

Albuquerque Gem & Mineral Club Field Trip Information Form

Location:	Shark Tooth Ridge
Ownership:	BLM, State of New Mexico
Permission:	None required
GPS:	A: N 35° 32.9274' W 107° 07.0657' B: N 35° 33.2366' W 107° 06.1658'
Material:	A: Fossilized shark teeth B: Septarian concretions and marine fossils
Roads:	Passenger Vehicle as long as roads are dry
Season:	Dry Season - – the roads through the valley are good when dry but very treacherous if wet.
Tools:	Rock hammer, chisel, hand rake, sand sift, small shovel, carry container & packing material
Meet at:	Turn off for Cabezon Peak - intersection of NM550 and NM279 (GPS Coords: N 35° 42.684 W 106° 56.317)
Exertion:	Easily accessible but will require walking around up and down hills

The Rio Puerco area around Cabezon Peak has several collecting areas, in particular Shark Tooth Ridge and another location close by where there are very large septarian concretions, most with nice crystals.

The meeting location will be the turn off for Cabezon Peak (Hwy 279) from Hwy 550 – Torreon, San Luis and Cabezon (just past mile marker 42). It is a left turn off of the highway. Distance from I-25 is 45 miles; from San Ysidro it is 18 miles. The roads through the valley are good when dry but very treacherous if wet.

Location A: - Shark Tooth Ridge is easily accessible but there is no shade. The formation is loosely bound sand that is easily broken apart with a hammer. Bring a chisel, hand rake, something to sift with to find the teeth. This is an outcrop of the upper Cretaceous, likely a transgressive sandstone deposit of the Mulatto Tongue of Mancos Shale¹, in which shark teeth² are common. Ant hills on top of the ridge feature small teeth moved to the surface by the ants. While there are considerably larger teeth to be found at the site, the ant hills make for an easily-accessible, high density source of fossils.

Why are teeth about the only fossils we find from ancient sharks? Shark skeletons are composed not of bone but of cartilage. Cartilage is the material found in your nose, ears,

¹ The Transgressive and Regressive Relationships between the Upper Cretaceous Mulatto Tongue of the Mancos Shale and the Dalton Sandstone Member of the Crevasse Canyon Formation, Gallup-Pinedale Area, New Mexico by Allan R Kirk & Robert S. Zech
(http://nmgs.nmt.edu/publications/guidebooks/downloads/28/28_p0185_p0192.pdf)

² Selachian Fauna From The Upper Cretaceous Dalton Sandstone, Middle Rio Puerco Valley, New Mexico by Sally C. Johnson and Spencer G. Lucas
(http://nmgs.nmt.edu/publications/guidebooks/downloads/54/54_p0353_p0358.pdf)

and in between joints. It is harder and stiffer than skin and muscle but not as much as bone. It does not preserve well. That is why old skulls (think “Pirates of the Caribbean” or archeology relics) have no ears or noses. The teeth are composed of dense hydroxyl-apatite (hydrous calcium phosphate) like the enamel on the outside of your teeth. This material is one of the hardest and most resistant biological substances and so it is preserved well and often. Most marine fossils are composed of calcite or aragonite and they often have a “soft” look to them like they have been partially dissolved. Phosphatic fossils are usually bright and shiny. Why are they so numerous? Sharks grow new teeth continuously. Old teeth will be pushed out and replaced even if they are not lost when biting/fighting prey. At death essentially every shark leaves behind many teeth, very few of which are dissolved unlike many carbonaceous fossils.

Location B: - The Mancos Shale, a marine Cretaceous unit, is also easily accessible but will require walking around up and down hills to locate the septarian concretions. These can be quite large and can require digging tools; many are already exposed on the surface and have been broken open, but are also quite nice and full of crystals – quartz, calcite, barite, and more. Bring something to wrap them and carry them in. There are also marine fossils in the area.

