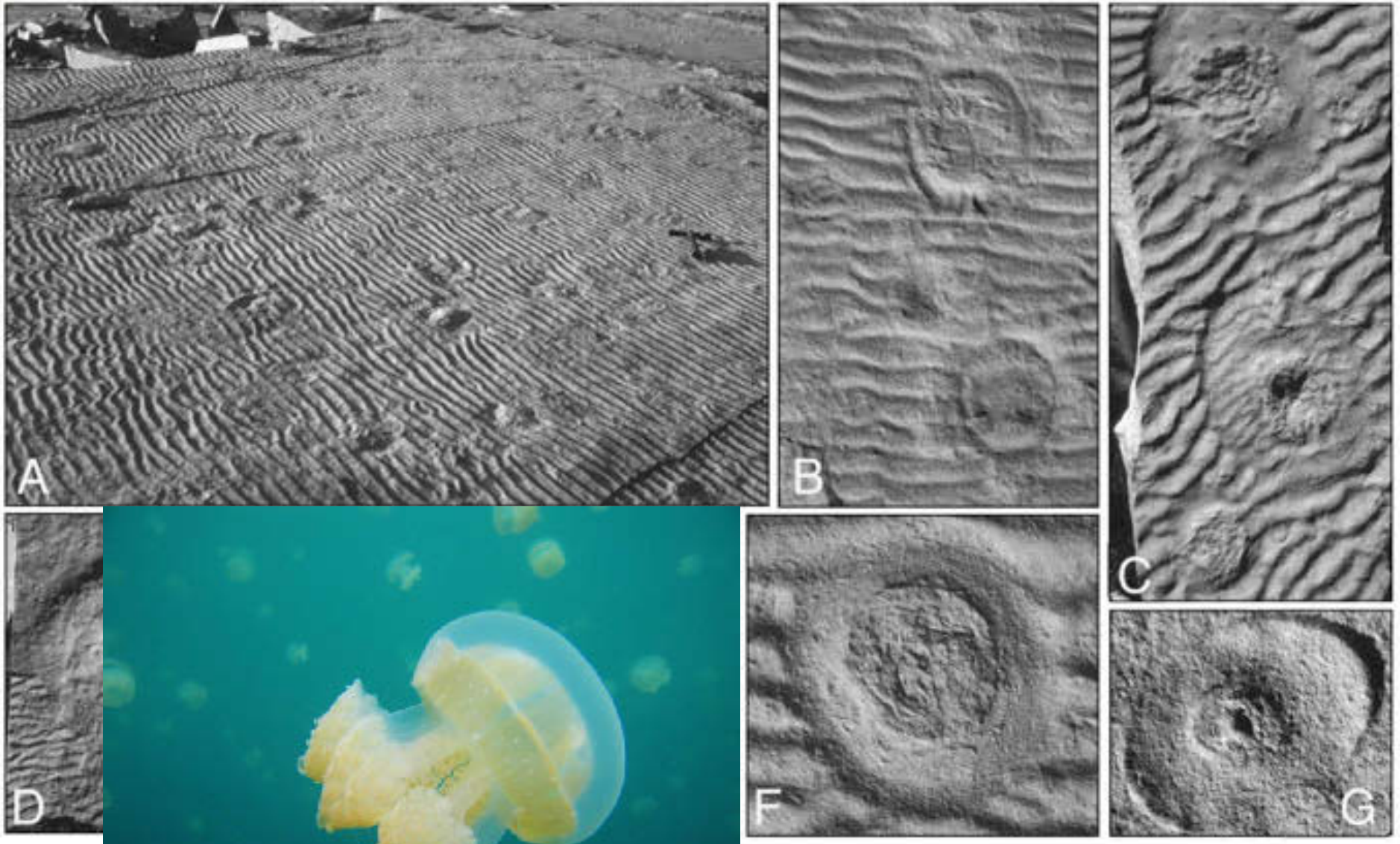
Sedimentary Rocks

12.001 – 17 September 2012



Courtesy of Geological Society of America. Used with permission. Source: Hagadorn, James W., Robert H. Dott, et al. "Stranded on a Late Cambrian shoreline: Medusae from Central Wisconsin." *Geology* 30, no. 2 (2002): 147-50.

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Cambrian,
Newfoundland

P. Myrow

Ripples spreading from an initial bump

1 second in movie = 10 minutes real time

Table 5.3 Major Classes of Clastic Sediments and Sedimentary Rocks

Particle Size	Sediment	Rock
COARSE	GRAVEL	
Larger than 256 mm	Boulder	Conglomerate
256–64 mm	Cobble	
64–2 mm	Pebble	
MEDIUM		
2–0.062 mm	SAND	Sandstone
FINE	MUD	
0.062–0.0039 mm	Silt	Siltstone
Finer than 0.0039 mm	Clay	Mudstone (blocky fracture) Shale (breaks along bedding) Claystone

(a) Conglomerate

(b) Sandstone

(c) Shale

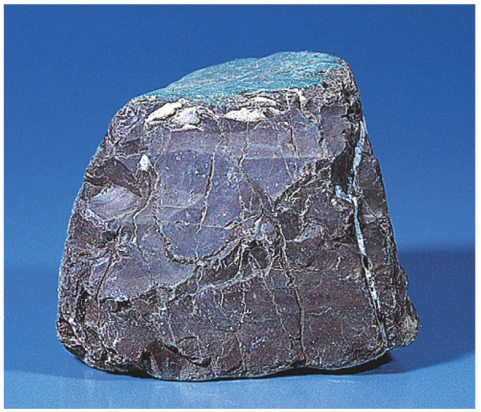
Table 5.4 Classification of Biological and Chemical Sediments and Sedimentary Rocks

