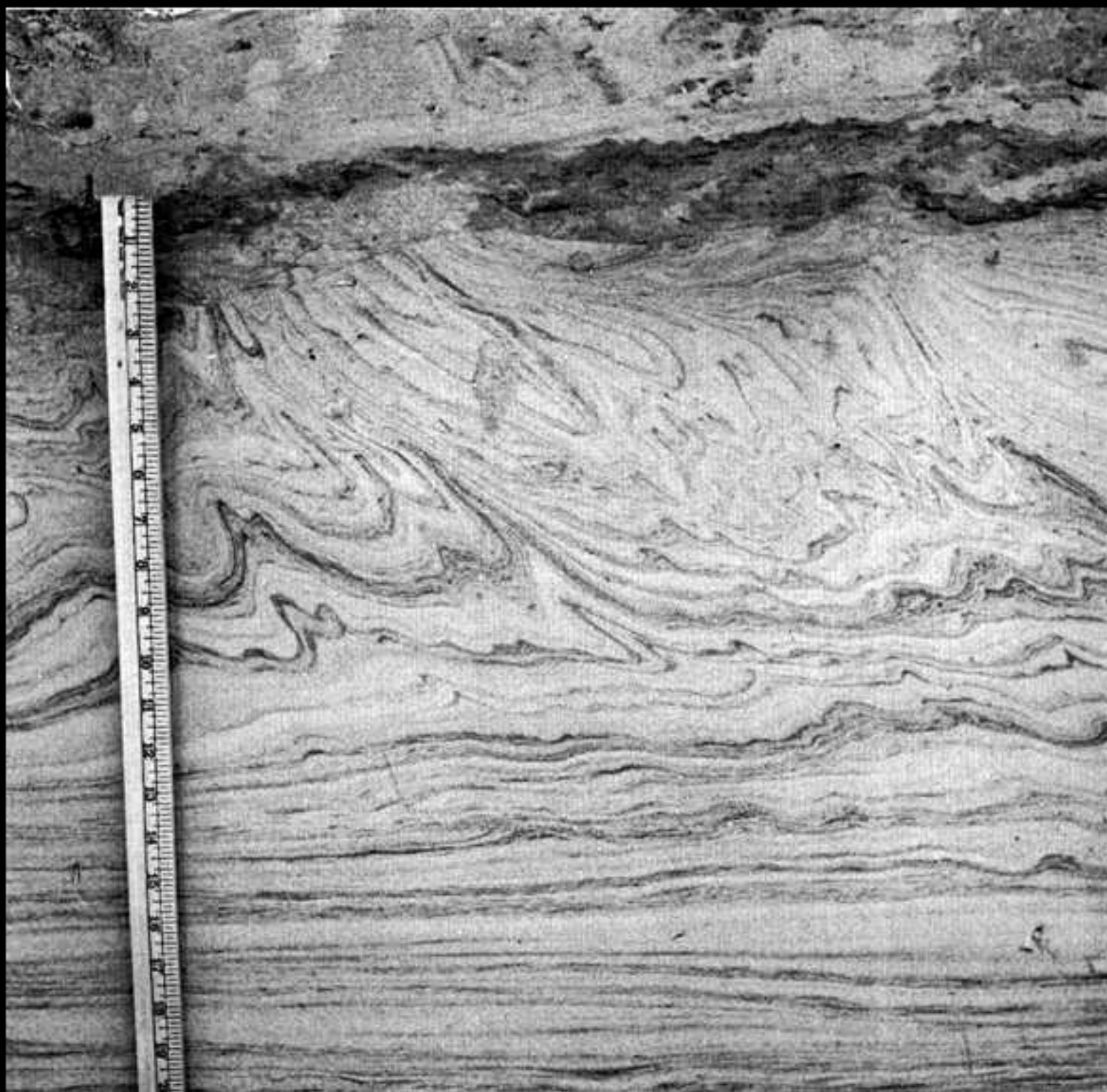


Argiles



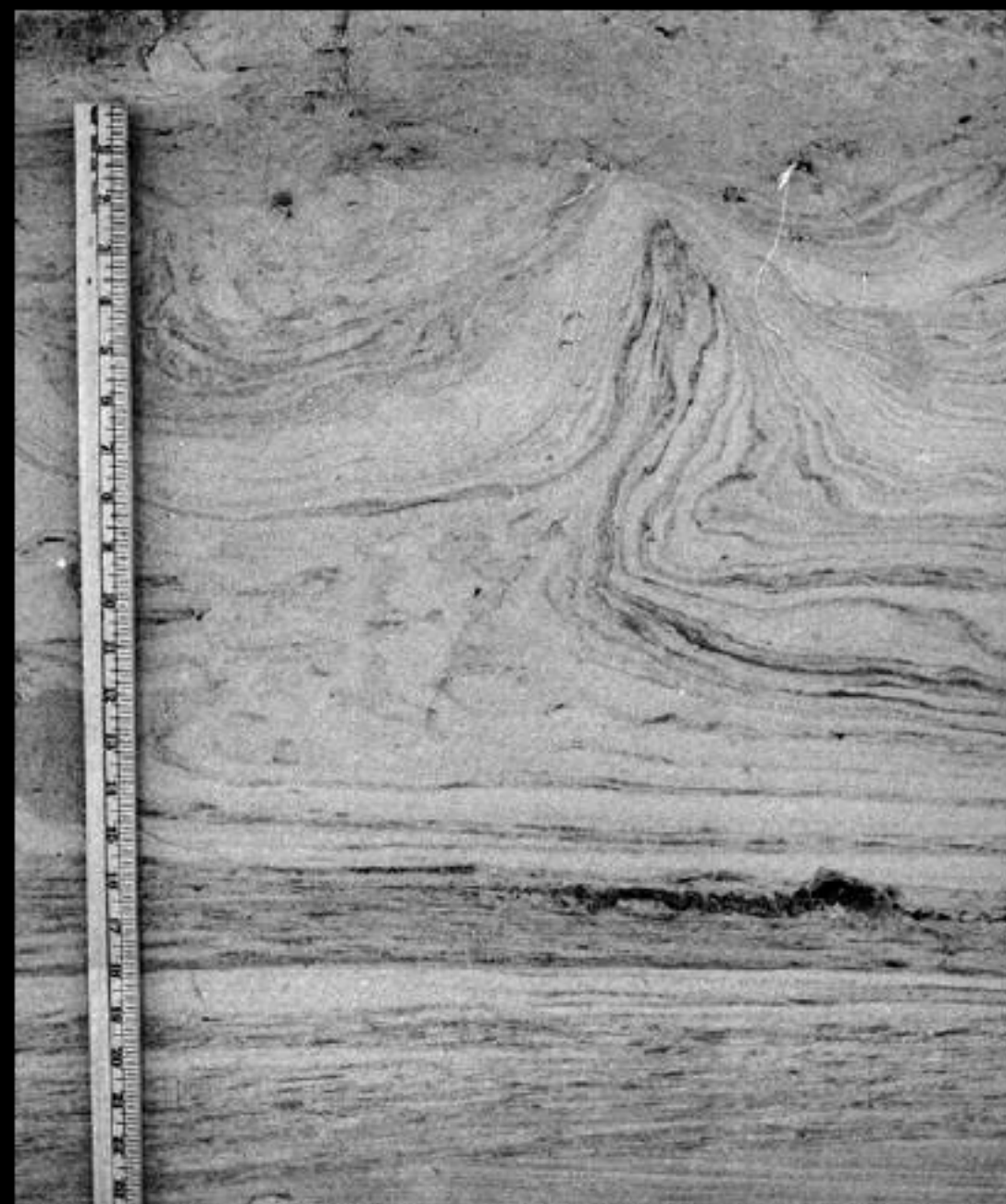
# Litage à circonvolution



