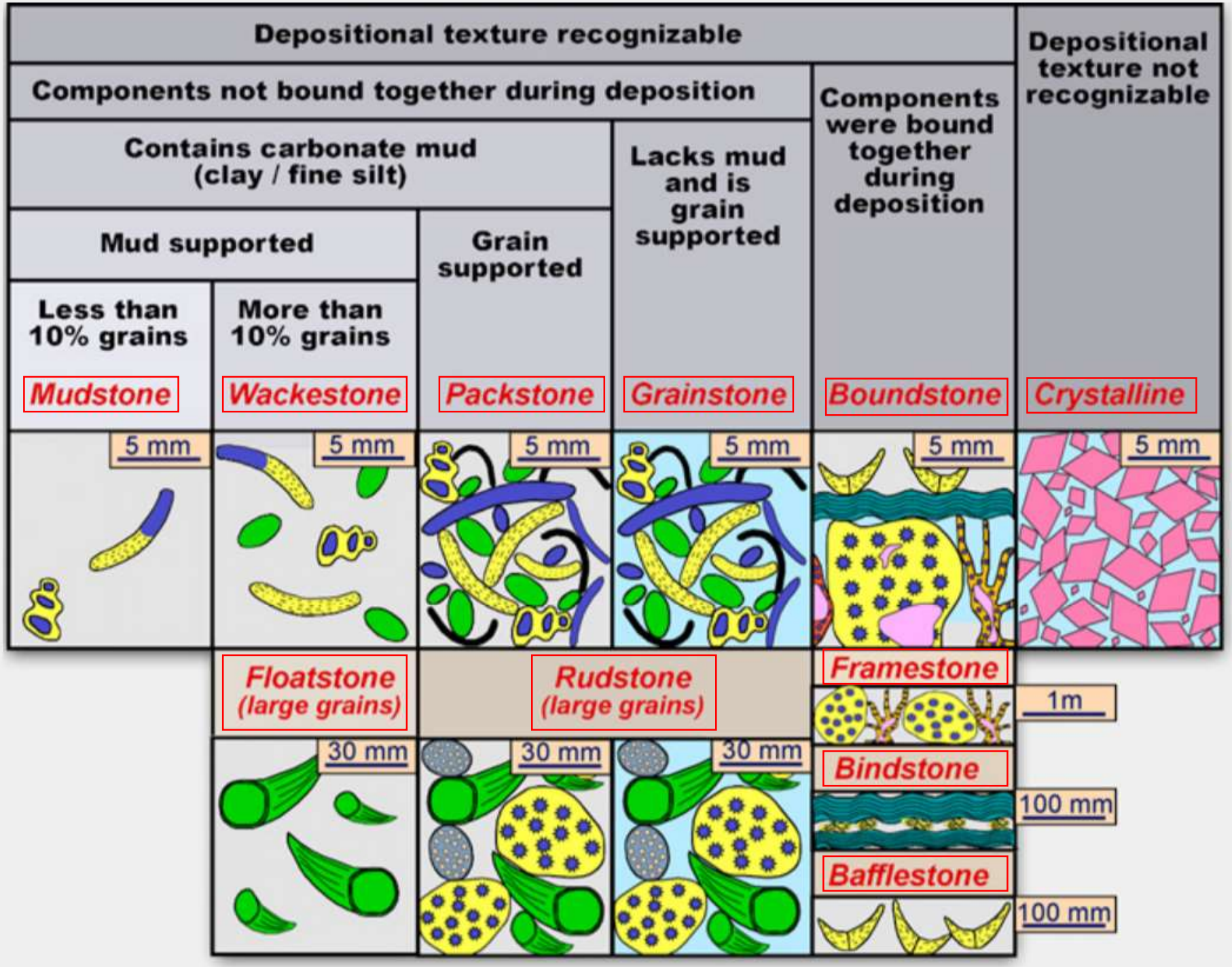

Depositional texture recognizable
Components not bound together during deposition
Contains carbonate mud (clay / fine silt)
Mud supported
Less than 10% grains
Mudstone
More than 10% grains
Wackestone
Grain supported
Packstone
Lacks mud and is grain supported
Grainstone
Components were bound together during deposition
Boundstone
Depositional texture not recognizable
Crystalline
5 mm
Floatstone (large grains)
Rudstone (large grains)
Framestone
1m
30 mm
Bindstone
100 mm
Baffflestone
100 mm

> Les constituants sont liés lors du dépôt — **BOUNDSTONE**

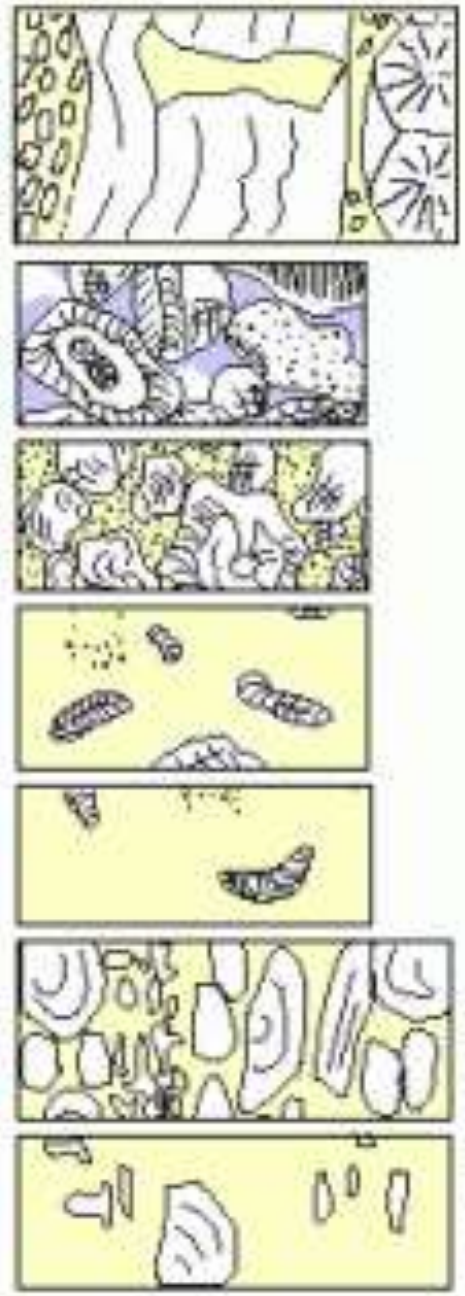
> Les constituants ne sont pas liés lors du dépôt