Sediment	Rock	Chemical Composition	Minerals
BIOLOGICAL			
Sand and mud (primarily bioclastic)	Limestone	Calcium carbonate ($CaCO_3$)	Calcite (aragonite)
Siliceous sediment	Chert	Silica (SiO_2)	Opal, chalcedony, quartz
Peat, organic matter	Organics	Carbon compounds; Carbon compounded with oxygen and hydrogen	(coal), (oil), (gas)
No primary sediment (formed by diagenesis)	Phosphorite	Calcium phosphate ($Ca_3[PO_4]_2$)	Apatite
CHEMICAL			
No primary sediment (formed by diagenesis)	Dolostone	Calcium-magnesium carbonate ($CaMg[CO_3]_2$)	Dolomite
Iron oxide sediment	Iron formation	Iron silicate; oxide (Fe_2O_3); limonite, carbonate	Hematite, siderite
Evaporite sediment	Evaporite	Sodium chloride (NaCl); calcium sulfate ($CaSO_4$)	Gypsum, anhydrite, halite, other salts

(a) Limestone

(b) Gypsum

(c) Halite

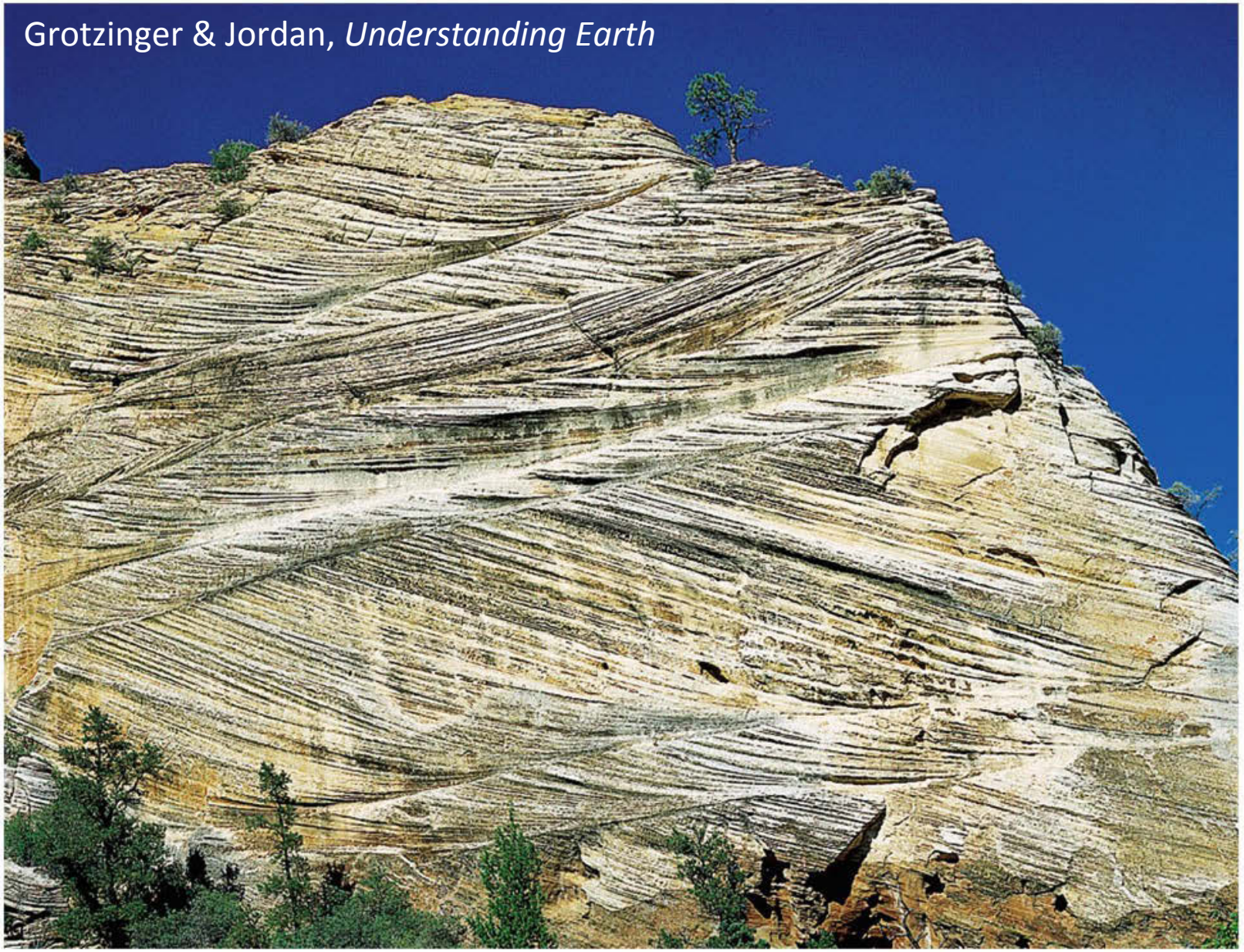


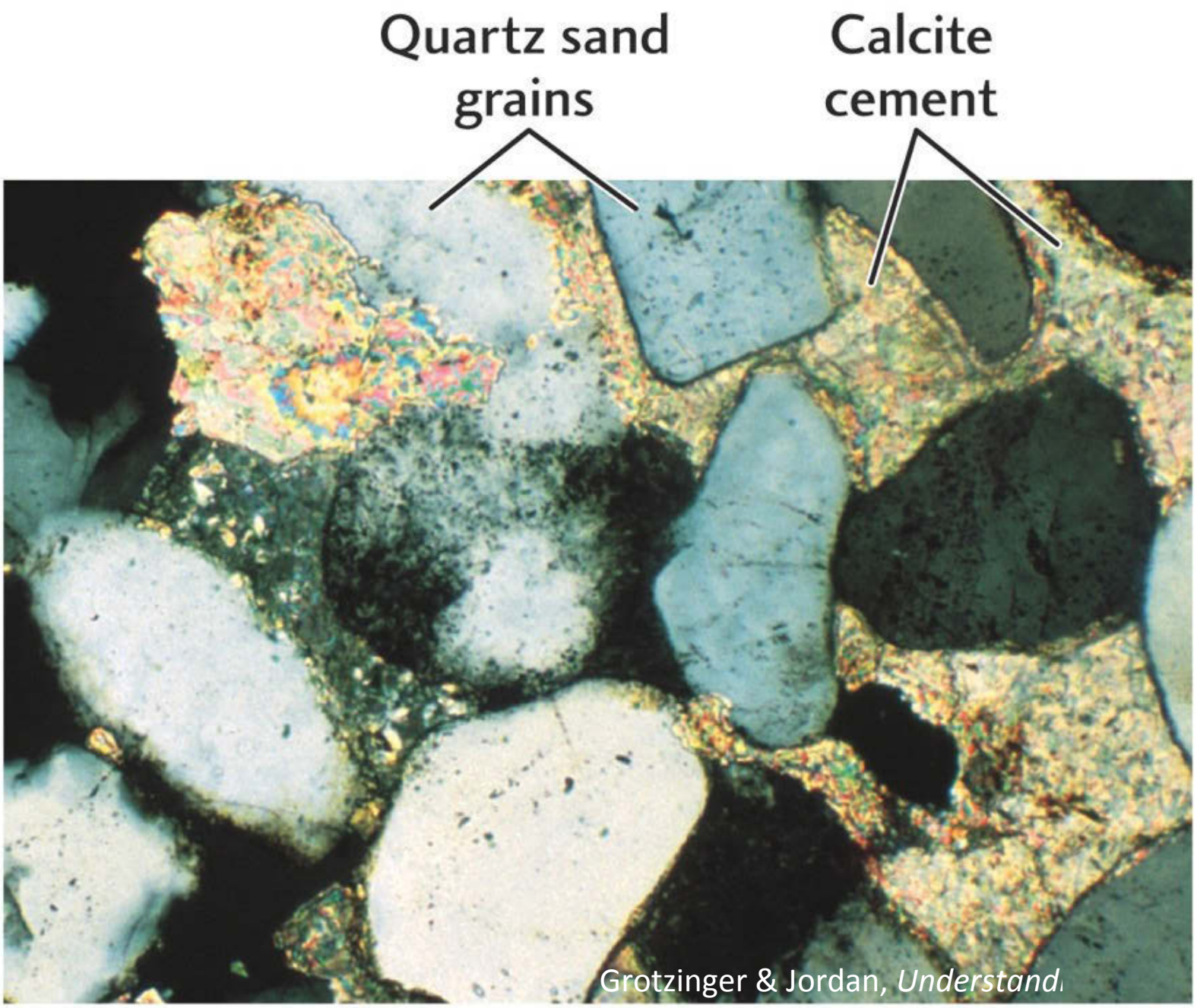
(d) Chert

Well-sorted sand

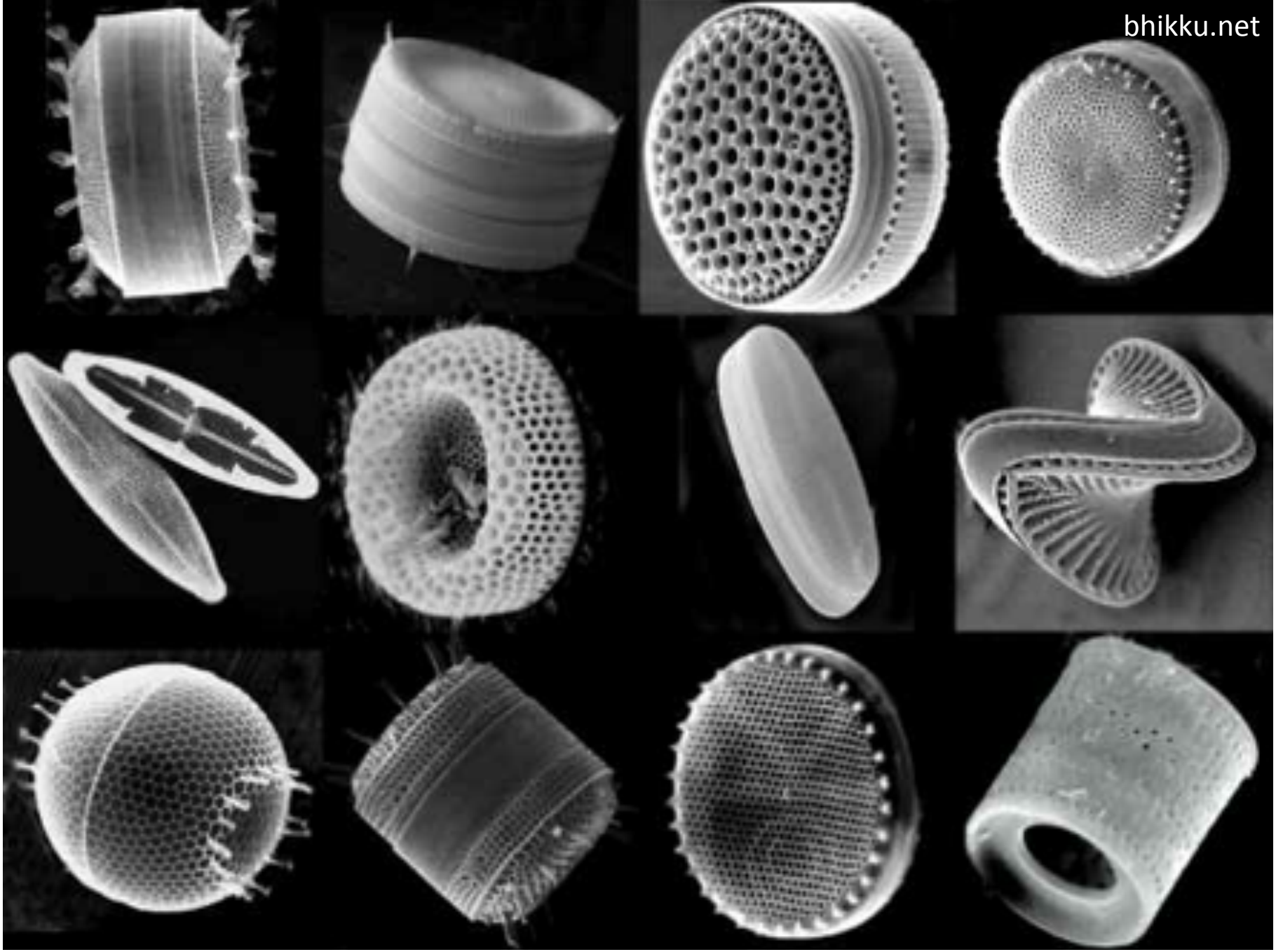
Poorly sorted sand

