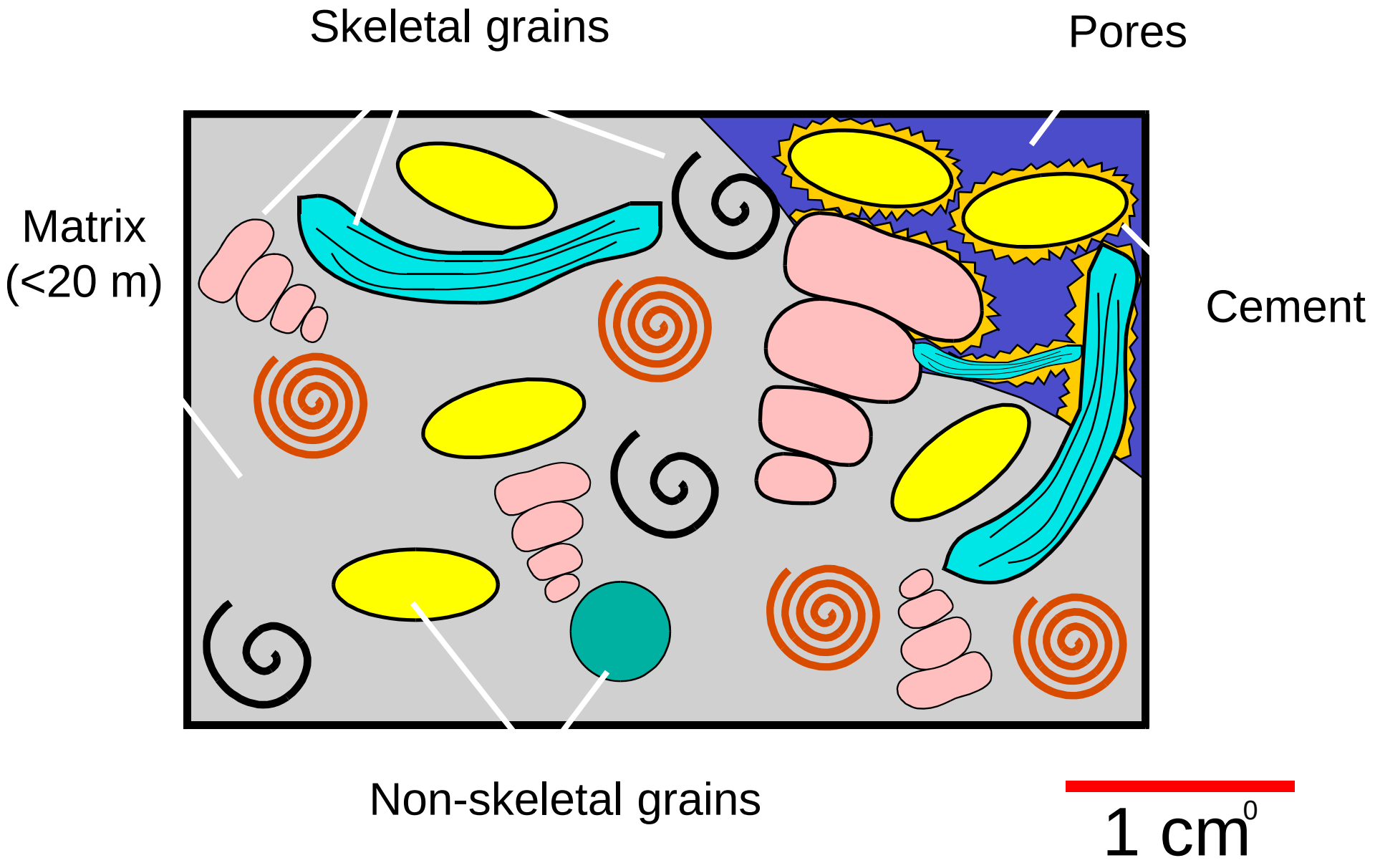
# Components of a Carbonate rock



# Non-Skeletal Grains

- Peloids
- Coated Grains
  - ooids, pisoids, oncoids, rhodoliths
- Grain Aggregrates (grapestone)
- Mechanical Clasts
  - intraclasts
  - lithoclasts

# Peloids


- ***Peloids*** are small (< 2 mm) spheroidal or ovoid particles of fine-grained carbonate mud that lacks internal structure.
- Most originate as fecal pellets from a range of organisms that have ingested mud.
- Some peloids originate from microbial breakdown of other particles.

# Peloids

- Fecal pellets
- Micritized grains

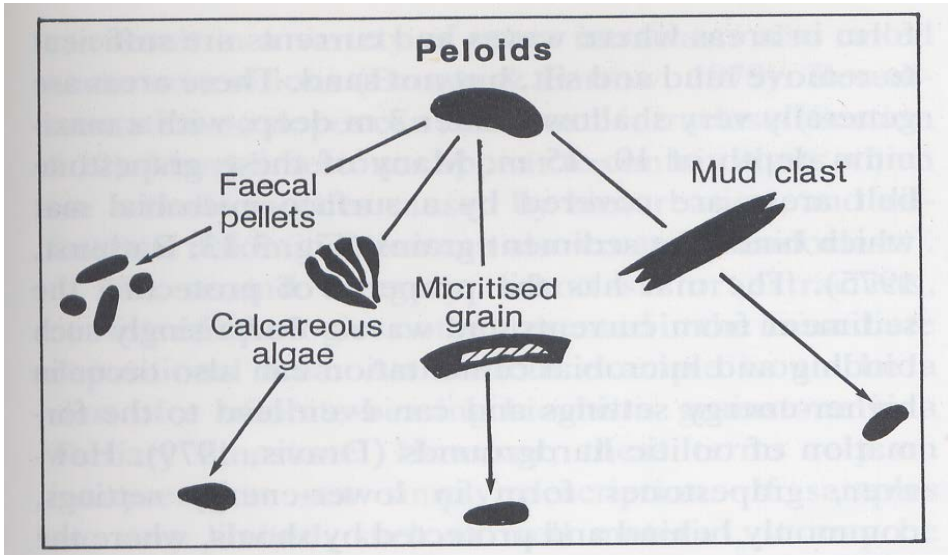
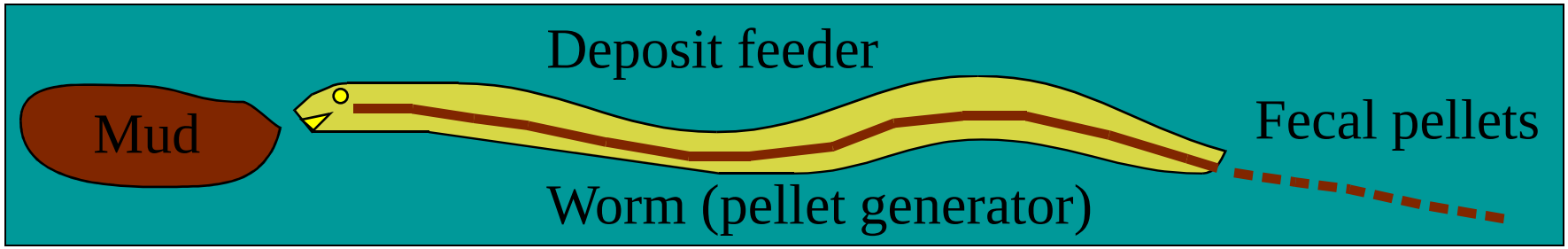
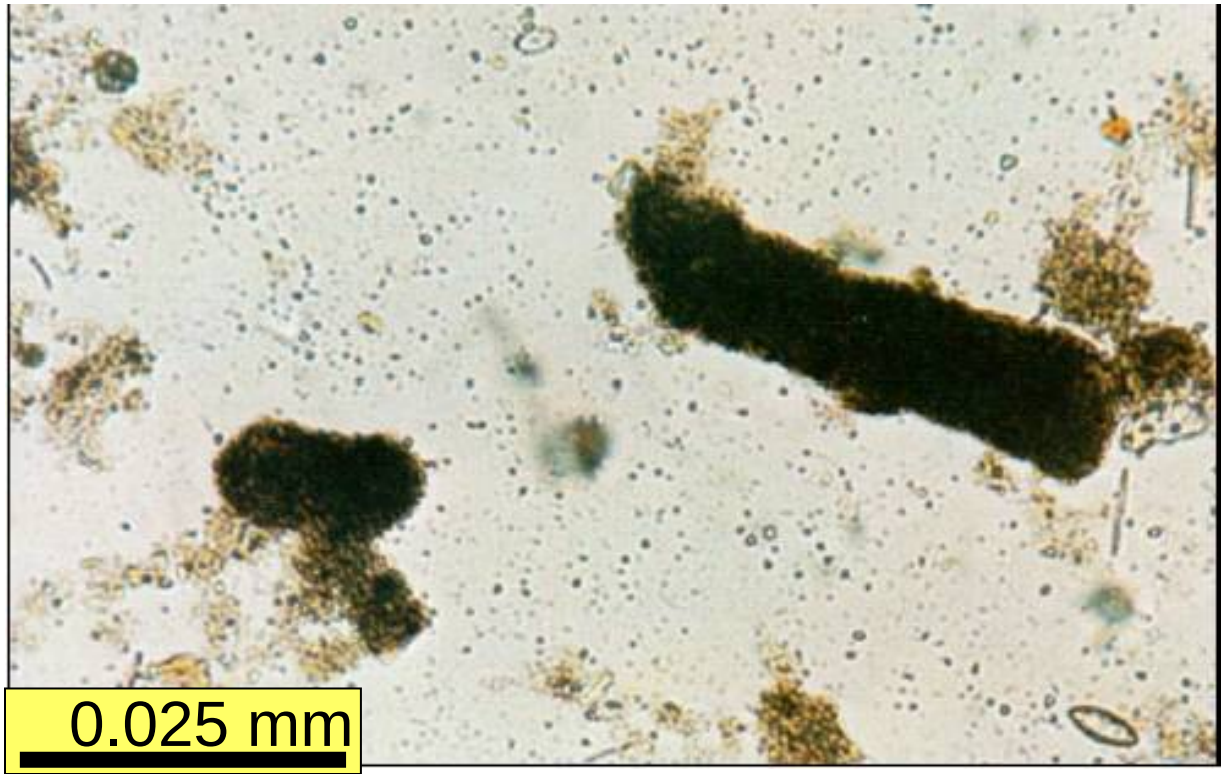