> Moins de 10% des particules ont une taille supérieure à 2 mm

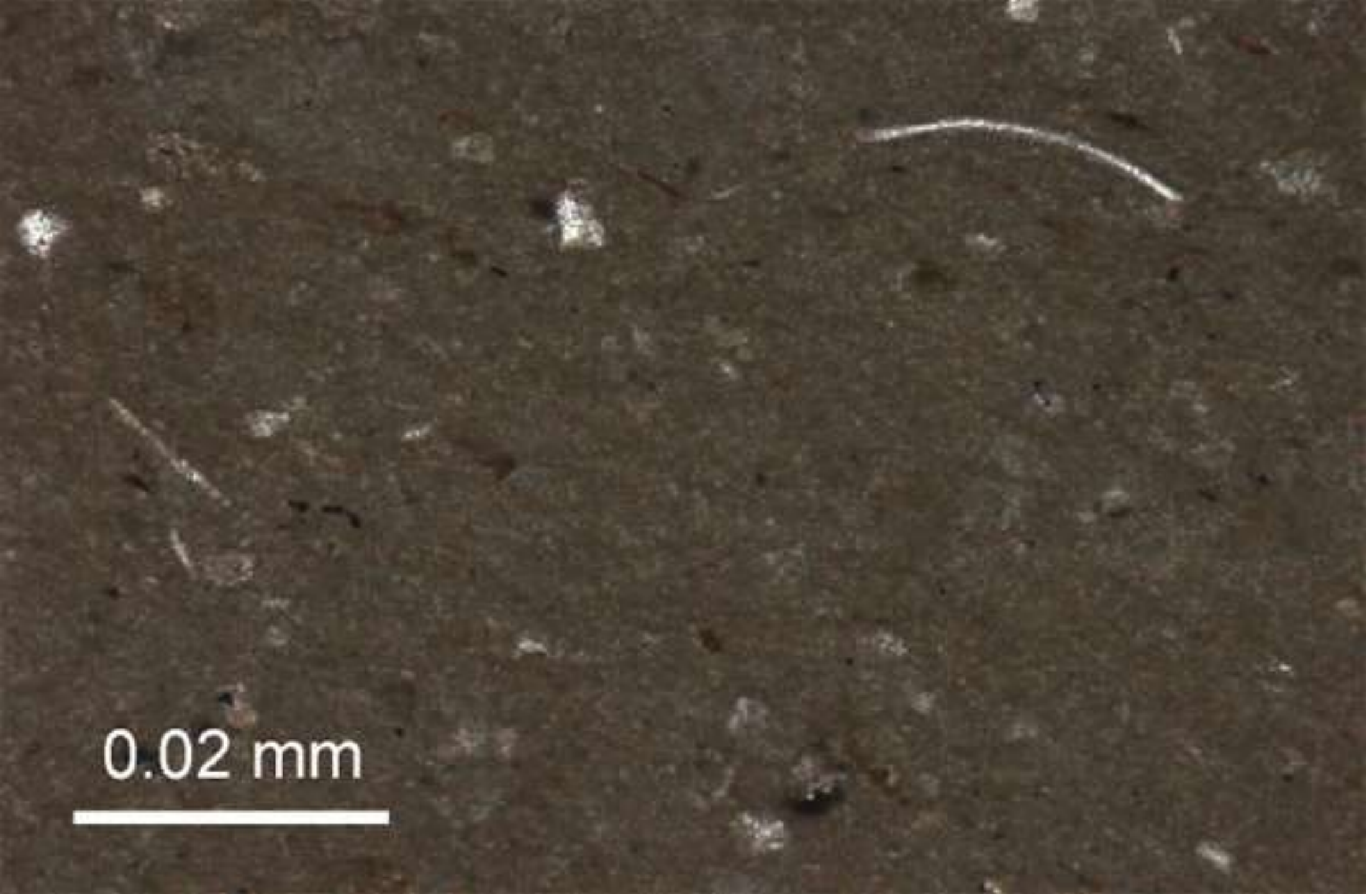
- Absence de boue carbonatée — **GRAINSTONE**
- Présence de boue carbonatée
  - Grains jointifs - Plus de 10% de grains — **PACKSTONE**
  - Grains non jointifs - Plus de 10% de grains — **WACKESTONE**
  - Grains non jointifs - Moins de 10% de grains — **MUDSTONE**