Grotzinger & Jordan, *Understanding Earth*





Brown et al., 2007

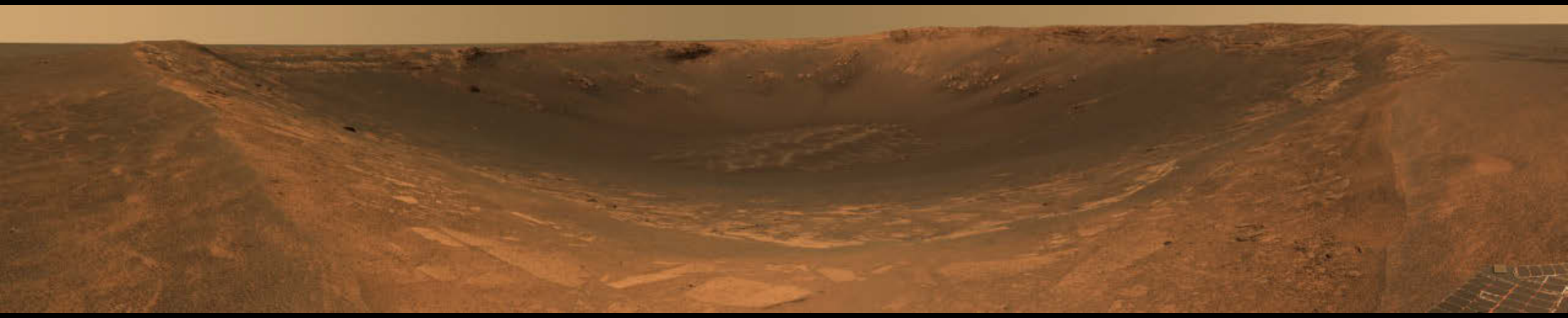


Photograph of dropstone removed due to copyright restrictions. See figure 1.23 on SnowballEarth.org.

Photograph of dropstone removed due to copyright restrictions. See figure 4.2 on SnowballEarth.org.

Photograph of dropstone removed due to copyright restrictions. See figure 3.6 on SnowballEarth.org.

Photograph of giant wave ripples removed due to copyright restrictions. See figure 4.18 on SnowballEarth.org.