**Fig. 1.7** *Origins of peloids.*

# Fecal Pellets (Peloids)



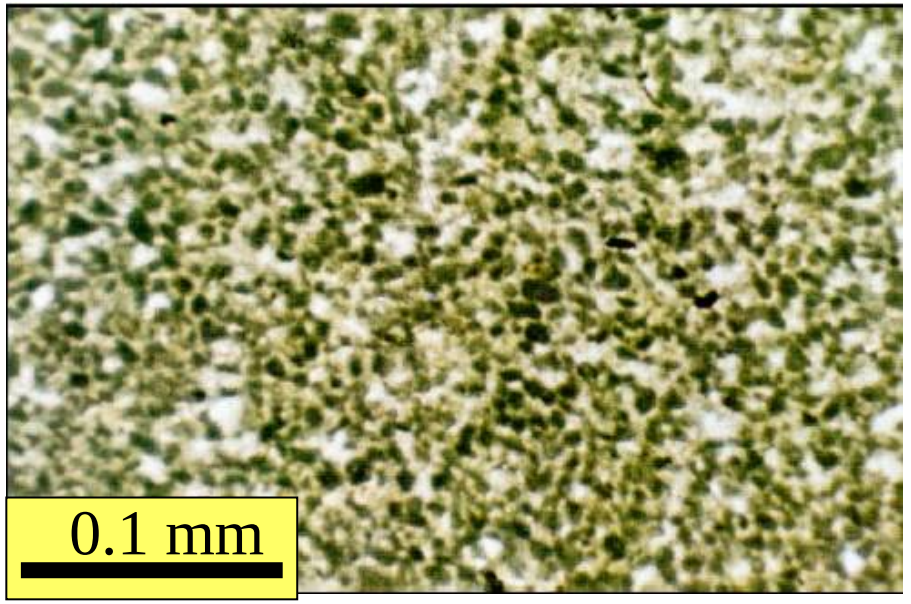

Modern fecal pellets. Generally rod shaped (circular in diameter).