> Plus de 10% des particules ont une taille supérieure à 2 mm

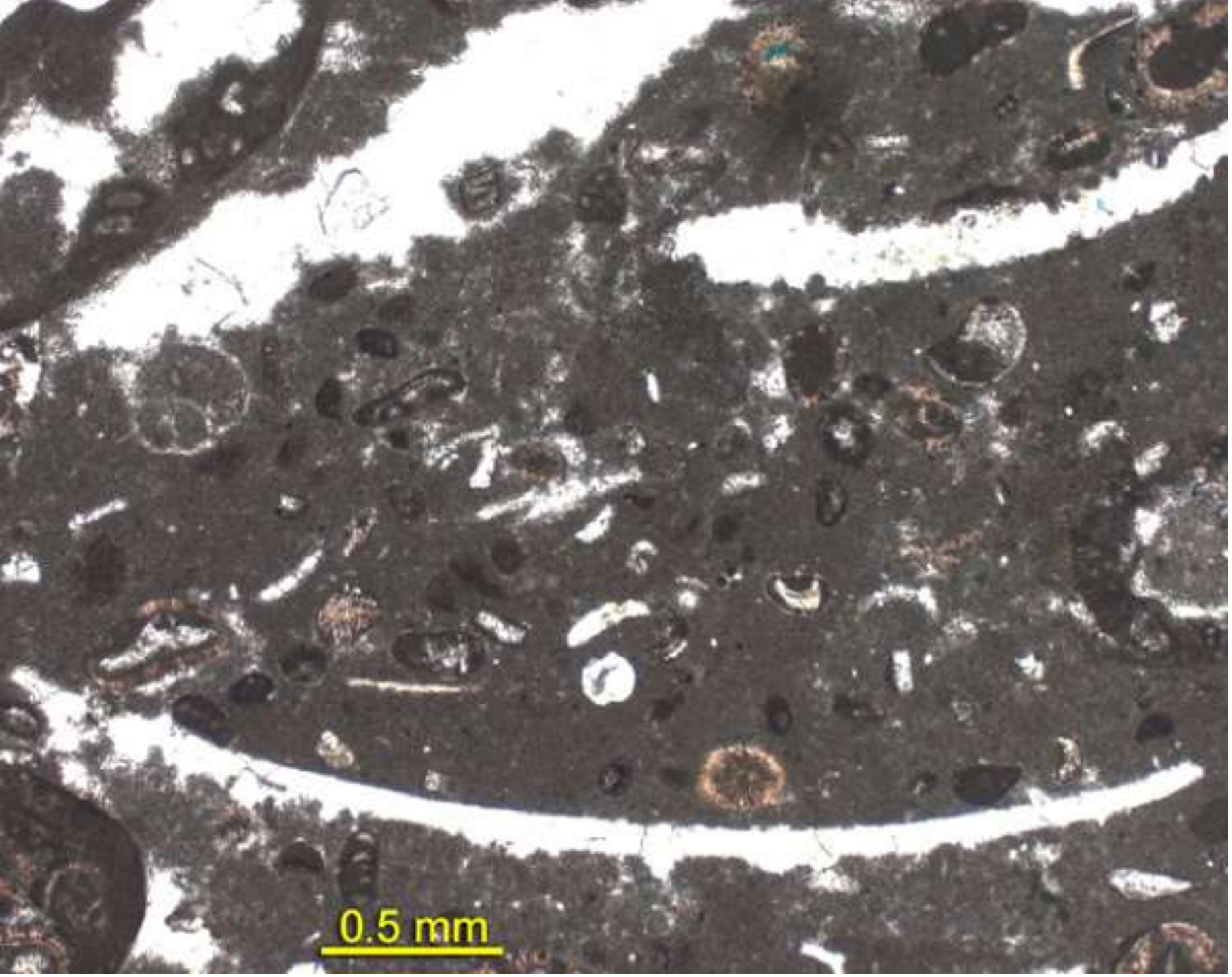
- Grains jointifs — **RUDSTONE**
- Grains non jointifs — **FLOADSTONE**



Mudstone: Muddy carbonate rock containing less than 10 percent grains (Dunham, 1962).
Generally indicates calm water and apparent inhibition of grain-producing organisms (low-energy depositional setting).
Wackestone: Mud-supported carbonate rock containing more than 10 percent grains (Dunham, 1962).
Generally indicates calm water and restriction of grain-producing organisms (low-energy depositional setting).
In cases where grains are exceptionally large, Embry and Klovan (1971) designated these carbonates "**floatstones**."
Packstone: Grain-supported muddy carbonate rock (Dunham, 1962).
Lucia (1999) divided packstones into mud-dominated (pore spaces totally filled with mud) and grain-dominated (some intergrain pore space is free of mud) packstones.
This division is important in understanding reservoir quality because mud plugs interparticle pore spaces.
Packstones indicate a range of depositional properties.
Mud suggests lower-energy processes, whereas the abundance of grains suggests higher-energy processes.
Dunham (1962) provided several scenarios for the origin of packstones:
(1) they may be a product of compacted wackestones,
(2) they may result from early or late mud infiltration of previously deposited mud-free sediments,
(3) they may result from the prolific production of grains in calm water, or
(4) they may record the mixing by burrowers of different layers of sediment.
In cases where the grains are exceptionally large, Embry and Klovan (1971) designated these carbonates "**rudstones**."
Grainstone: Mud-free carbonate rocks, which are grain supported (Dunham, 1962).
They generally are deposited in moderate- to high-energy environments, but their hydraulic significance can vary.
Dunham (1962) provided several suggestions for their origin:
(1) they may be produced in high-energy, grain-productive environments where mud cannot accumulate,
(2) they may be deposited by currents that drop out the grains and bypass mud to another area, or
(3) they may be a product of winnowing of previously deposited muddy sediments.
In cases where the grains are exceptionally large, Embry and Klovan (1971) designated these carbonates "**rudstones**."
Boundstone: Carbonate rocks showing signs of being bound during deposition (Dunham, 1962).
Embry and Klovan (1972) further expanded the boundstone classification on the basis of the fabric of the boundstone.
They have three subdivisions:
(1) framestone: the organisms build a rigid framework,
(2) bindstone: the organisms encrust and bind loose sediment together, and
(3) bafflestone: the organisms do not form a framework or bind the sediments together but provide protected areas for the sediment to accumulate by baffling the currents.
Boundstones generally are deposited in higher energy environments, where currents can provide nutrients to the organisms that form the boundstone, as well as carry away waste products.
Crystalline carbonates: Carbonate rocks that lack enough evidence of depositional texture to be classified.
Extensive dolomitization commonly obliterates the original depositional texture.