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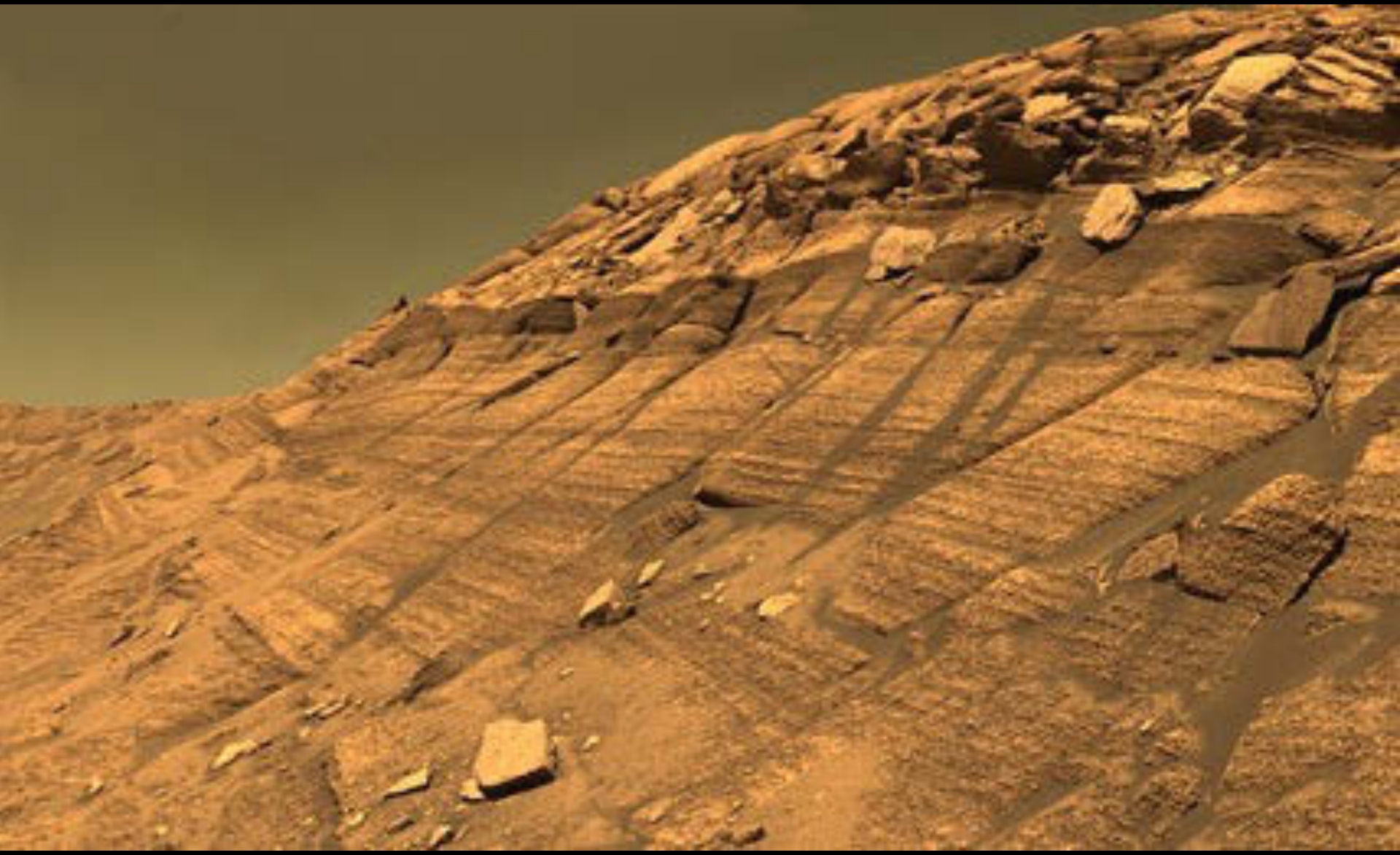

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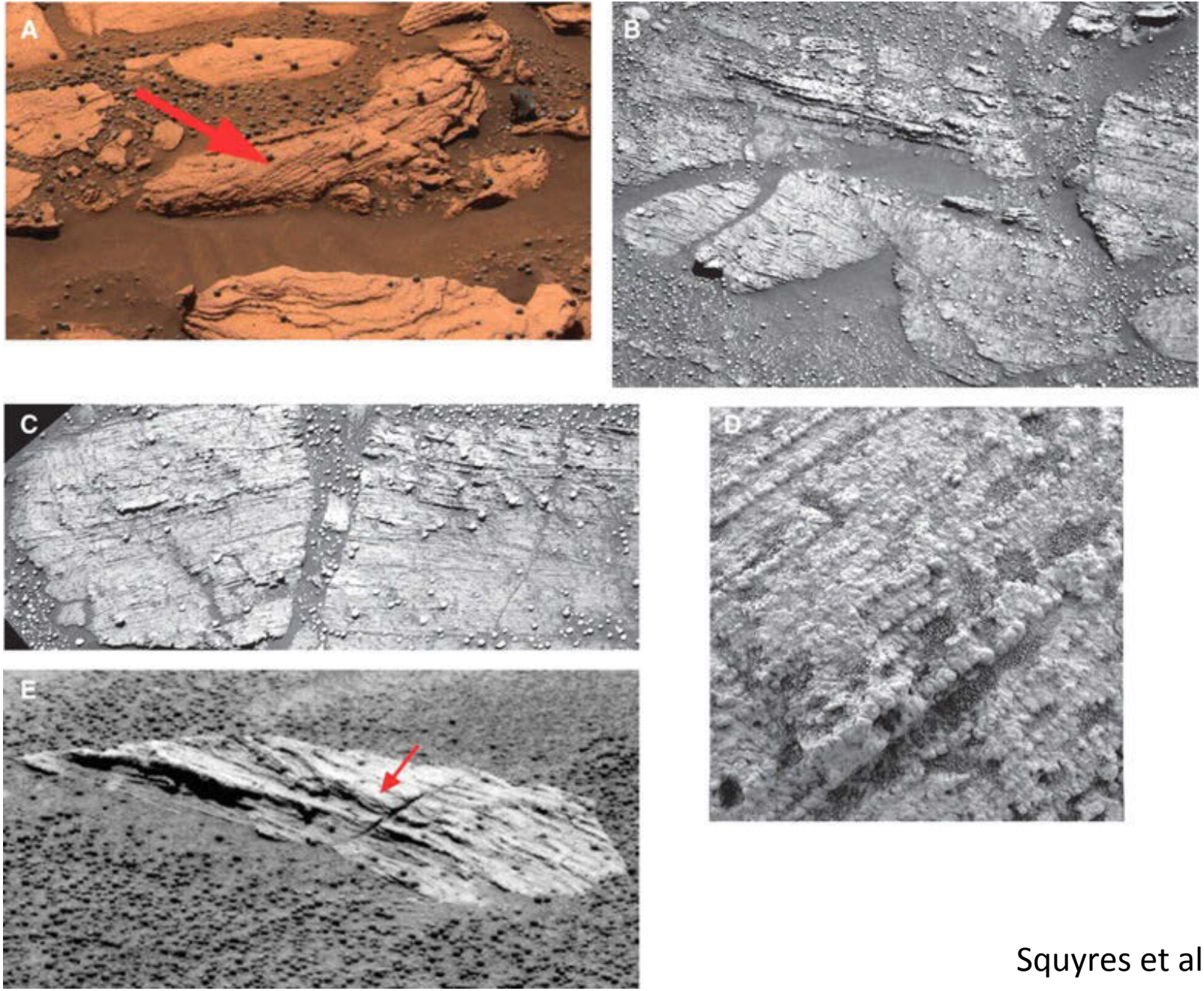
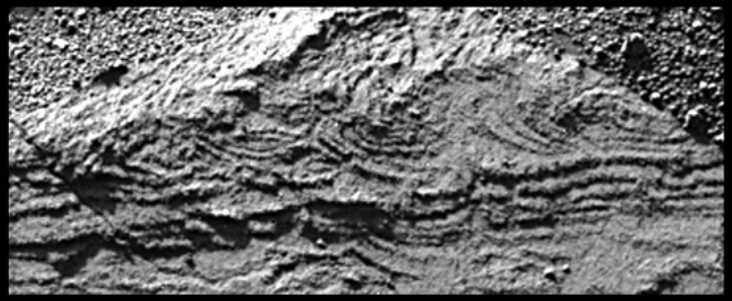