# Non-Skeletal Grains: Peloids

- Fecal Pellets

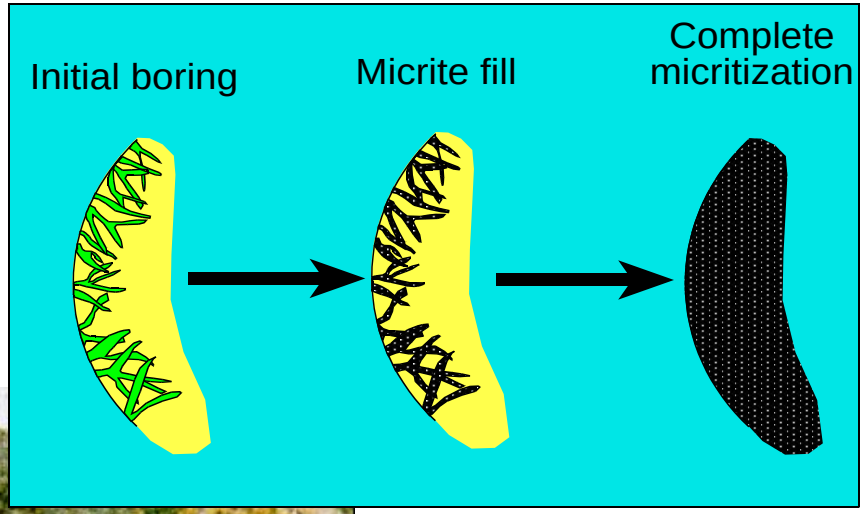
Mud shrimp Calianassa burrows

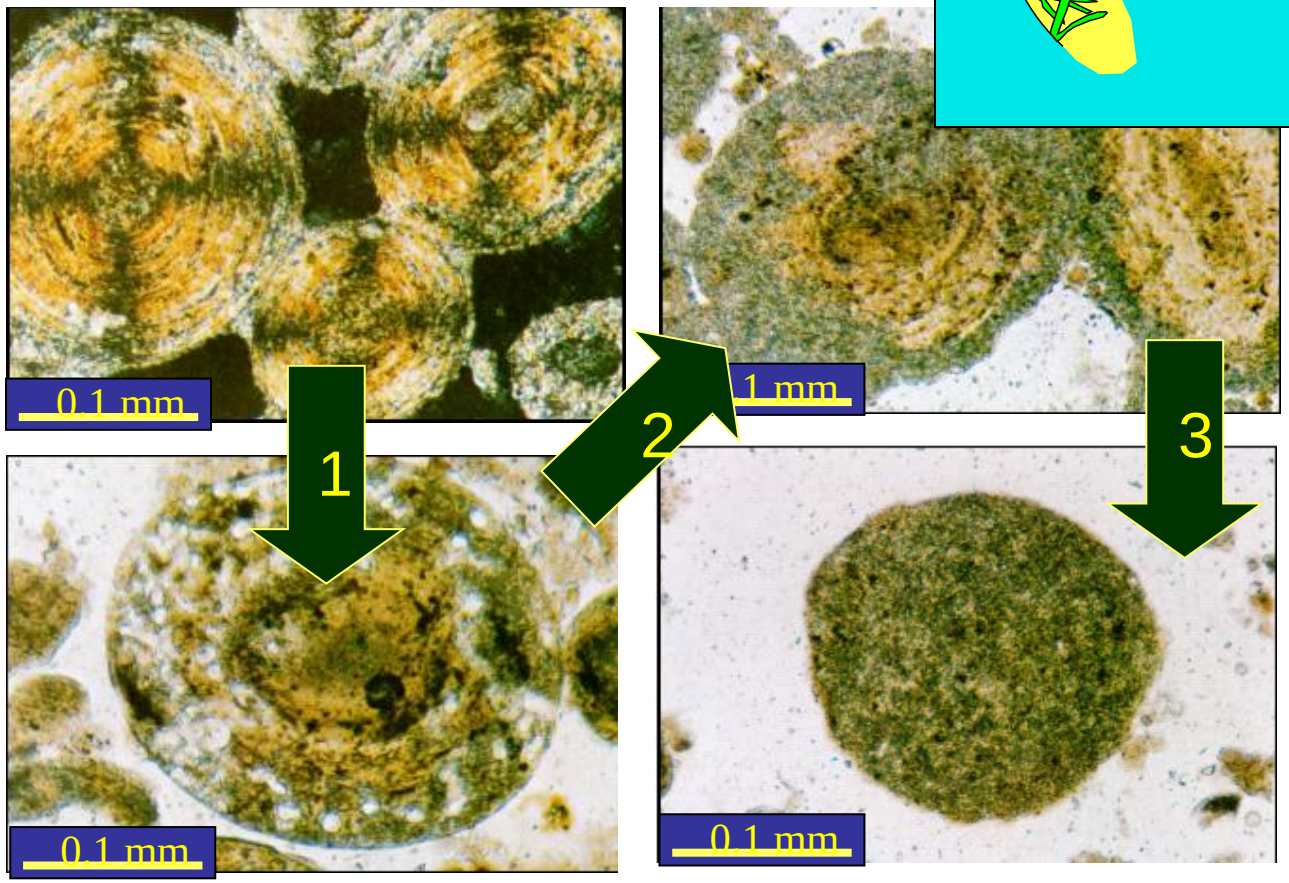



- Probably fecal pellets based on size and uniformity of shape (disaggregated rods).
- Probably most lime muds were composed of squashed soft fecal pellets.

# Non-Skeletal Grains: Peloids

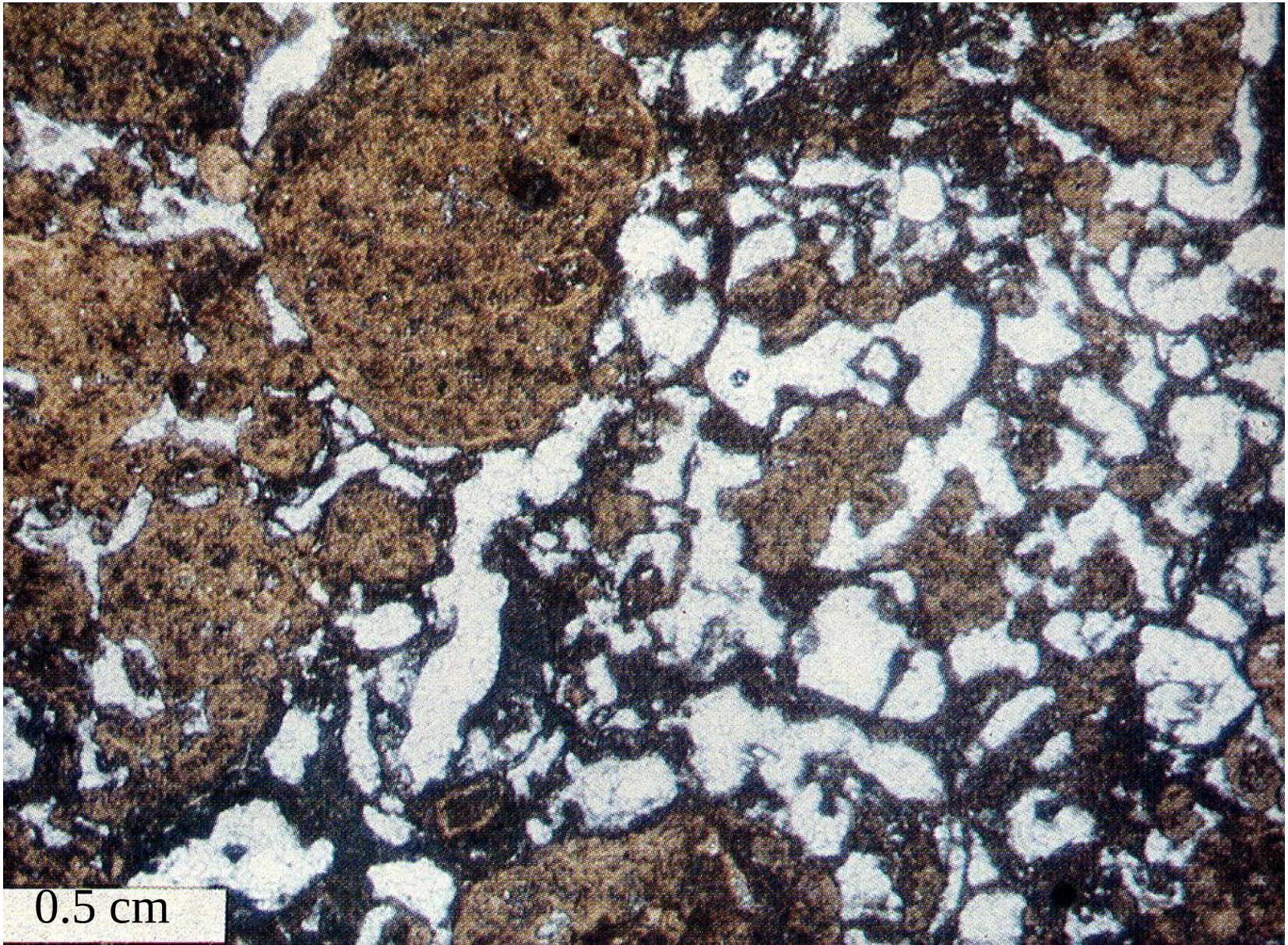
- Micritized Grains
  - – boring by endolithic algae
  - – infestation by cyanobacteria



# Micritic Peloids Associated with Caliche

# Micritic Peloids Associated with Caliche



# Non-Skeletal Grains: Peloids

- Peloids in the Environment
  - important grain type in ancient carbonates
  - multi-origin: Fecal, algal breakdown