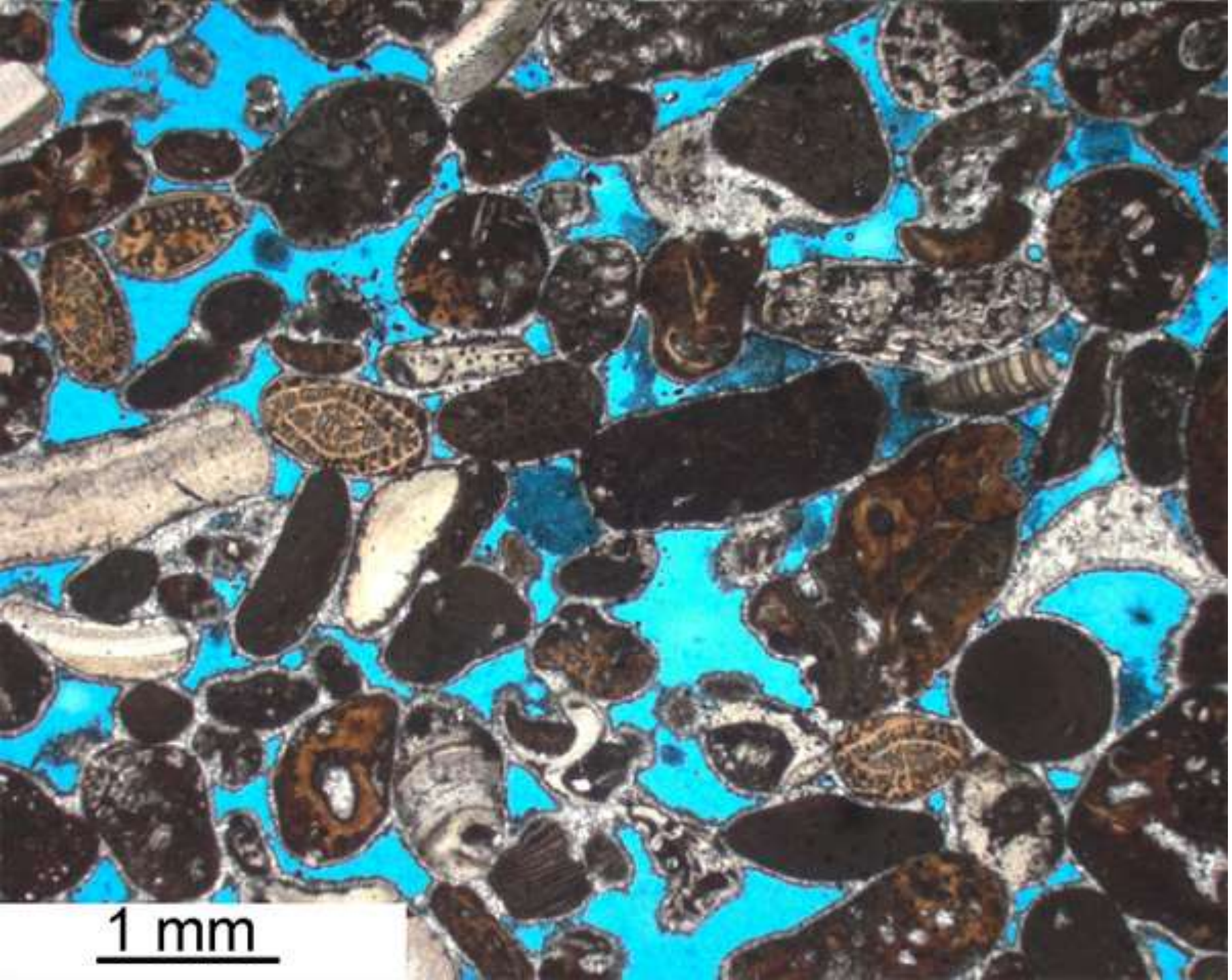


Mudstone. The rock shown in this thin section of a mudstone is composed of lime mud with fewer than 10 percent fossil fragments. The fossils float in the lime-mud matrix.



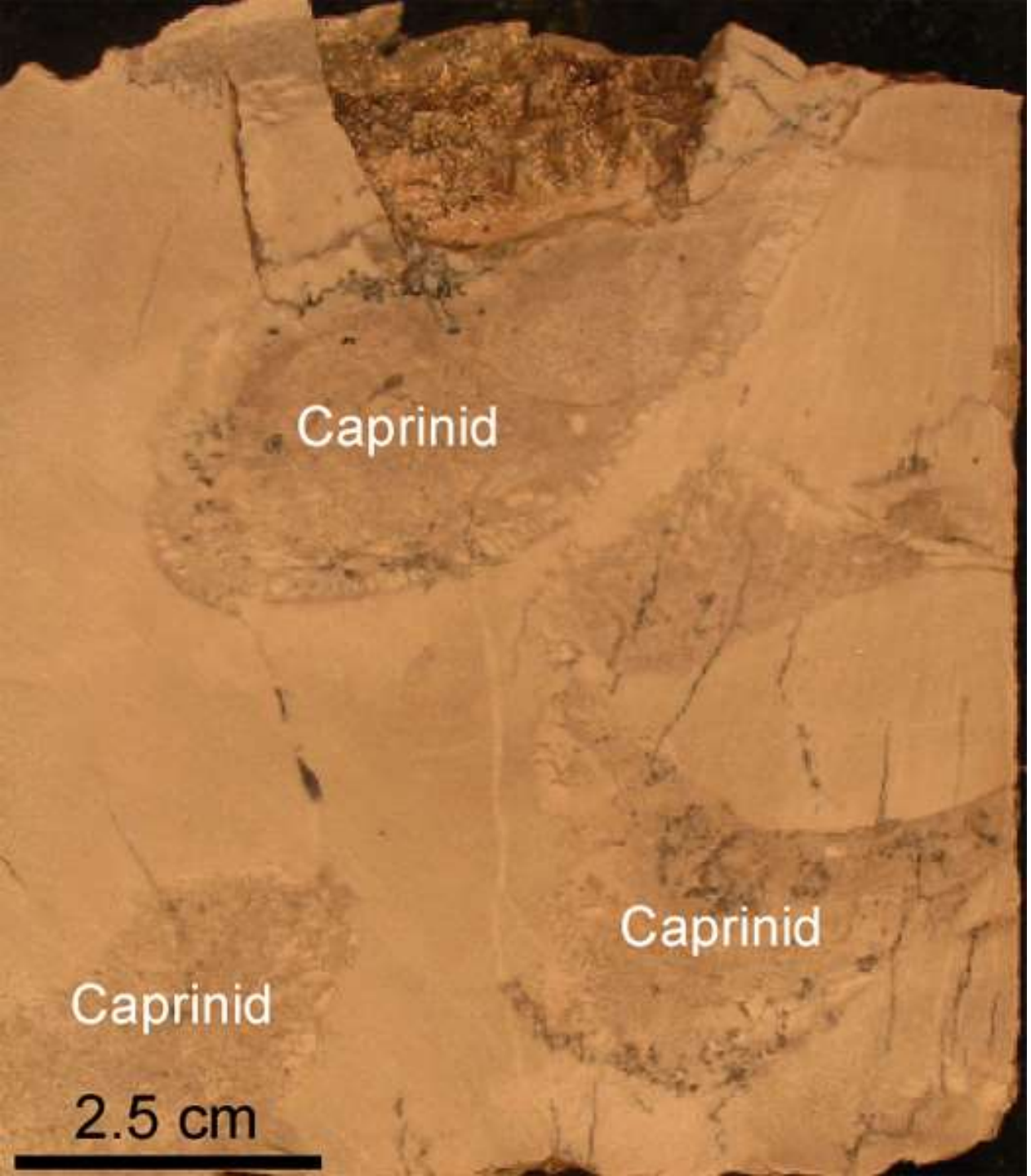
Wackestone. The rock shown in this thin section of a wackestone is composed of lime mud containing greater than 10 percent fossil fragments. The lime mud supports the fossil fragments.

