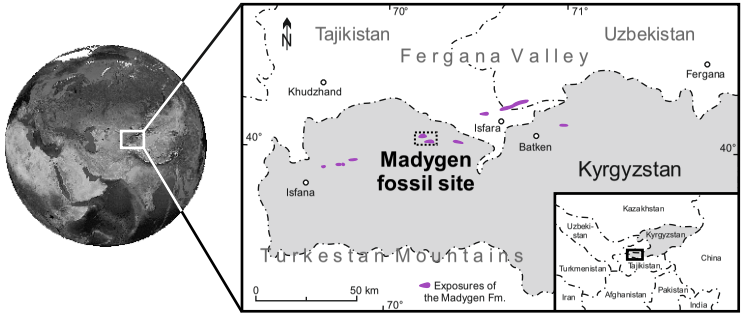
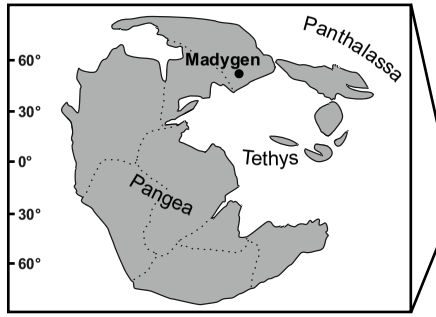
# Madygen - a unique mid-Triassic lagerstätte

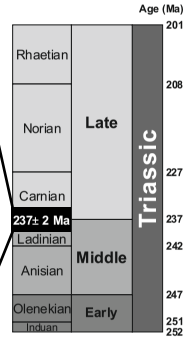
Jan Fischer, Ilja Kogan, Sebastian Voigt, Michael Buchwitz, Frederik Spindler & Jörg W. Schneider