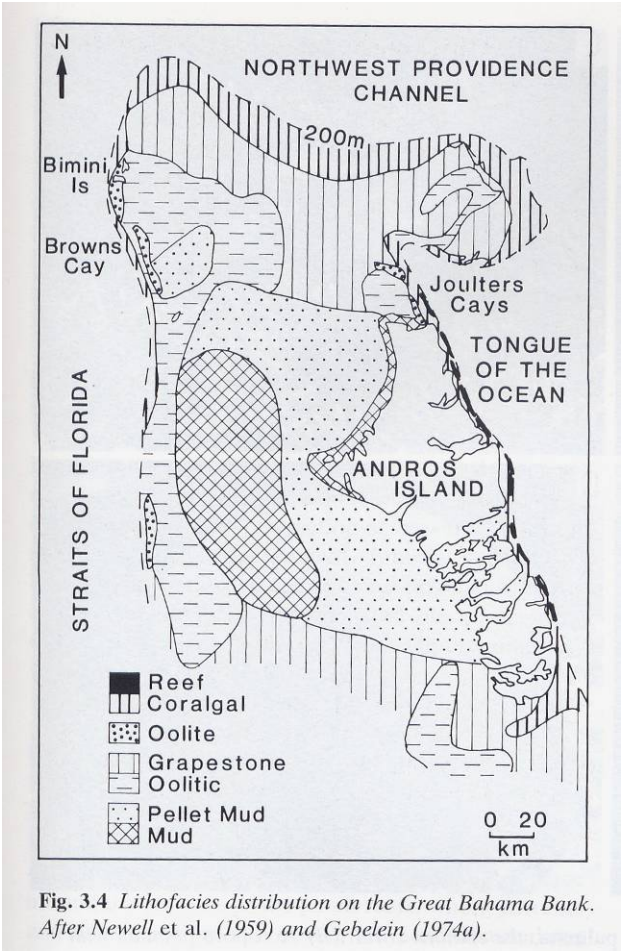
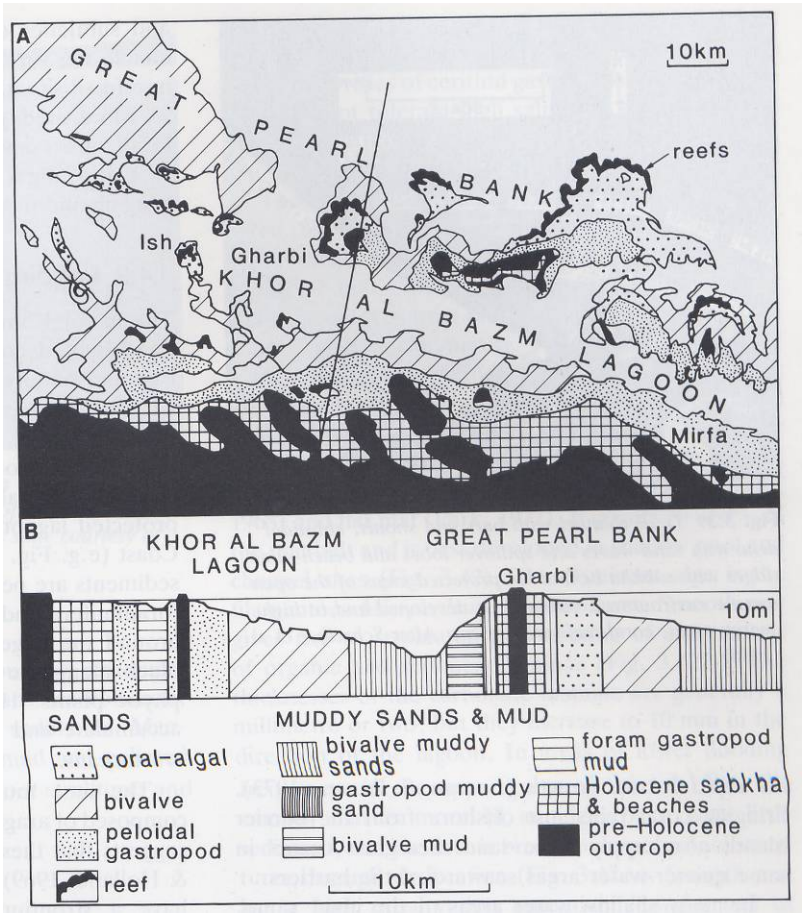



**Fig. 3.4** *Lithofacies distribution on the Great Bahama Bank. After Newell* et al. *(1959) and Gebelein (1974a).*



# Non-Skeletal Grains: Coated Grains

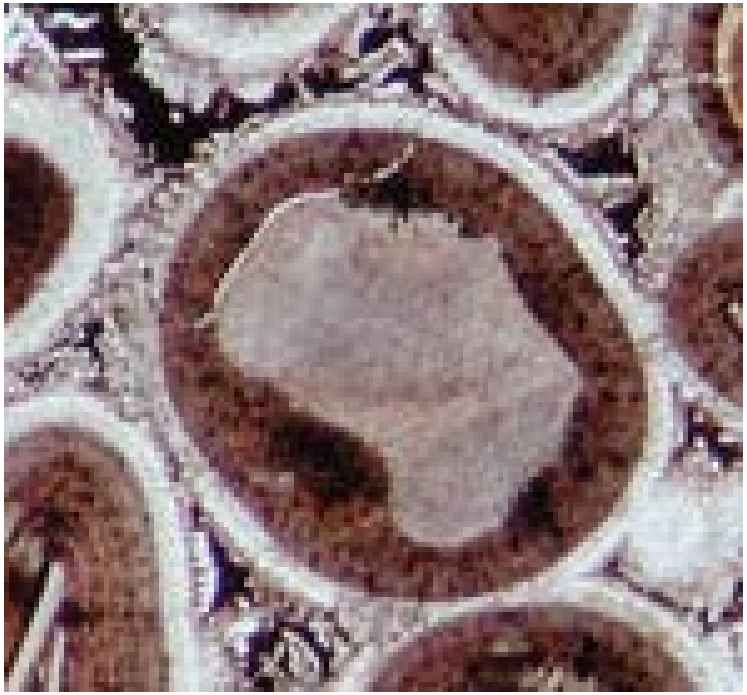
- Comprised of nucleus (undefined) & a cortex of carbonate laminations
- Ooid
  - evenly laminated cortex
  - inorganic in origin
  - normally < 2 mm
- Pisoid
  - irregularly laminated cortex
  - normally inorganic in origin
  - often > 2 mm
- Oncoids & Rhodoliths
  - irregularly laminated cortex
  - organic in origin