Squyres et al., 2004

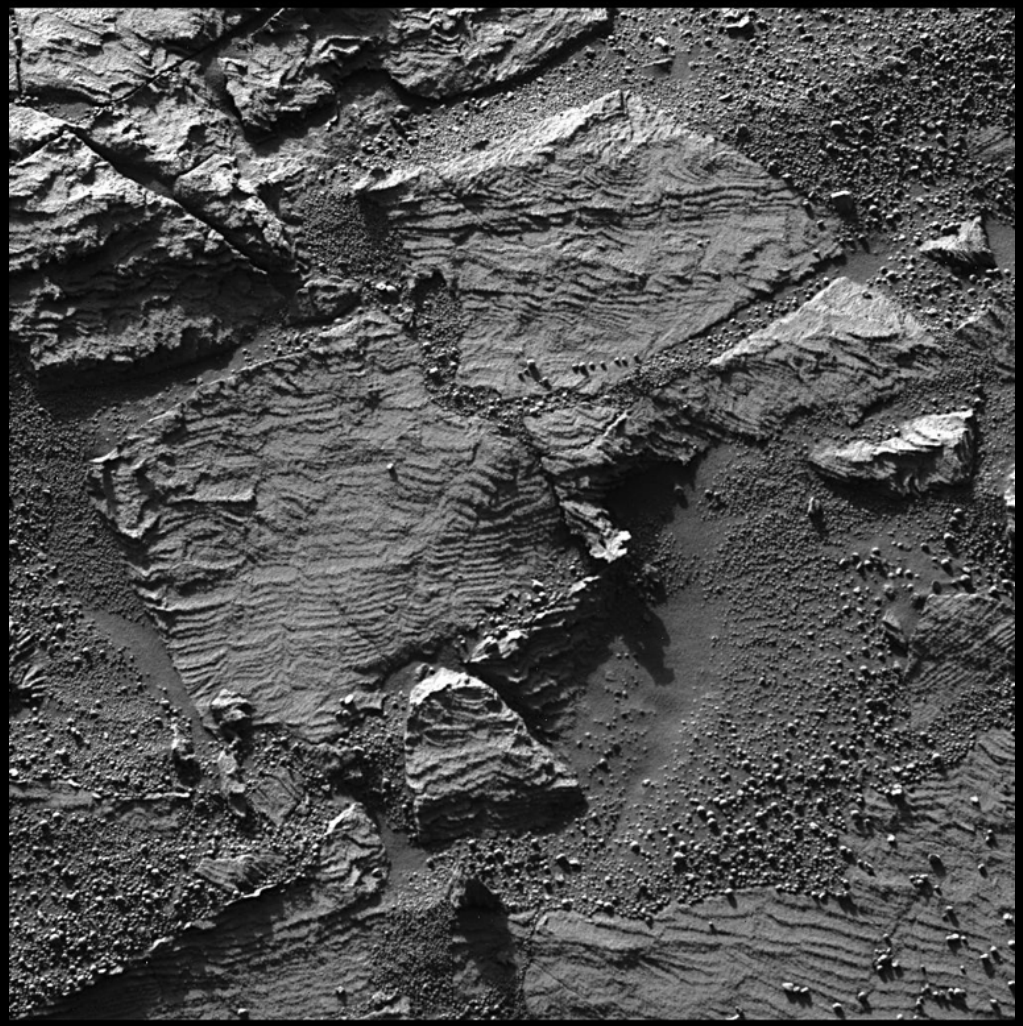
Source: Squyres, Steve W., J. P. Grotzinger, et al. "In Situ Evidence for an Ancient Aqueous Environment at Meridiani Planum, Mars." *Science* 306, no. 5702 (2004): 1709-14.