Packstone. The rock shown in this thin section of a packstone is composed of mollusks and echinoid fragments in a lime-mud matrix. The texture shows grain support.



Grainstone. The rock shown in this thin section is a grainstone composed of skeletal grains and intraclasts. There is no mud present, and the grains support one another. Pores are blue.

Boundstone. The rock shown in this outcrop is a framestone composed of corals. The stick corals grow attached to one another, forming the framework of the reef.



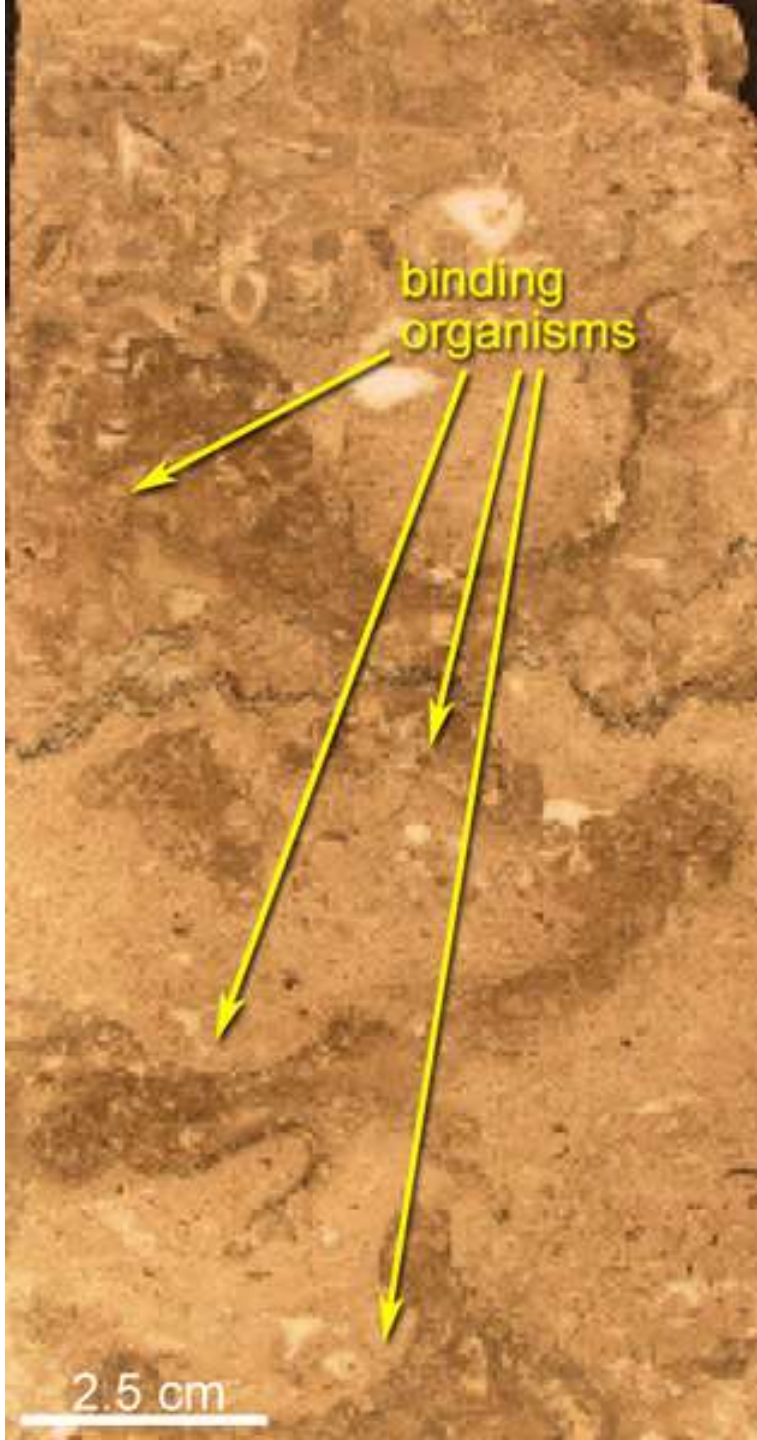
Floatstone. The rock shown in this core slab is a floatstone composed of large caprinids (rudists) floating in lime mud.