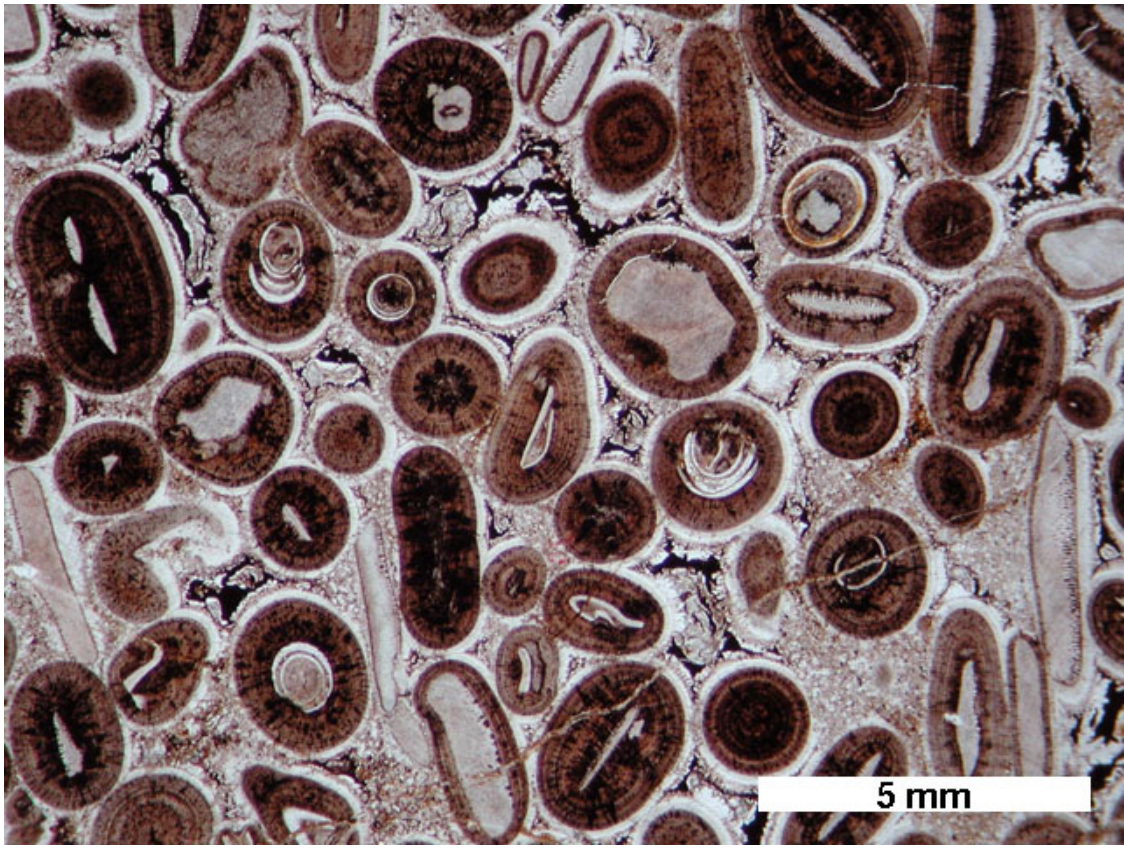
# Non-Skeletal Grains: Ooids

- Origins
  - Mechanical Aggregate (snowball)
  - Inorganic precipitation
  - Microbial Precipitation
- Modern occurrence
  - tropical shallow water
  - agitated water
    - role grains around
    - drive off $CO_2$

# Ooids

***Oolite*** is the sedimentary rock composed mainly of ooids.



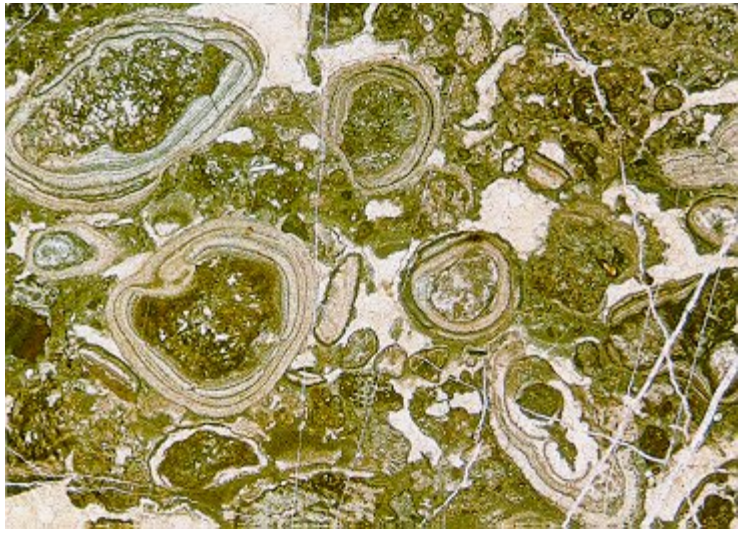


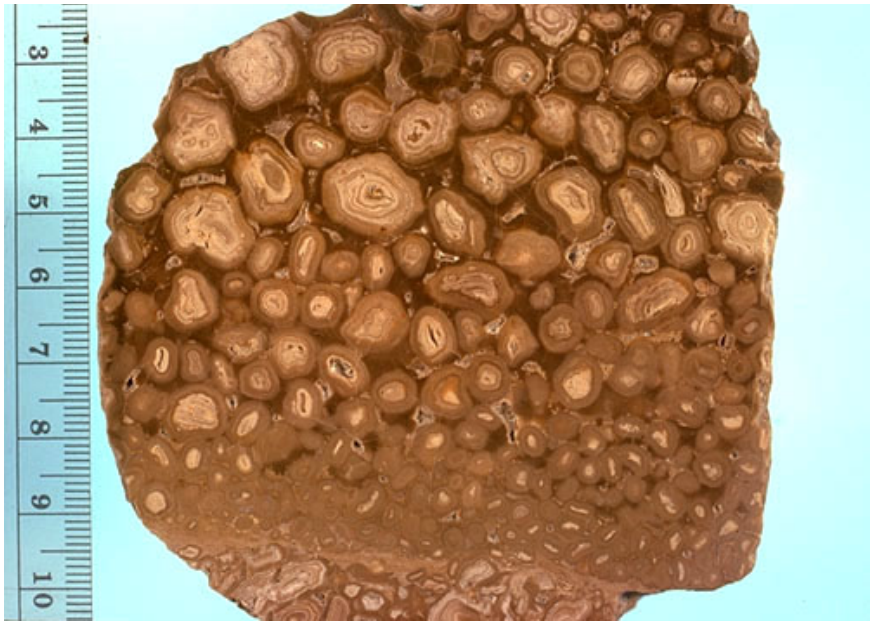
# Ooid Occurrence

- Moderate to high-energy setting
- Tropical factory only, in settings where hypersaline waters meet open-marine waters
- Indicative of moderate to high and continuous wave or tide energy and agitation
- Commonly oolitic zones are found later as zones of moldic porosity that has high porosity but low permeability
- Ooid mineralogy is tied to atmospheric pCO2 as noted by Sandberg (1983), Wilkinson et al (1985), and Stanley and Hardie (1998)

# Non-Skeletal Grains: Pisoids

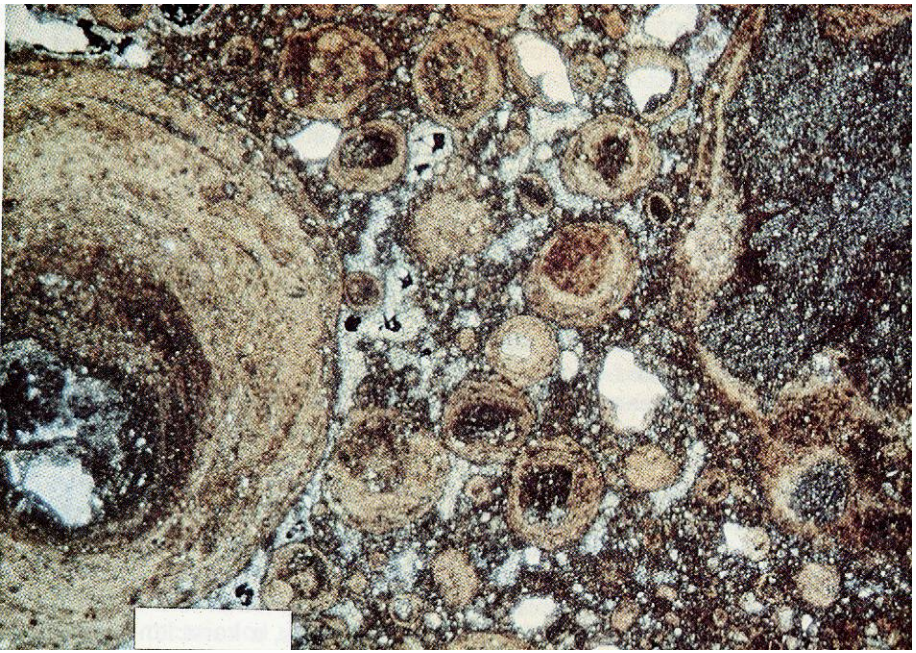
- Environments of Formation
  - – soils, caves, supratidal (usually Hypersaline)





