Teeny teeth indicate ancient shark nurseries

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Fuelled by Hollywood and its vision of Jaws, sharks conjure images of fearsome predators patrolling our seas in search of their next unfortunate victim. It is therefore hard to imagine sharks as relatively small, harmless fishes living in lakes and rivers, as many species were more than 200 million years ago. Some scientists have suggested that these ancient sharks bred in the shallows of freshwater lakes, forming nurseries for their hatchlings. Reporting in the most recent issue of the *Journal of Vertebrate Paleontology*, a team of German paleontologists support this claim with spectacular 230 million-year-old fossil egg capsules and tiny teeth from Kyrgyzstan.

The Madygen Formation in southwestern Kyrgyzstan is well known to paleontologists for its exquisite preservation of insects and plants from the Late Triassic – a time when the earliest dinosaurs walked the earth. “Today, this amazing fossil site is one of the farthest points on land from any sea – quite similar to the situation during the Late Triassic,” said Sebastian Voigt, one of the authors of the study. It was therefore

something of a surprise when fossil shark eggs and babies were recently discovered in this area. Lead author of the study, Jan Fischer of the Geologisches Institut, TU Bergakademie Freiberg, remarked that “the chemistry of the tooth enamel indicates that the Madygen nursery was unequivocally created in freshwater, which is in sharp contrast to all modern egg laying sharks, which spawn exclusively in the sea.”

The team found the tips of dozens of tiny teeth together with egg capsules representing two different species of shark. One species is based on both teeth and egg capsules and is considered to be member of a family of sharks called hybodontids. The second species is based solely on egg capsules and probably is a type of shark known as a xenacanthid. The hybodontids became extinct at about the same time as the dinosaurs (65 million years ago), while the xenacanthids failed to survive beyond the Triassic, 200 million years ago.

Fossil sharks are generally rather rare. This is partly due to their cartilaginous skeleton, which usually is not preserved as a fossil. Consequently, painstaking searches of large quantities of rock often yield very little reward. As Michael Buchwitz, another author of the

report, noted, “The fossil record of sharks is no laughing matter; a spine here, a tooth there, or three miniscule denticles [small spines of the skin] picked from a 10 kilogram sample. Therefore, dozens of egg capsules alongside juvenile teeth in one deposit is a dream come true!"

Almost all of the tiny teeth represent small juveniles. Only a very small number of adult teeth have been discovered. This suggests that just like modern sharks, these freshwater cousins spawned in shallow waters. The young sharks lived in these more protected areas before moving away from the lake shoreline as they matured. However, where the adults went after spawning is another matter. Voigt is “curious to know if the adult sharks permanently lived in nearby freshwaters or perhaps migrated hundreds of kilometers from the sea upstream for the purpose of breeding.” Such a breeding style would make these ancient sharks similar to modern-day salmon, which undertake a similarly long trek for breeding. For the time being that is a question that even the remarkable Madygen deposits cannot answer.

More information: FISCHER, J., et al. 2011. A SELACHIAN FRESHWATER FAUNA FROM THE TRIASSIC OF KYRGYZSTAN AND ITS IMPLICATION FOR MESOZOIC SHARK NURSERIES. *JOURNAL OF VERTEBRATE PALEONTOLOGY* 31(5) Journal website: Society of Vertebrate Paleontology: www.vertpaleo.org

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