Opportunity Pancam
"Overgaard" rock
Sol 690 (Jan. 2, 2006)
430 nm image

2x
enlarged
portion



Full original image



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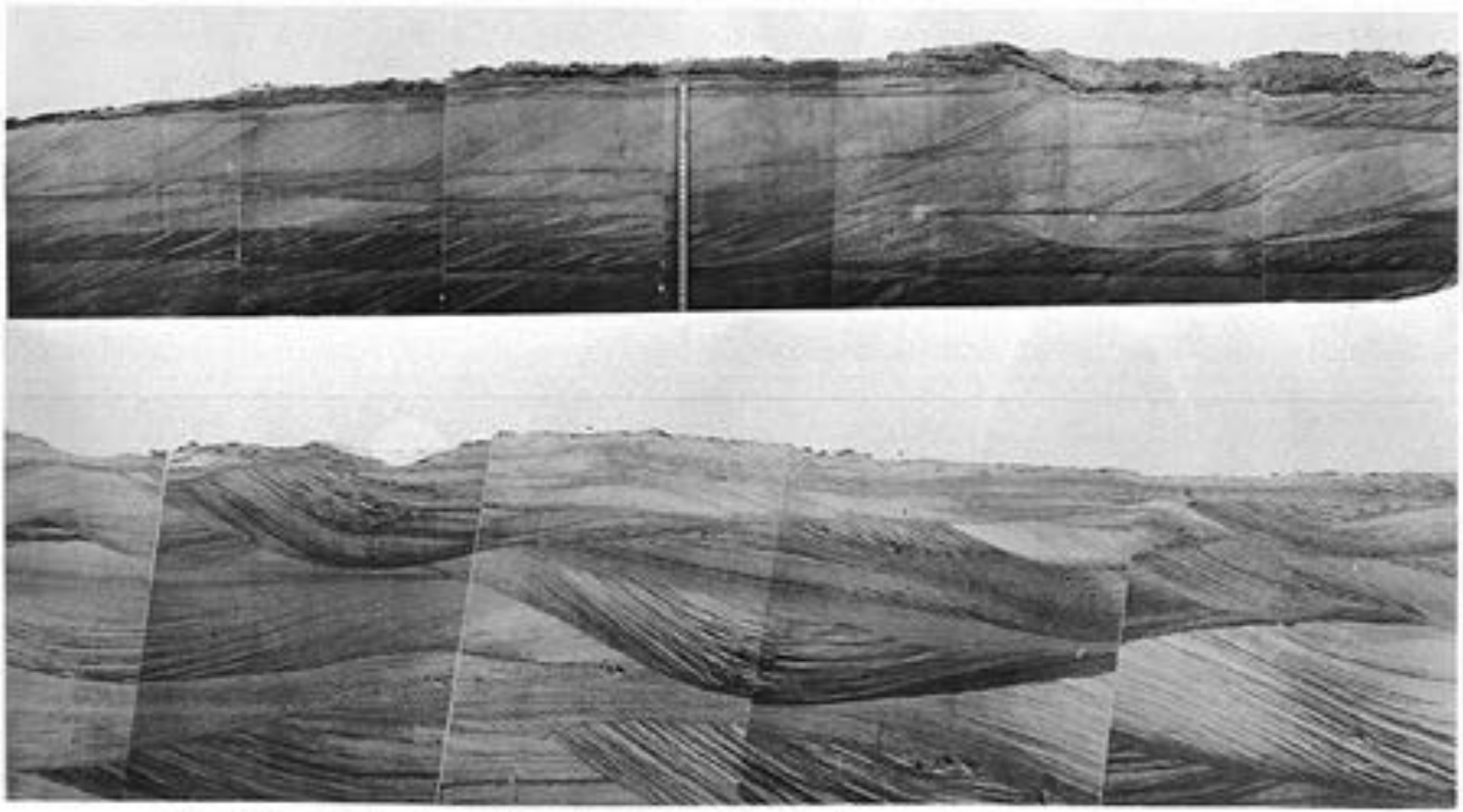
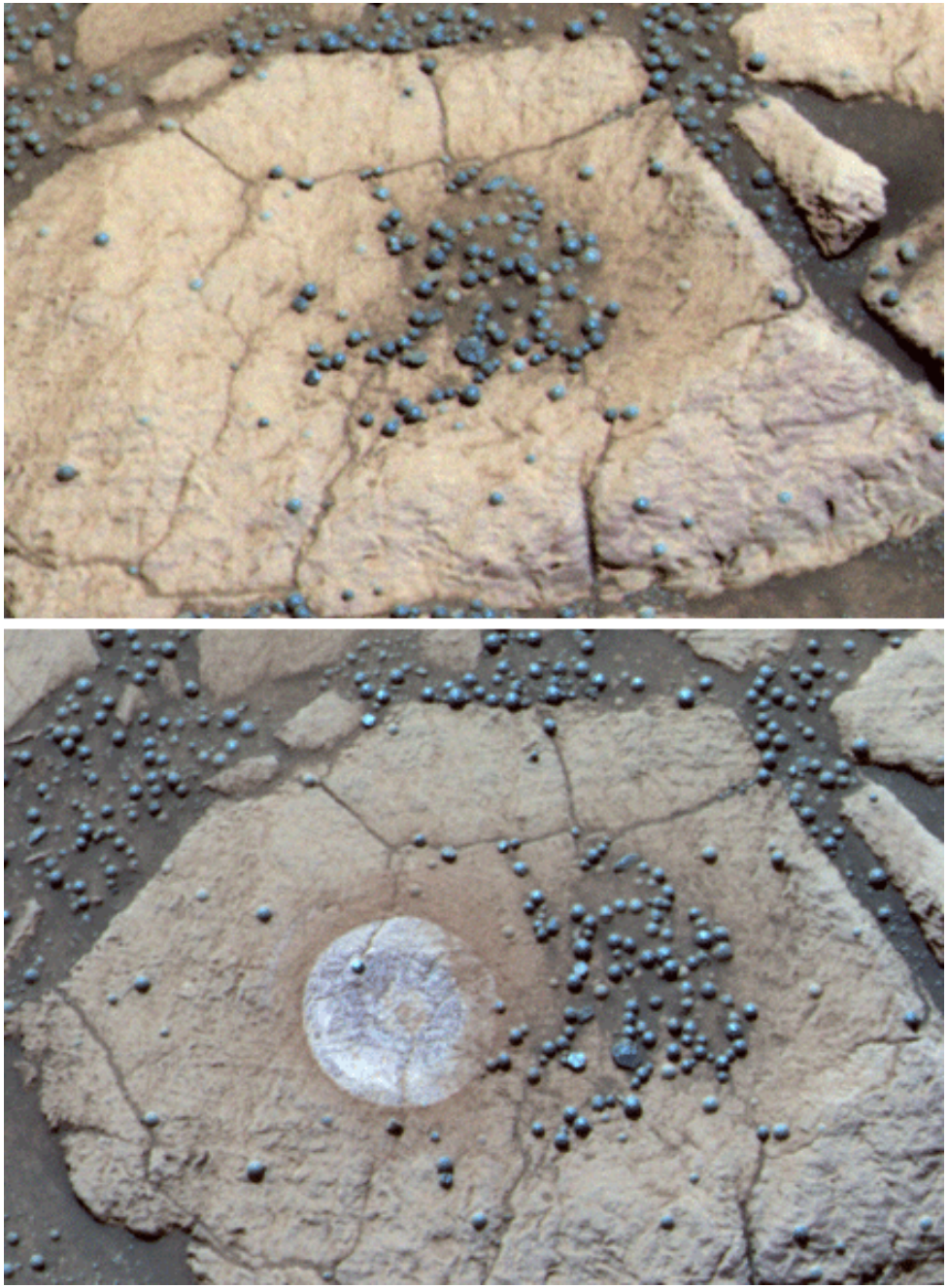