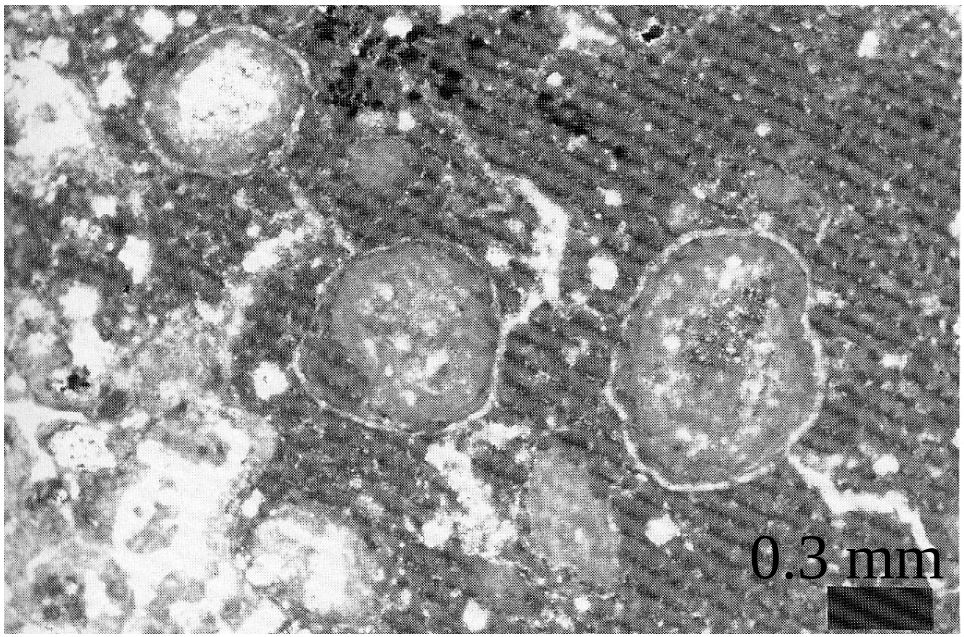
# Caliche Pisolites

Form in caliche crusts in semiarid to arid climates.



0.5 mm

Grain-rich matrix

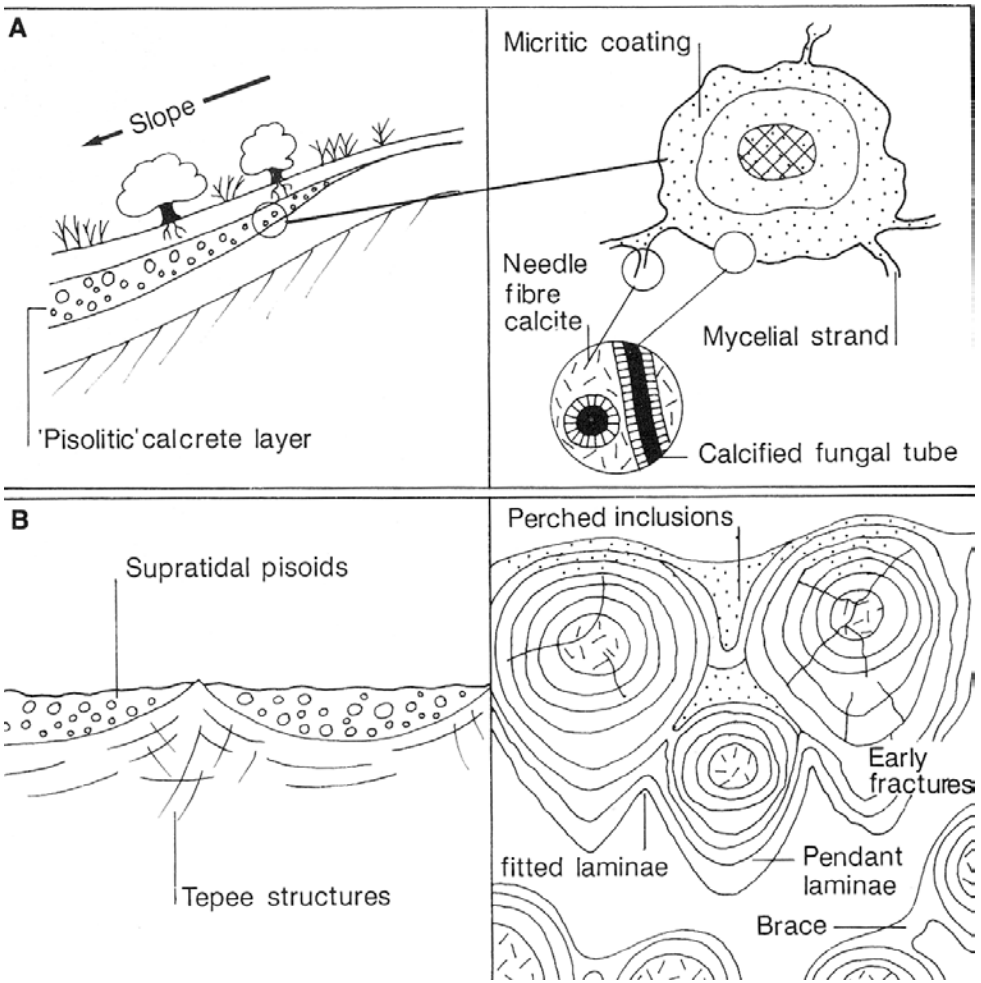



Mud-rich matrix

# Cave Pearls

# Pisoid Occurrence

- Soils
- Supratidal zones in tropical carbonate factory
- Caves



# Biologically Formed Coated Grains

- Oncoid (oncolite)
- Rhodolith (rhodolite)

# Non-Skeletal Grains: Oncoids

- cyanobacteria coated grain traps mud on sticky surface
- Moderate energy, semi-protected Environment