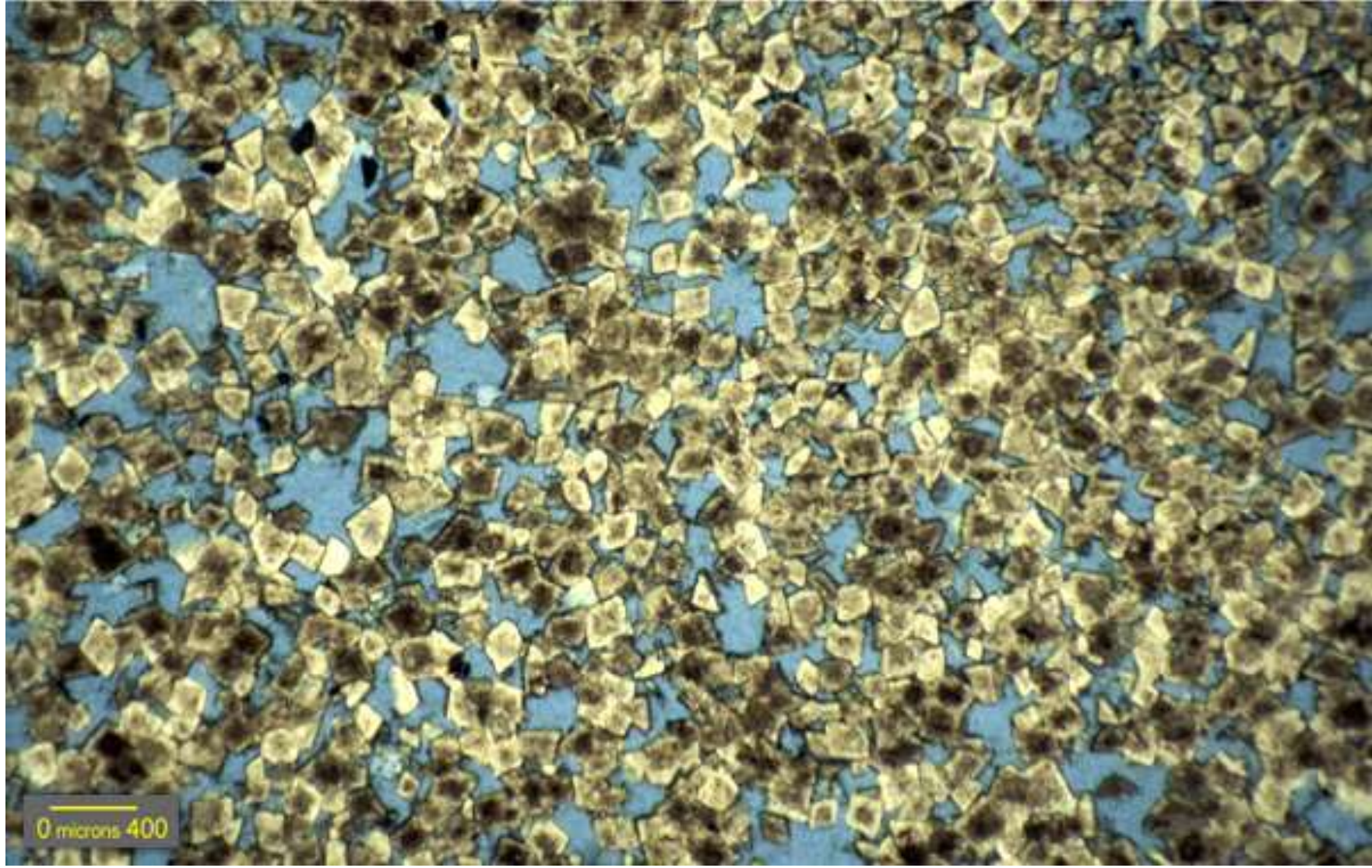
Mud-rich rudstone. The rock shown in this core slab is a rudstone composed of large caprinid rudist fragments and lime mud. The fragments support one another, and the mud occurs within the spaces between the fragments.

Mud-free rudstone. The rock shown in this core slab is a rudstone composed of large caprinid (rudist) fragments. There is no mud present in the pore spaces. The pores are filled by cement.

Framestone. The rock shown in this outcrop is a framestone composed of massive corals. The corals grew attached to one another, forming a rigid framework.

Bindstone. The rock shown in this core slab is composed of bindstone, in which the wackestone matrix is bound by layers of binding organisms.