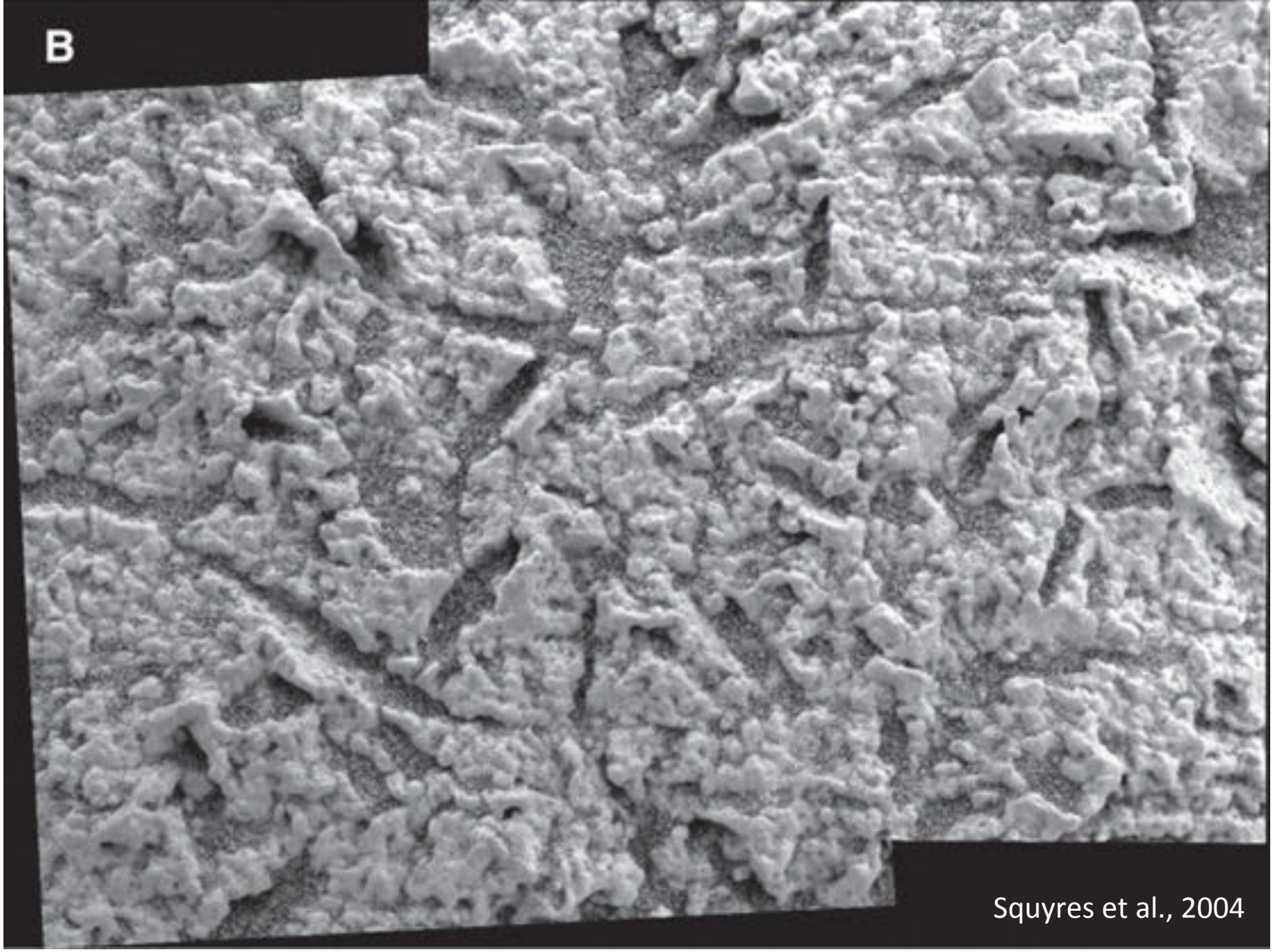
Fig. 10 - Giant ripple bedded (festoon) point bar sands, Brazos River. The scale is indicated by the meter stick in the upper photograph. The upper is a dip section and the lower is a strike section.

Bernard et al., SEPM, 1999



Courtesy of NASA. Images in the public domain.

Squyres et al., 2004



12.001 Introduction to Geology

Fall 2013