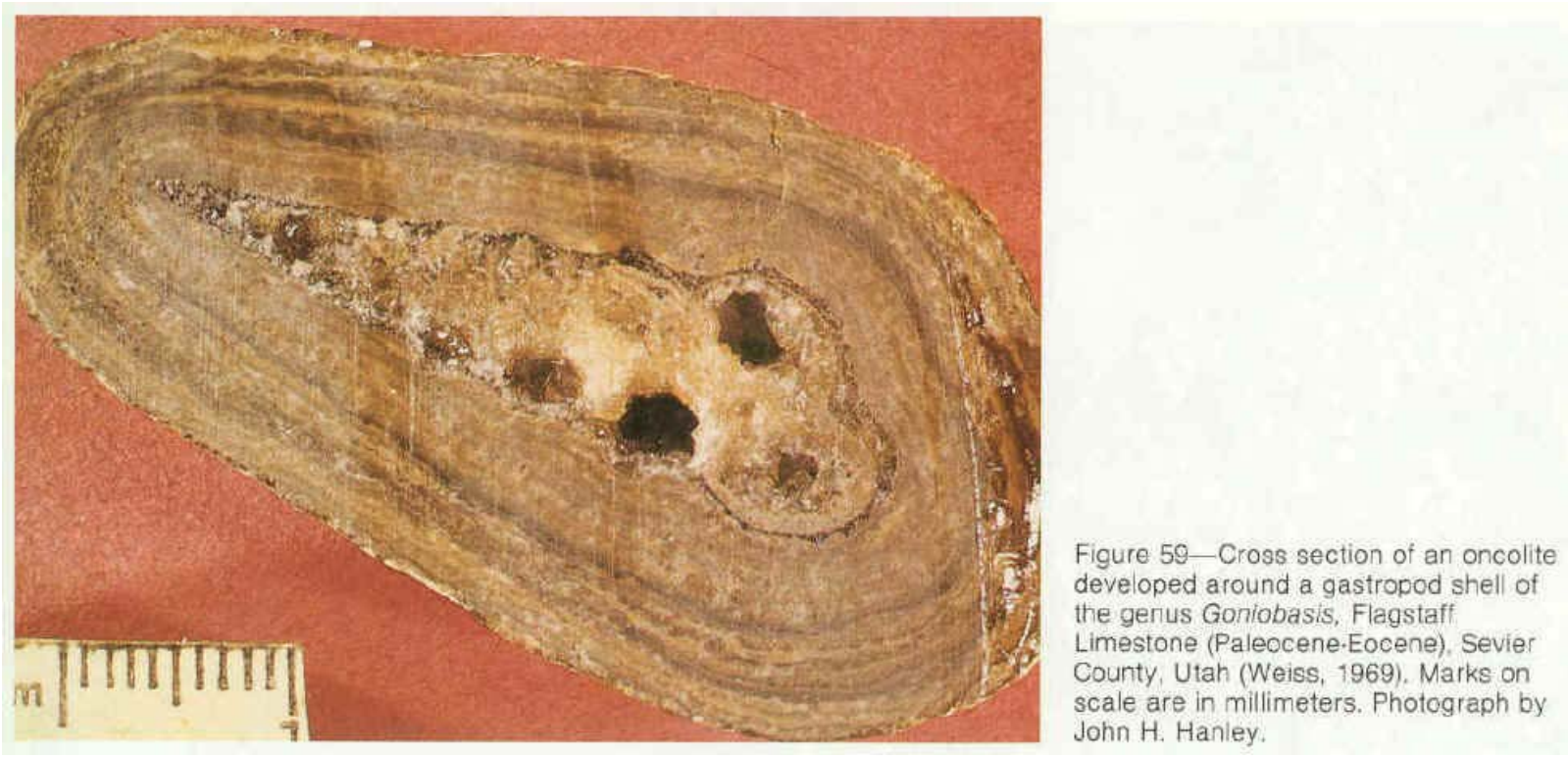
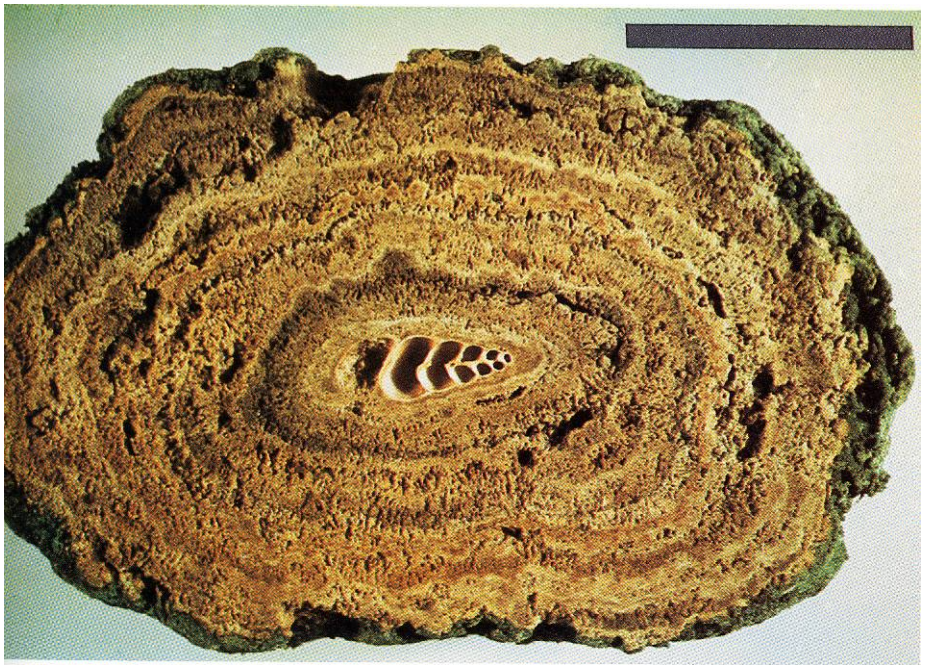


Figure 59—Cross section of an oncolite developed around a gastropod shell of the genus *Goniobasis*, Flagstaff Limestone (Paleocene-Eocene), Sevier County, Utah (Weiss, 1969). Marks on scale are in millimeters. Photograph by John H. Hanley.

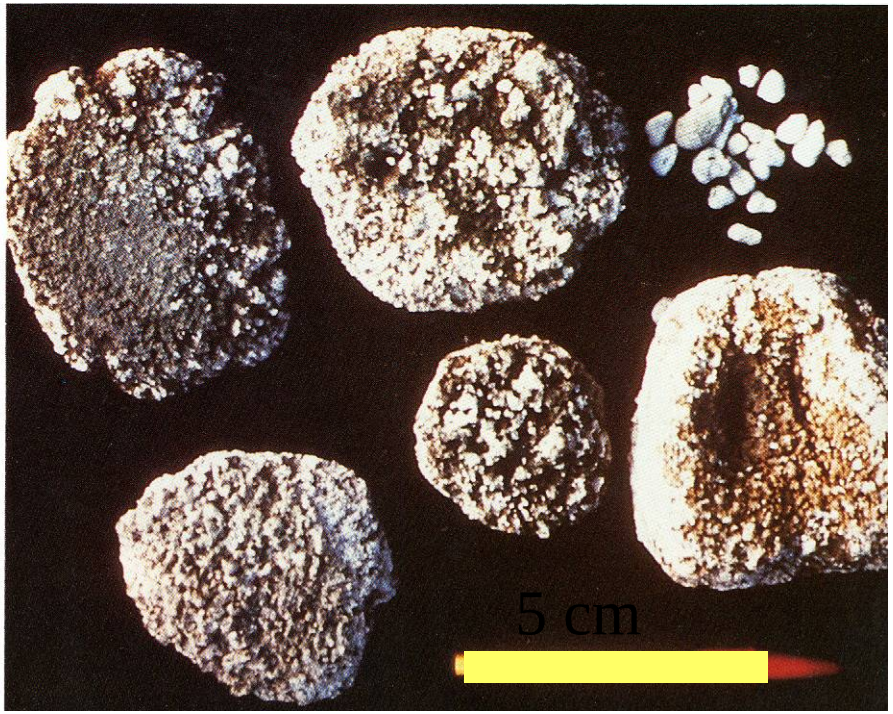
# Oncoids (Oncolite)



- Blue-green algal (cynobacteria) coated grain
- Mineralogy is whatever the mud is (was)
- Sometimes contains encrusting forams