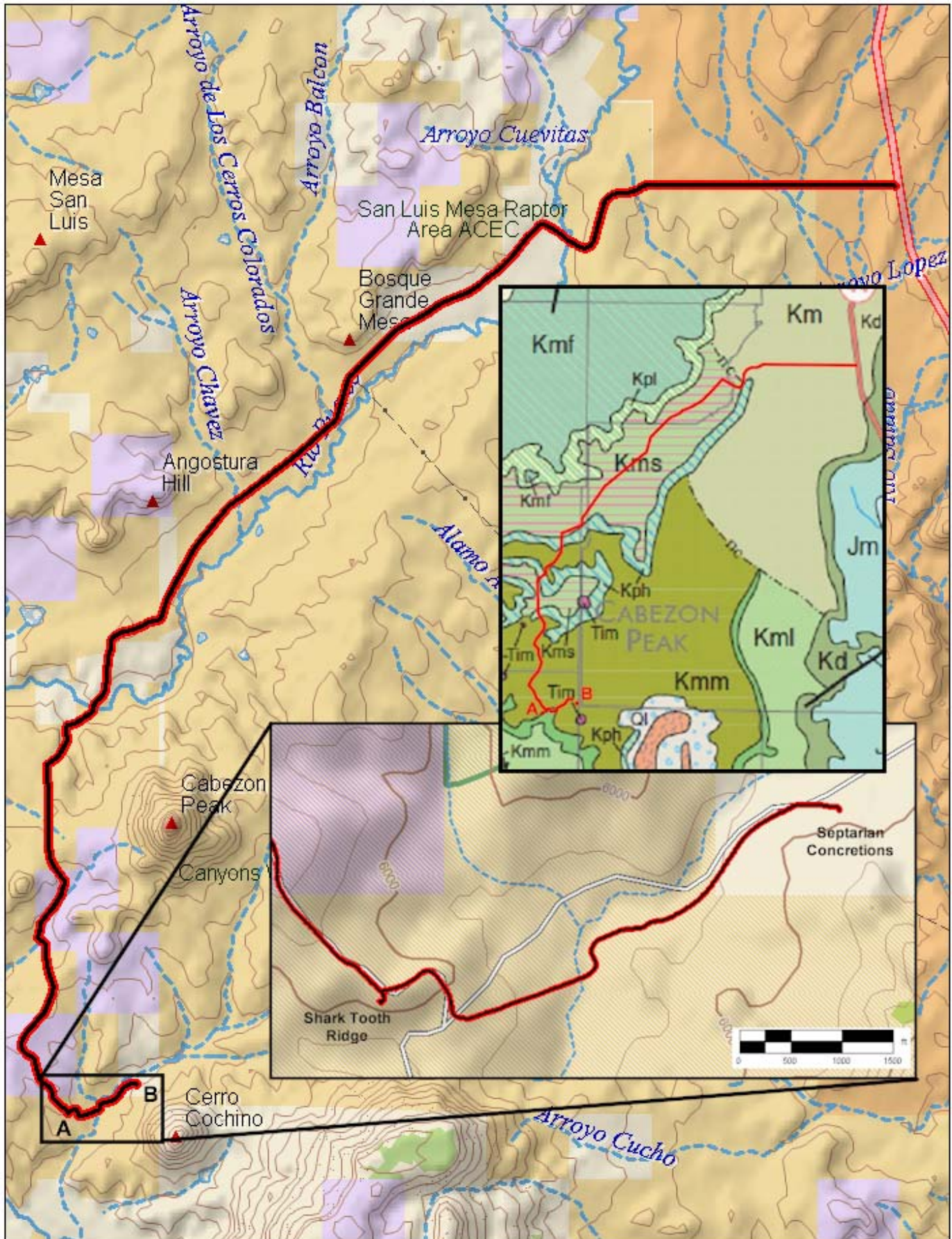
Septarian Concretions or nodules³ form when a cementing mineral precipitates between mineral grains in a sedimentary rock usually around some object. The cement is often calcite (like at shark teeth ridge) but can be quite a few other minerals such as microcrystalline silica, other carbonates (dolomite, siderite, ankerite), oxides like goethite or hematite, even sulfides like pyrite or marcasite or sulfates like gypsum or barite. What kinds of objects do they grow around? They might be leaves, teeth, fossils, or bits of shell and organic material is almost always involved. Why? Decaying organic material in the rock creates a special chemical environment that causes the minerals to precipitate there versus the rest of the rock. How can this happen in solid rock? The precipitation takes place during diagenesis⁴ when the rock wasn't completely solid – it was sort of mushy in the case of shales or siltstones (clay rich rocks); sandstones are naturally porous. Yes, most concretions form in shales, siltstones, and a few form in sandstone (the “sand crystals” of Rattlesnake Butte in SD). How do they become septarian and what does that mean? Septa are partitions or walls – you have a cartilaginous septum in the middle of your nose. So septarian concretions are named for those cracks that filled with calcite or whatever. Why do the cracks form? My hypothesis is that the rock in the core of the concretion has less cement than the outside because the cement piles up on the outside and prevents more cement from going in farther. Clay particles have a natural tendency to attract each other and shrink with time. This process is called syneresis and a good example is found in mud cracks. The material in the concretion core is soft like a gel and clay rich while the rind is hardened by the extra precipitate. So the core shrinks a lot but is constrained by the rind ergo cracks form. These will fill with mineral precipitates which are more resistant than the clay rich material in the core and, voila! - you have septa/walls, etc., form. When the concretion is exposed and partially

³ The term septarian nodule is not really correct as nodules are replacement features while concretions form by precipitation around some nucleus.

⁴ Diagenesis is a series of things that can happen during lithification - as sediments are turned into rocks.

weathered these septa are exposed and may make the concretion resemble a turtle. Some septarian concretions are hollow in the center because there wasn't enough cement to go around or the channel got blocked.

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2013 May Field Trip

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