

Fishkeeping in 50 Million B.C.

Whatever killed off hundreds of thousands of fish eons ago in a now defunct lake is probably similar to what plagues the fishes we keep in our tanks today.

Posted: January 23, 2009

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Fossil fish similar to these plied the waters of Fossil Lake 50 million years ago. These longnose gars (*Lepisosteus osseus*) are "living fossils." Their distant relatives lived 50 million years ago in huge lakes in what is today the American West. Imagine awakening tomorrow to find yourself on the shores of Fossil Lake (once a real lake), a 50-mile-long-by-20-mile-wide lake, 50 million years removed from the present in what is today the southwest corner of Wyoming.

You soon discover that Fossil Lake (the ancient lakebed is found in the petrified sediment layers of Fossil Butte) is no ordinary lake. Perhaps the subtropical palm, fig and cypress forests that ring the lake's shallow waters are your first clue. As you wade thigh-deep into the warm subtropical waters (64 to 72 degrees Fahrenheit) you spy shoals of 10-inch-long *Knightsia eocaena*, members of the family Clupeidae that includes today's herrings and sardines. The individual *K. eocaena* making up these large shoals work in unison, turning in tight military precision, as they give the appearance of a single, but much larger fish. Immediately you think back to your aquarium books, and you recall that shoaling fishes rely on their numbers and togetherness as a defense against much larger piscine predators. Ah, yes, fish with lots of teeth, cavernous maws and indiscriminate eating habits. You and your dripping feet are suddenly once again back on dry lakeshore – how'd that happen?

You regain your composure and begin staring once again out into the depths of Fossil Lake. You make out the undeniable figure of a large stingray. You mutter under your breath, "I'm not in Kansas anymore." You see other shadowy silhouettes of huge fishes, such as 6-foot-long gars, paddlefish and bowfins. There are more than 20 freshwater species inhabiting the lake (more than 40 species have been described from fossils in the Green River Formation), including pirate perches, mooneyes and 30-inch-long, mouth-filled-with-teeth *Phareodus encaustus*. There are also crayfish and freshwater shrimp. And if that weren't enough, huge turtles and crocodiles patrol the shallows.

Make no mistake about it: The fish *mélange* that made up the piscine fauna of Fossil Lake, now found in the petrified sediment layers of Fossil Butte, part of the Green River geological formation and a national monument, represent genera of fishes living together unlike any found anywhere today. In Fossil Lake there were fishes living together that are commonly found today in marine environments as well as those considered to be tropical freshwater species. And all of these fishes (stingrays, paddlefish, etc.) were found in a landlocked body of water thousands of miles from the nearest ocean.

Simplified Classification of Fish from Fossil Basin Elasmobranchii

- Trygonidae
 - Xiphotrygon (sting ray)
- Chondrostei
 - Polyodontidae
 - Polyodon (paddle fish)
- Holostei
 - Lepisosteidae
 - Lepisosteus (gar)
 - Amiidae
 - Amia (bowfin)
- Isospondyli
 - Osteoglossidae
 - Phareodus
 - Gonorhynchidae
 - Notogoneus (sand fish)
 - Clupeidae

- Diplomystus (herrings, shad)
- Knightsia
- Ostariophysi
- Siluridae
 - Ameiurus (catfish)
- Xenarchi
 - Aphredoderidae (pirate perches)
 - Erismatopterus
 - Asineopidae
 - Asineops
- Acanthoptergii
 - Percidae
 - Mioplosus (perches)
 - Serronidae

Priscacara Fossil Butte National Monument, near Kemmerer, Wyoming, preserves one of the world's most complete fossil assemblages of an Eocene freshwater aquatic ecosystem. Fossil Lake survived for two million years, but as the area became more arid, Fossil Lake eventually went dry. All during its existence, sediment, detritus, dead fish, insects and leaves rained down on the lake bottom and were covered over by successive layers of sediment. The pressure and air-tight seal caused by the overlying sediments eventually fossilized everything buried beneath.

But fossil deposition was not always gradual. In some of the shales of Fossil Butte, paleontologists have found the fossilized remains of giant shoals of *K. eocaena* that all seemed to have died at once. Some of these "mass mortality layers" harbor hundreds of thousands of fish. Theories abound as to what caused these mass die-offs and include everything from an algae super bloom that caused widespread oxygen deprivation to sudden changes in water temperature or salinity.

So here's an aquariumkeeping take-home lesson that is 50 million years in the making: Whatever killed off hundreds of thousands of *K. eocaena* eons ago in a now defunct lake is probably similar to what plagues the fishes we keep in our tanks today.

Have aquarists ever lost fish because they took their pH, salinity, nitrate, nitrite and temperatures readings for granted? How about skipping water changes, only to have the tank go green and the fish belly up? You don't want your fish to go the way of *K. eocaena*, now do you? Then you better perform regular partial water changes, routinely test your water parameters, have a back-up generator just in case your power goes out and do not overfeed your fishes.

If you're intrigued by Fossil Butte and are planning a visit, remember that it is a national monument and removal of any living plant or animal, historic artifacts or fossils is prohibited by federal law and subject to stiff fines and possible prison sentences. The monument visitor center has a spectacular collection of fossils on display. Commercial fossil quarries on nearby private sites allow visitors the chance to quarry for their own fish fossils for a fee.

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References

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Taken from: McGrew, Paul Orman and M. Cassilliano. 1975. *The Geologic History of Fossil Butte National Monument and Fossil Basin.* NPS Occasional Paper No. 3. (nps.gov/history/history/online_books/fobu/sec4b.htm).