# Modern Oncoids

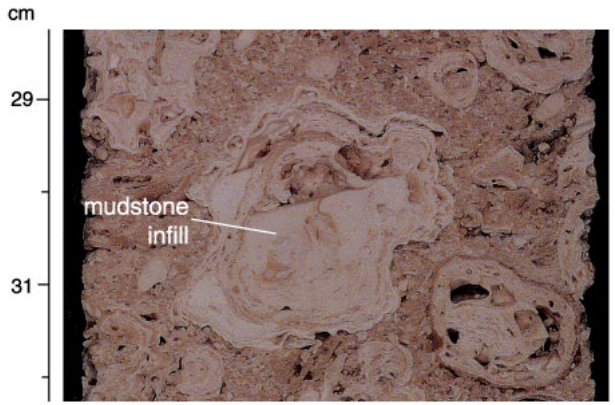

Marine
Florida Bay




Freshwater lake
Syracuse, New York

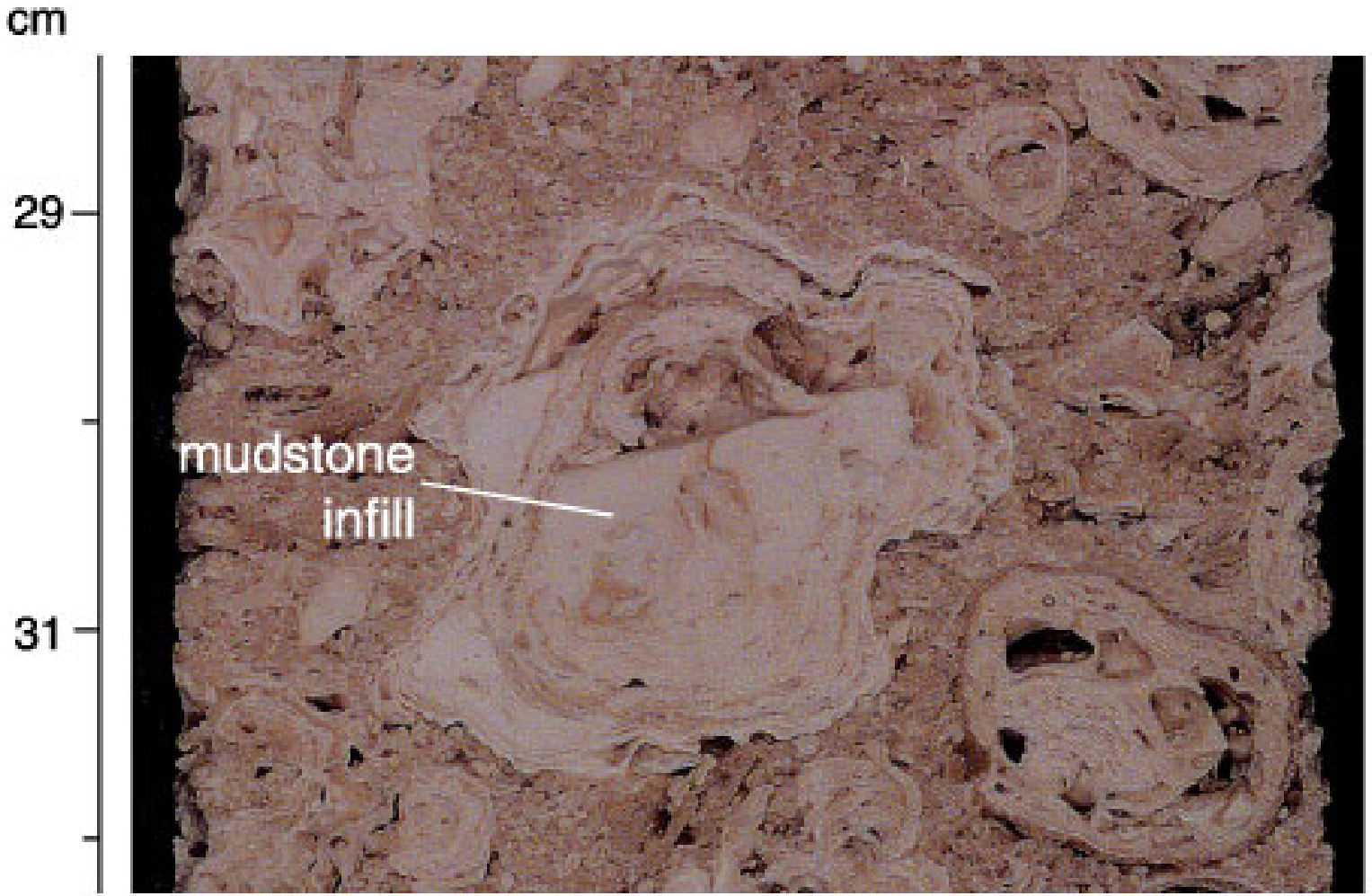
# Non-Skeletal Grains: Rhodolith

- Red algal (HMC) coated grain
- High-energy, open shelf environment




Point Addis Marine National Park, Victoria, Australia

# Rhodolite

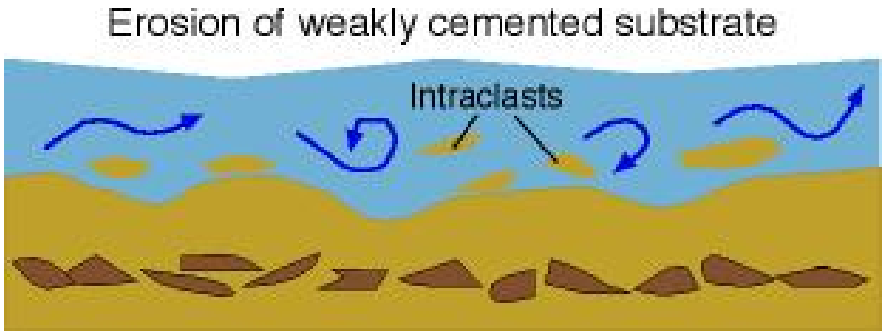


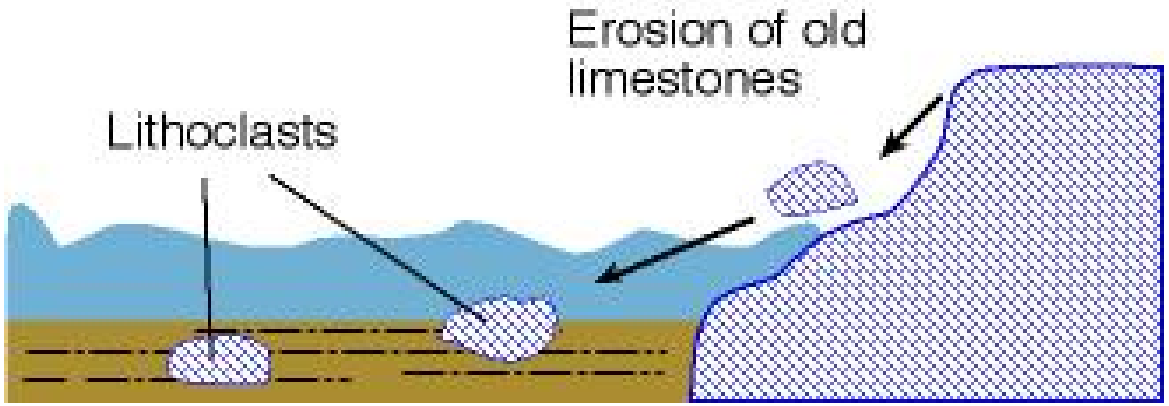
# Non-Skeletal Grains: Grapestone

- Grape-like clusters of grain aggregates
- Micritized grains common
- protected shallow marine environment

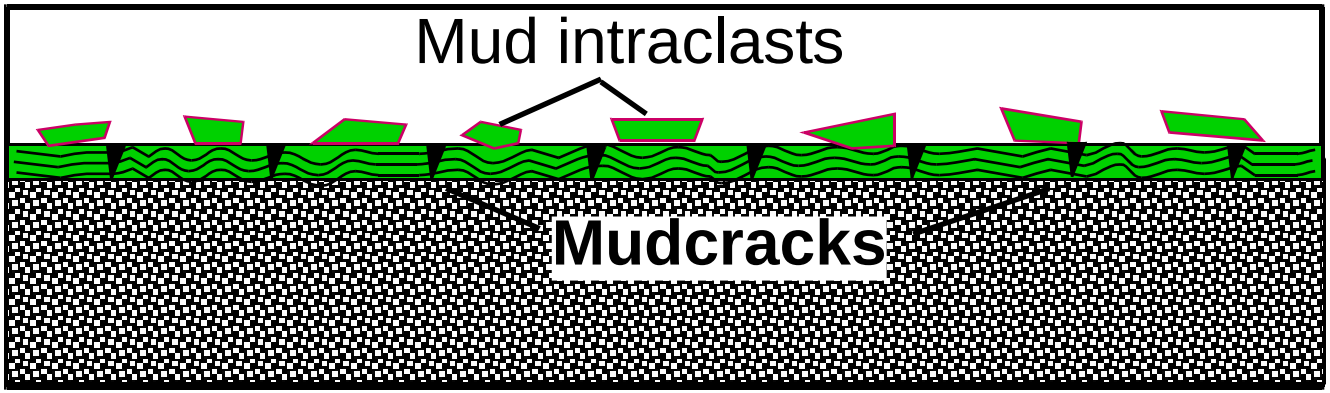
# Non-Skeletal Grains: Mechanical Clasts

- Intraclasts
  - Fragments of lithified or partly lithified sediment
- Lithoclasts (Extraclasts)
  - fragments consisting of a lithology not represented in the immediate depositional environment



# Mud-Rich Intraclasts




# Flat-Pebble Conglomerate


**[K. Medig]**