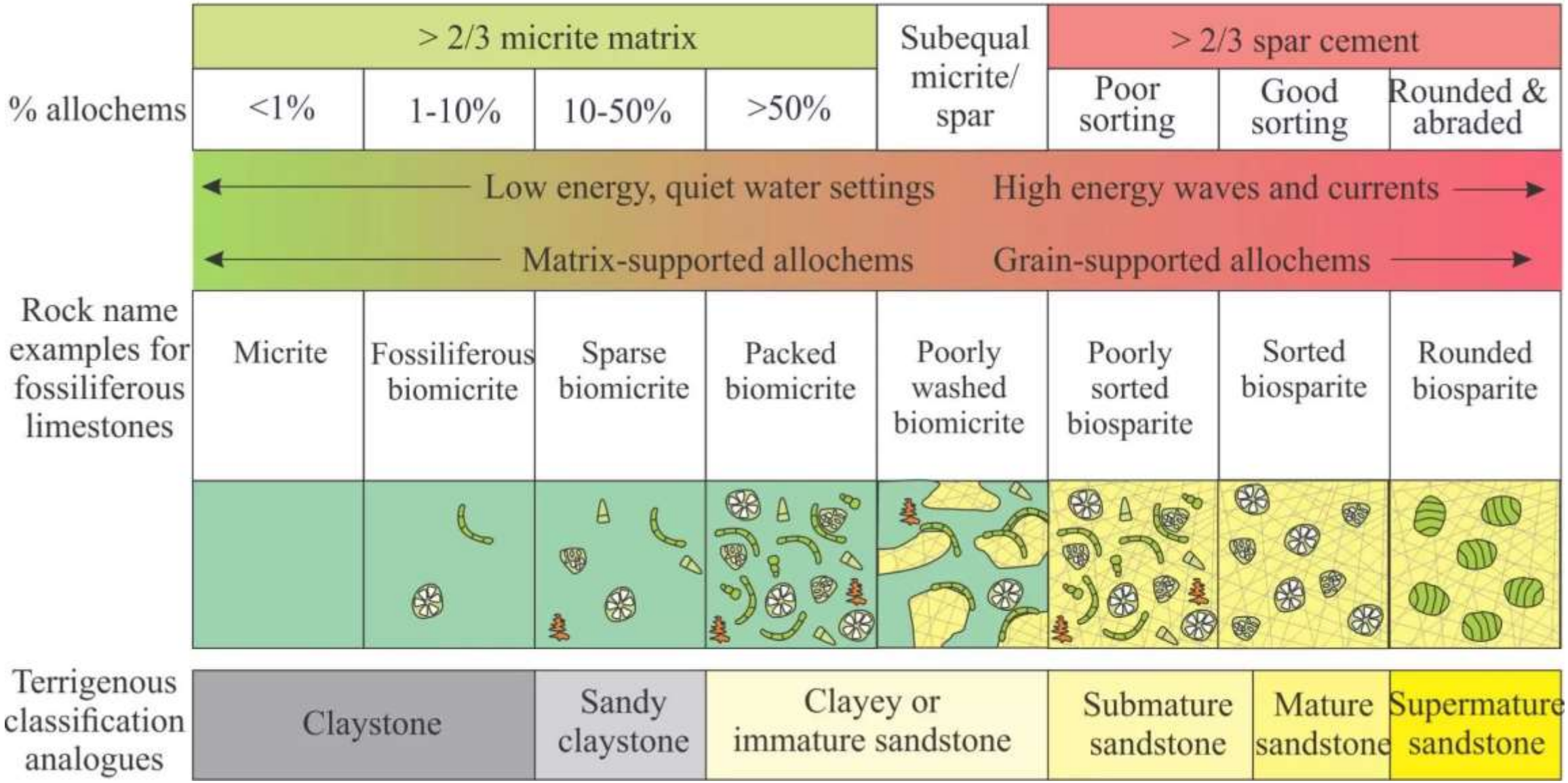




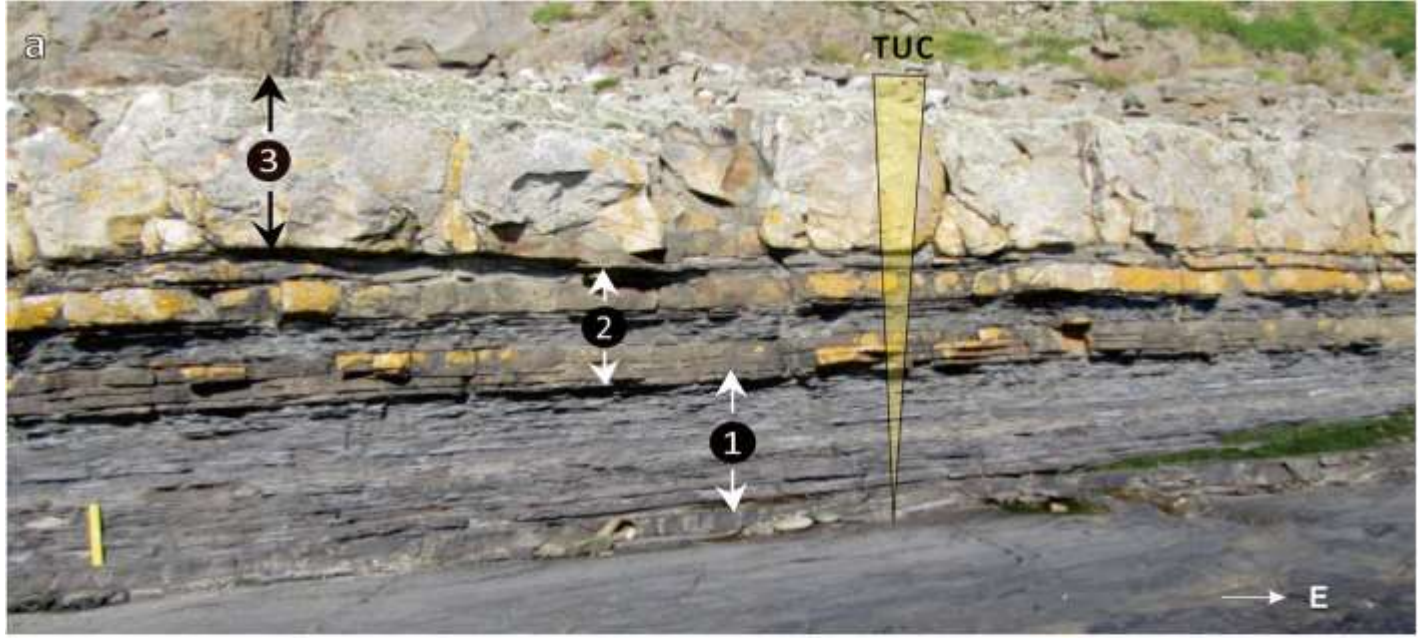
Crystalline carbonates. The rock shown in this thin section is composed of dolomite crystals that have replaced the original carbonate rock, obliterating the original rock texture. When the original carbonate rock texture has been obscured by diagenesis, it is classified as crystalline.

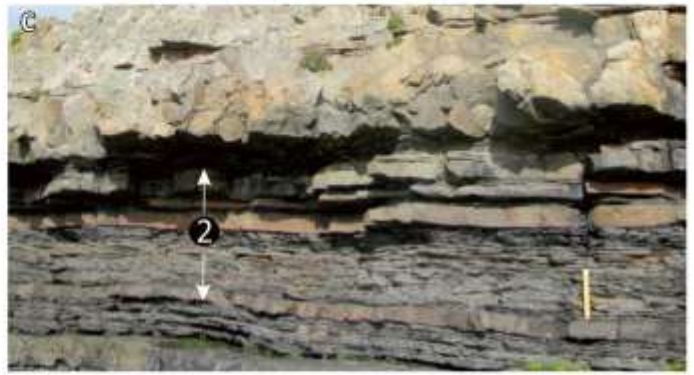
Bafflestone. The rock shown in this core slab is composed of a branching hydrozoan. The branches of the hydrozoan baffle the wave and current energy, allowing finer grained material to be deposited between the branches of the hydrozoan. This finer grained material adds to the mass of the reef.