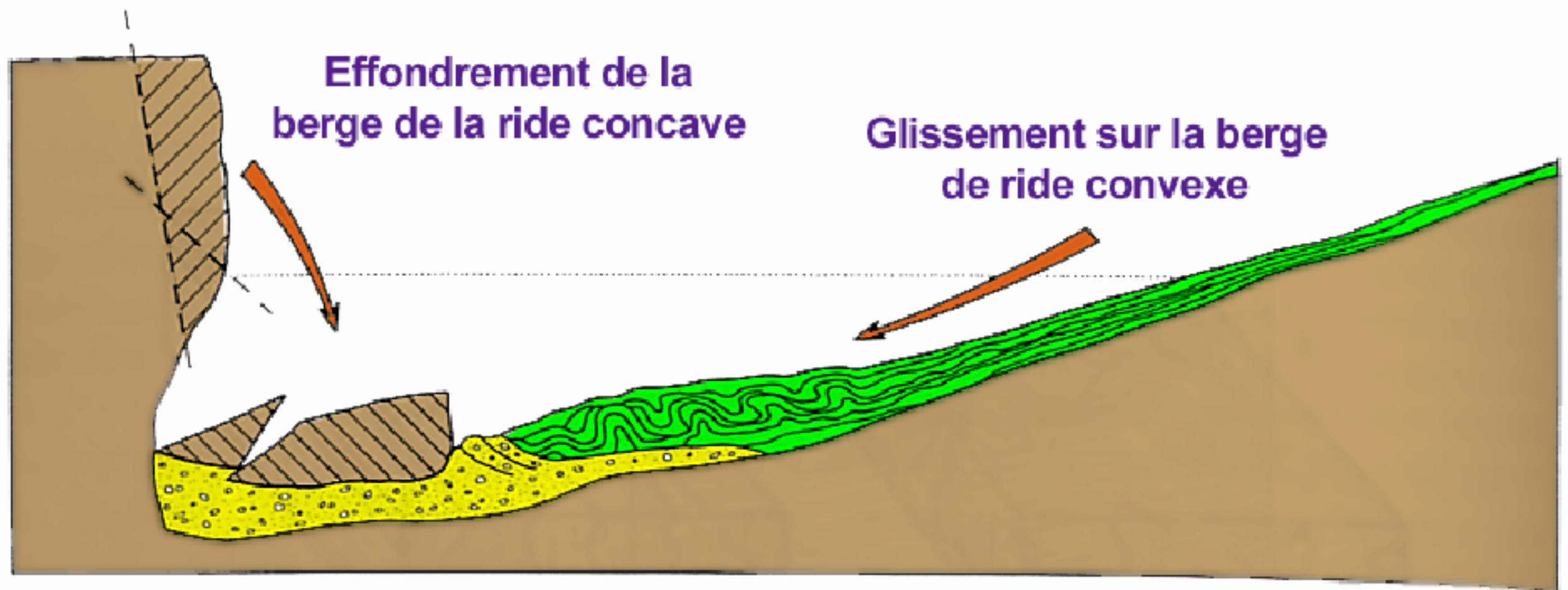


: Alluvions: Structures sédimentaires: Déformations: Litage à circonvolution: Cliché:

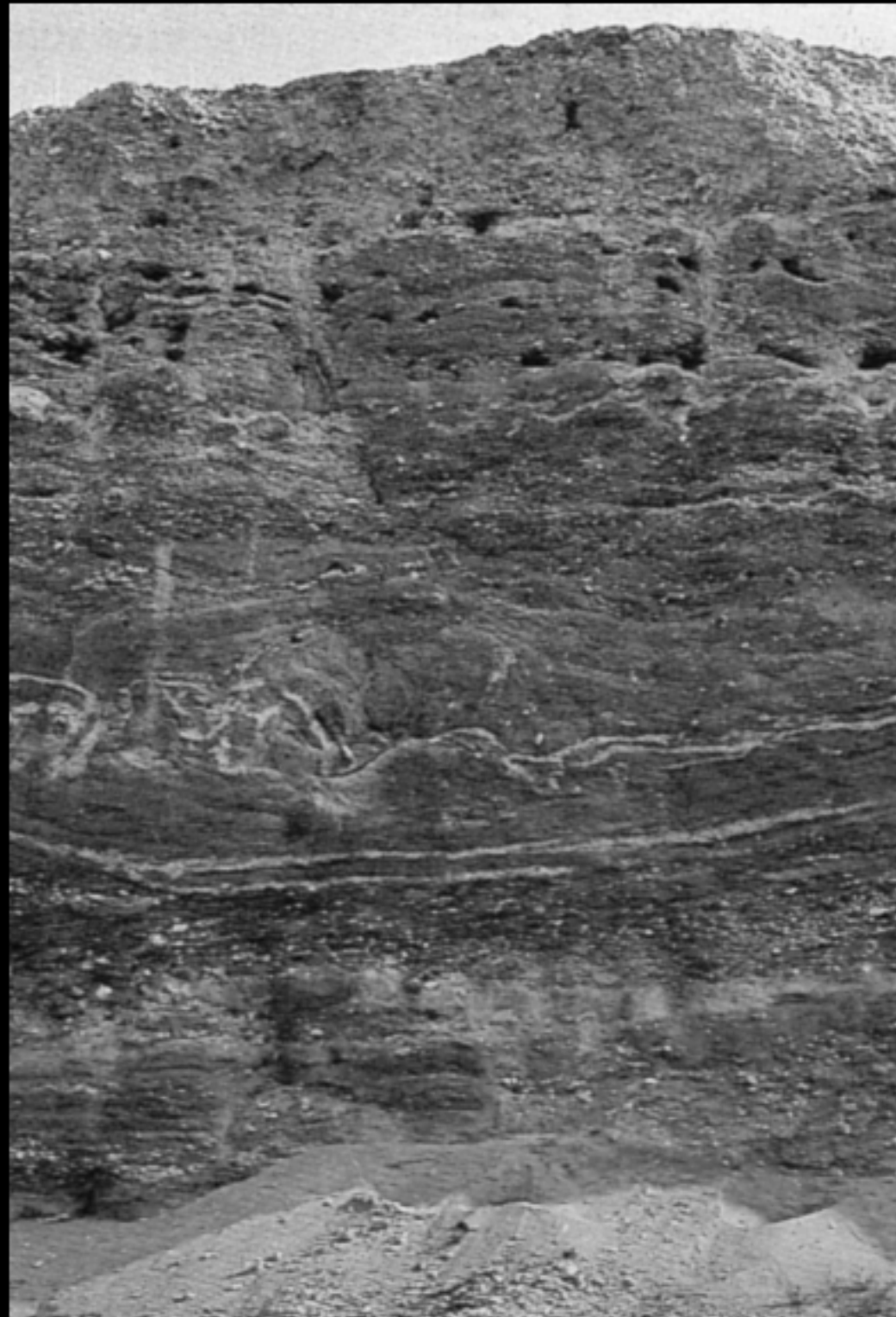




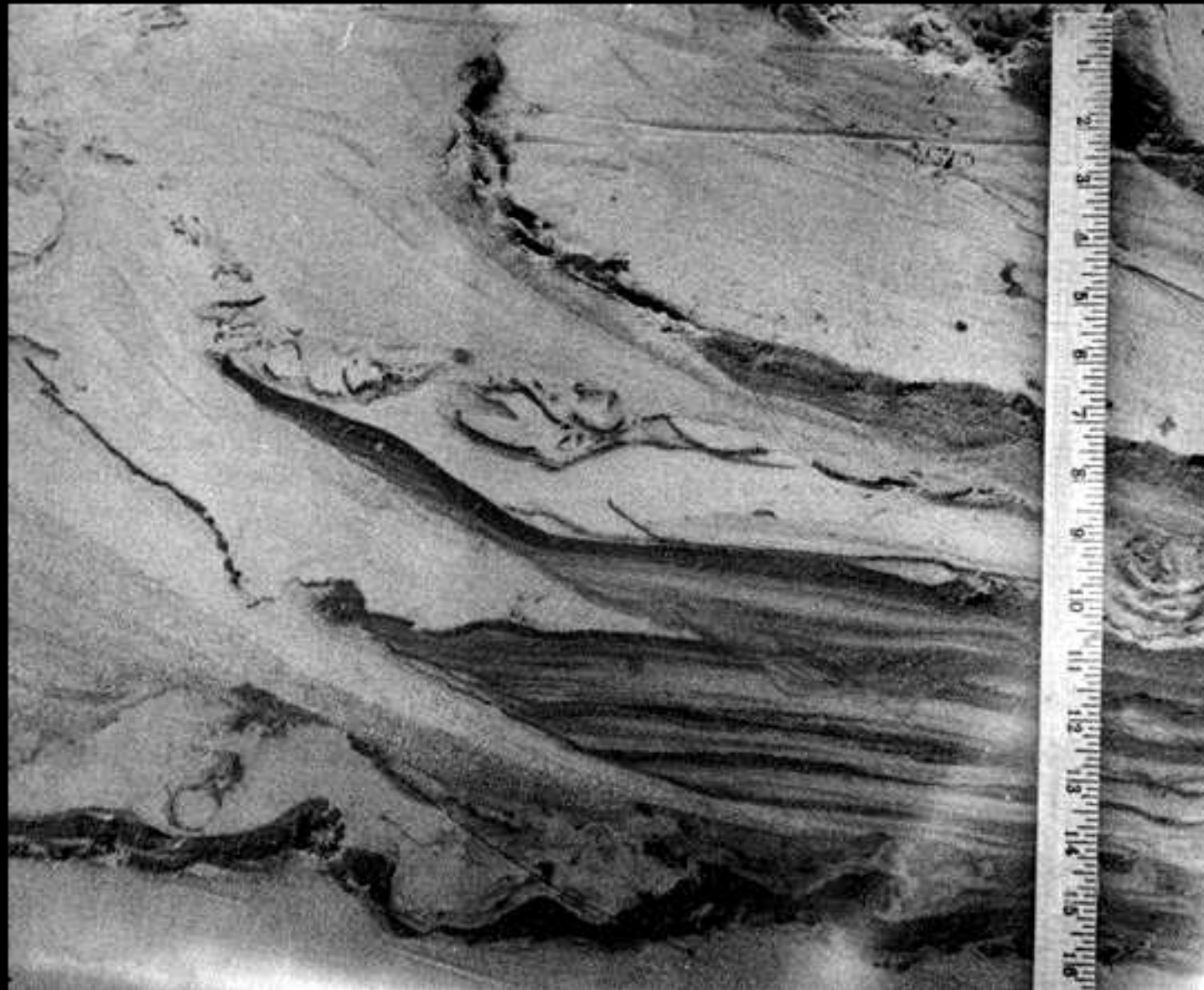