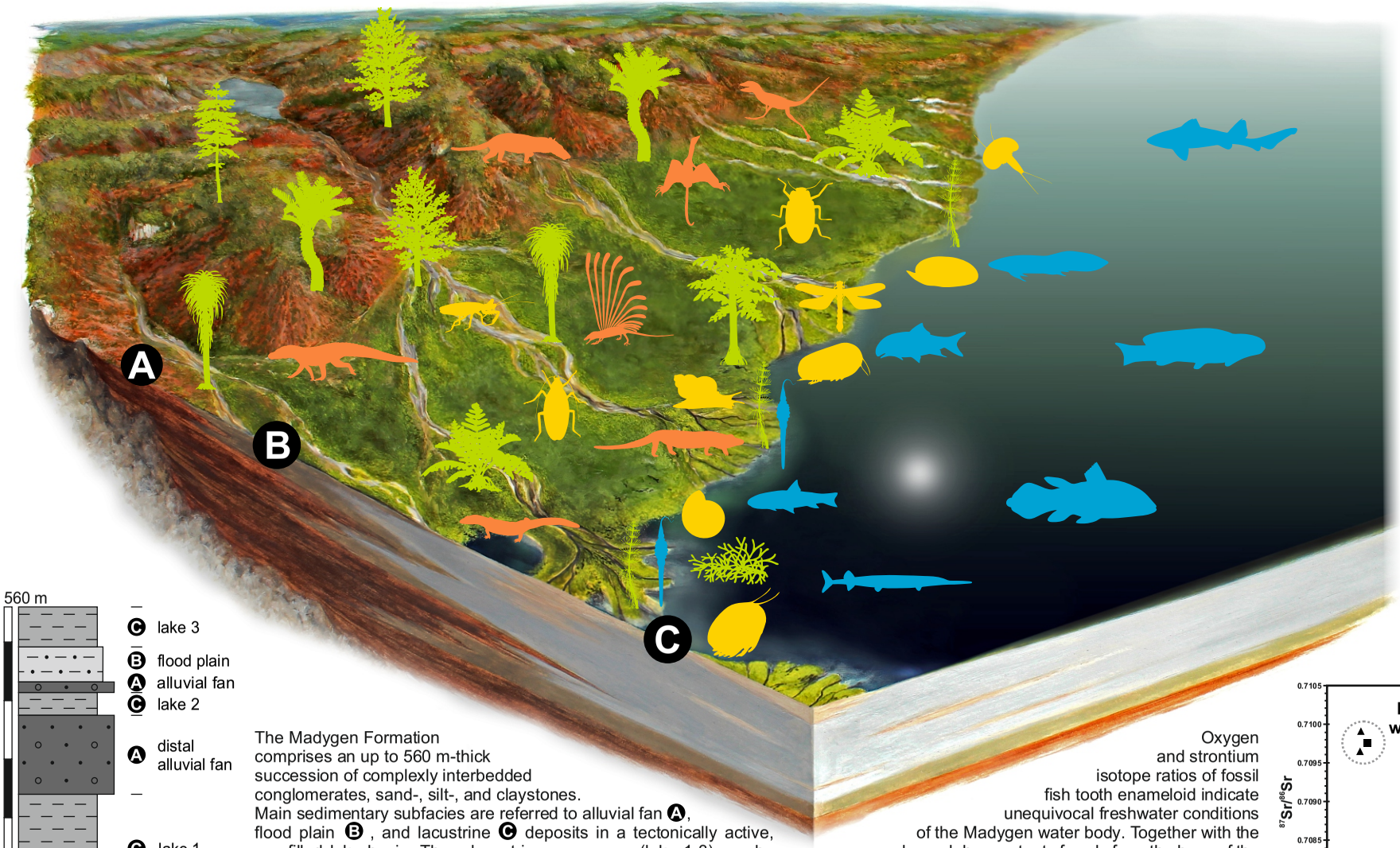



Madygen, named after a small farmers' settlement in southwest Kyrgyzstan, Central Asia, is one of the world's most famous continental Triassic fossil sites. Biostratigraphic and isotopic data suggest a mid-Triassic (late Ladinian to early Carnian) age of the fossiliferous sediments.

The Madygen fossil record, comprising a variety of aquatic and non-aquatic invertebrates and vertebrates as well as one of the most diverse Mesozoic floras of Eurasia, corroborates favorable living conditions within and around a perennial lake. It offers a unique taphonomic window into an Early Mesozoic ecosystem of a warm to temperate climatic zone with year-round rainfall in an area of low mountains at mid-northern latitudes and several hundred kilometers away from the nearest marine shoreline.




## Plants

- liverwort
- fern
- horsetail
- seed fern
- lycopsid
- cycad
- gingko
- conifer

## Invertebrates

- bivalve
- gastropod
- ostracod
- micro-conchid
- clam shrimp
- kaza-charthra
- cockroach
- beetle
- titanopteran
- dragonfly

## Fishes

- *Sixtelia*
- *Oshia*
- *Ferganiscus*
- shark egg capsule
- hybodont shark
- *Saurichthys*
- lungfish
- coelacanth

## Tetrapods

- *Triassurus*
- *Kyrgyz-saurus*
- *Madysaurus*
- *Sharo-vipteryx*
- *Madygen-erpeton*
- *Longi-squama*
- archosauro-morph




The Madygen Formation comprises an up to 560 m-thick succession of complexly interbedded conglomerates, sand-, silt-, and claystones. Main sedimentary subfacies are referred to alluvial fan Ⓐ, flood plain Ⓑ, and lacustrine Ⓒ deposits in a tectonically active, overfilled lake basin. Three lacustrine sequences (lake 1-3) can be recognized within the sedimentary succession. The minimum extent of the former Madygen lake environment was three to five km². It is possible, however, that Madygen just represents the marginal remnants of a much larger lake ranging tens of kilometers in length.

Oxygen and strontium isotope ratios of fossil fish tooth enameloid indicate unequivocal freshwater conditions of the Madygen water body. Together with the low sulphur content of coals from the base of the formation and its position in palinspastic maps for the Triassic of Eurasia, this firmly substantiates the interpretation of the Madygen lake system as a purely freshwater environment.