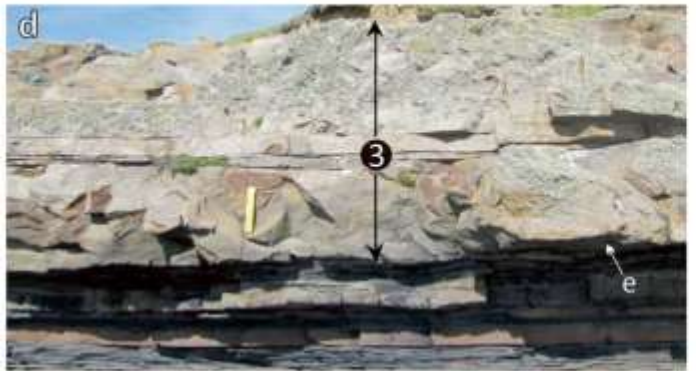
Folk's classification of limestones based on textural parameters and implied depositional conditions. For rock names apply the appropriate allochem qualifier. Diagram is from Folk 1959, 1962, Kendall and Flood, 2011.

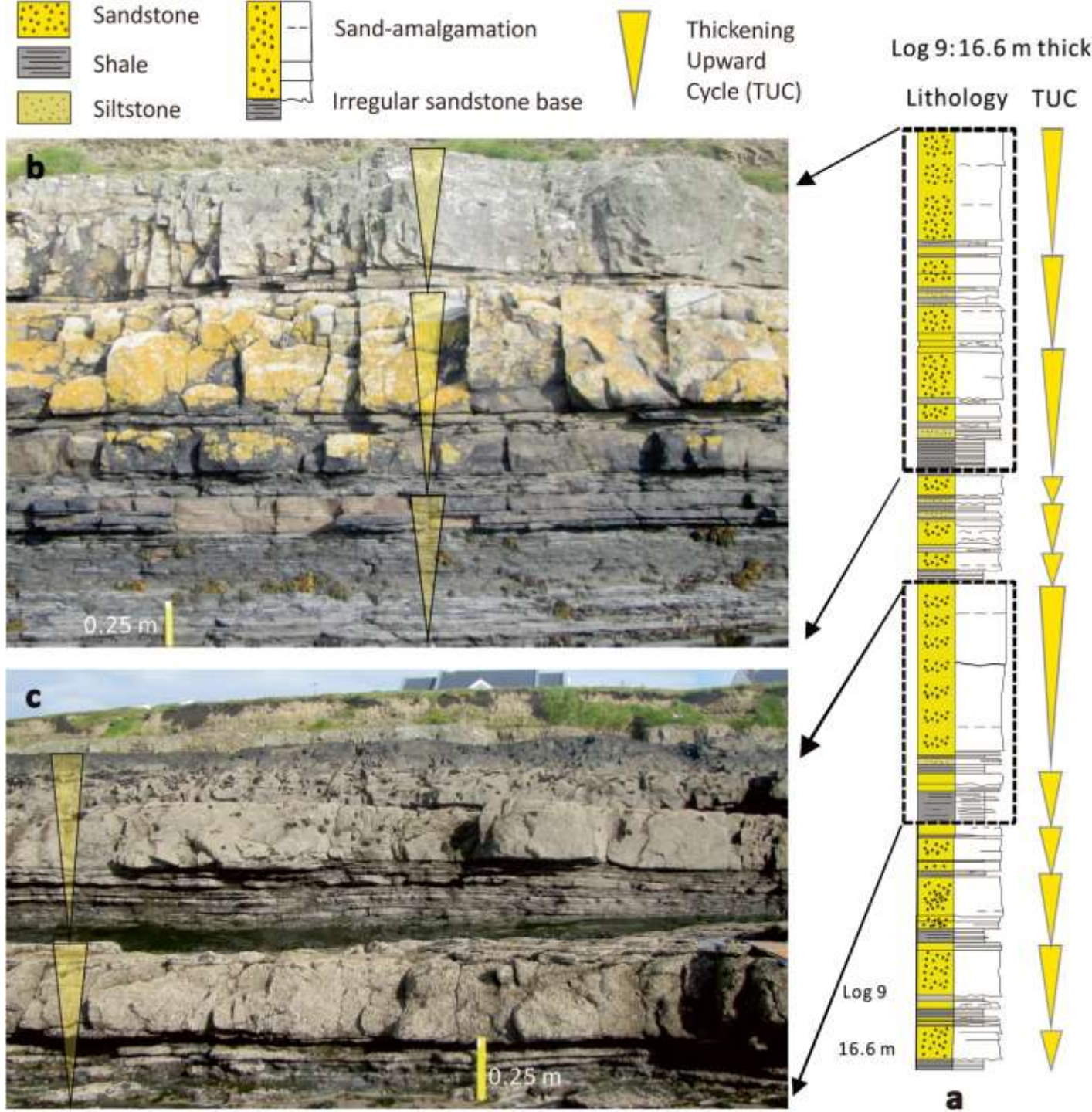


a A typical thickening-upward cycle (TUC) in the Ross Sandstone Formation, Kilbaha Bay, including: **b** Interval 1 – Laminated shales/shales with fine-grained siltstone beds; **c** Interval 2 – Interbedded thin sandstones/siltstones and mudstones; and, **d** Interval 3 – Structureless massive sandstones with strong degree of amalgamation; **e** Load structure at base of a thick sandstone bed. White arrow in **d** shows its location. Note the 0.25 m yellow ruler for scale









a Log 9 documenting continuous thickening-upward cycles in the Ross Sandstone Formation, Kilbaha Bay, see Fig. 1 for location of outcrop logs; **b** and **c** Outcrop photos showing details of thickening-upward cycles. Successions exposed in **c** are generally below sea level and covered by seaweed, thus showing different color in **b**