# Effondrement et glissement





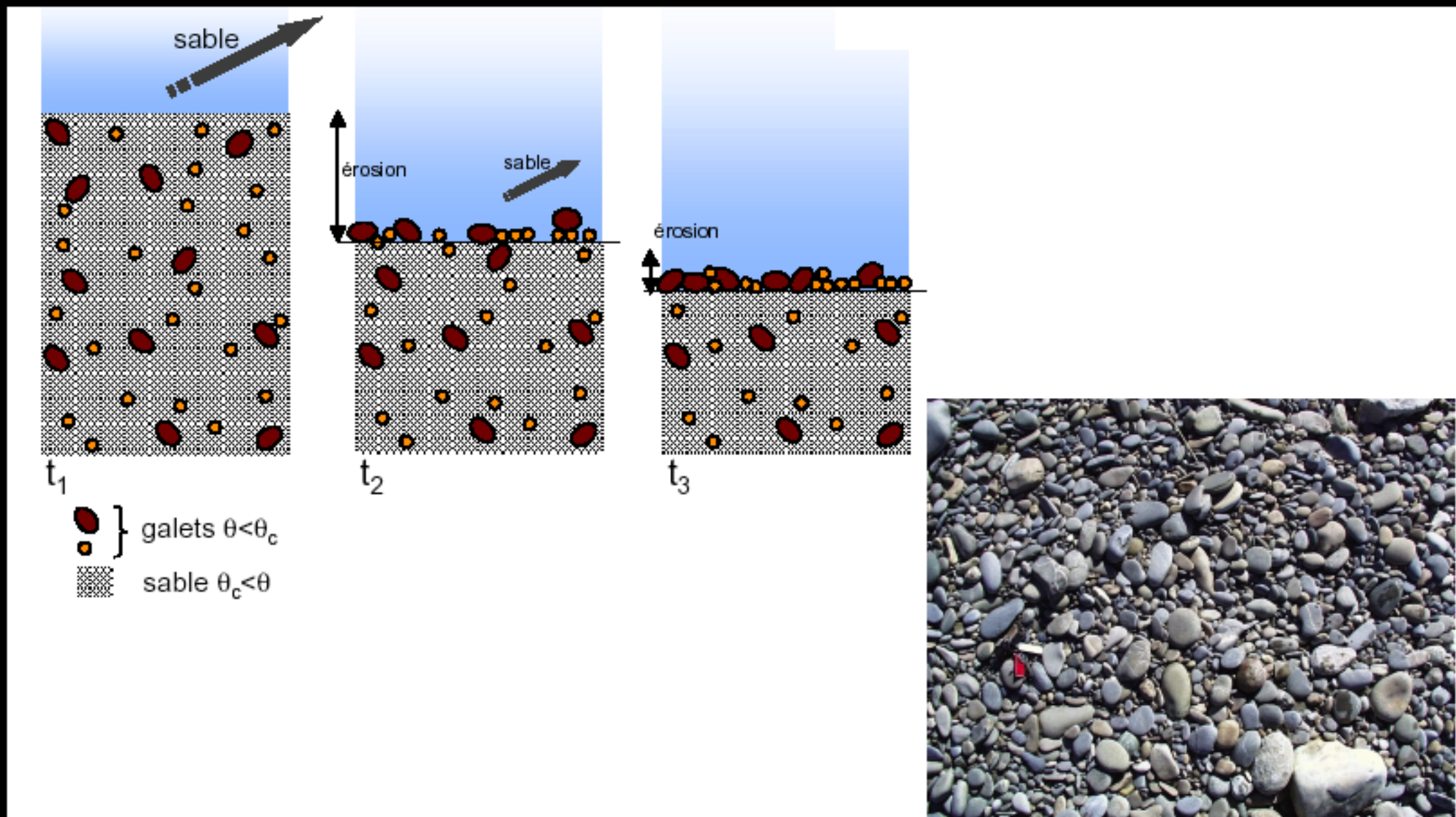


# Figures de slumping

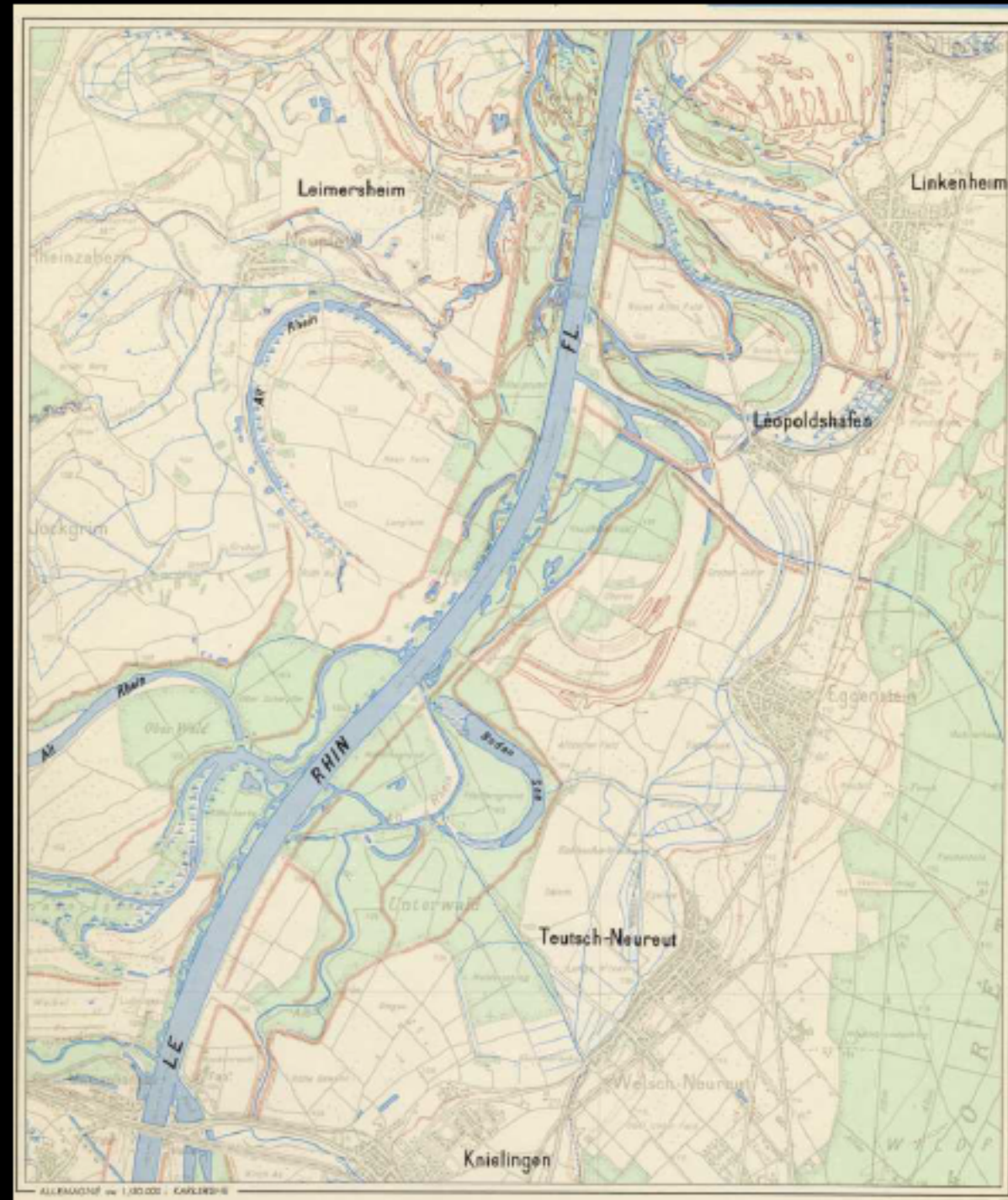




# Le pavage



# Aménagement: l'exemple du Rhin



Anciens méandres libres du Rhin