
The first 200 ky of the Early Jurassic in eastern North America and Morocco

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Biotic assemblages postdating the Triassic-Jurassic mass-extinction event were of very low diversity and very cosmopolitan. Hettangian age (earliest Jurassic) strata of the conjugate margin rift basins of eastern North America and Morocco preserve a gradient from lacustrine facies in the west to marine facies in the east that using the Milankovitch cyclostratigraphy and basalt (CAMP) stratigraphy allow us to look at the first 200 ky of this recovery period over a humid tropical to arid subtropical latitudinal swath. In addition, new collections of invertebrates demonstrate that euhaline and polyhaline conditions existed in the easternmost Moroccan basins, thereby documenting a marine connection from western-most Tethyan basins during the early Hettangian.

Macro and microfloras of these earliest Jurassic sequences are of spectacularly low diversity, dominated cheirolepidaceous conifers, the short fleshy leaves of which are characterized by sunken and papillate stomata. The terrestrial vertebrate assemblages are

likewise of low taxonomic diversity at the family level consisting almost totally of theropod and prosauropod dinosaurs, crocodylomorphs, sphenodontians, and tritheodonts with rare ornithischian dinosaurs. Lacustrine fish assemblages are likewise of low family diversity comprised of semionotids, redfieldiids, coelacanth, and hybodont sharks. Lacustrine mollusks seem restricted to unionids and possible corbiculid bivalves and minute valvatid and hydrobiid gastropods.

Moving to the east, towards the Tethys, in eastern Morocco fossiliferous marine strata (originally thought to be Ladinian in age) are present interbedded with CAMP basalts and contemporaneous with lacustrine strata to the west. While preservation is not ideal and the sample sizes are at present too small to permit specific identification, several diagnostic bivalve clades are present including the orders, Ostreoida, Pteroida, and Veneroida. Although none of the identified taxa are particularly age-diagnostic, they do exhibit paleoecological significance. Taken together, this association along with the presence of gastropods and serpulids (and other petrologic/geochemical information) suggest marginal marine conditions with a reduced (polyhaline) salinity. These bivalves exhibit small sizes and relatively simple ornamentation characteristic of salinity-controlled bivalve assemblages. Significantly absent are typical freshwater unionacean bivalve genera or other bivalve genera from inferred oligo- or mesohaline settings (e.g., Unionites, Neomiodon, or Eomiodon). Stenohaline taxa (e.g., corals, echinoderms, and/or articulate brachiopods) that would firmly demonstrate a euhaline setting have not yet been recovered. These strata presumably correlate with the pre-Planorbis zone of the European marine Jurassic.

While of very low diversity at higher taxonomic levels, these earliest Jurassic recovery assemblages show some indications of being very speciose for some families, as demonstrated by semionotid species flocks by McCune et al. (1984) and suggested by the wide range of morphologies seen in theropod dinosaurian footprints and some dinosaur skeletal data and cheirolepididae leaf and shoot shape. Combined with the dramatic increase in maximum size seen in theropod dinosaurs, both terrestrial and marine assemblages are consistent with a recovery period in which surviving taxa evolved under conditions of ecological release from competitors under unusual conditions, perhaps a super-greenhouse. Further, organic geochemical, morphological, and paleoecological analyses of these assemblages should give us significant additional insights into the recovery from one of Earth's most severe biotic crises.

References

- McCune, A.R., Thomson, K.S., and Olsen, P.E., 1984, Semionotid fishes from the Mesozoic Great Lakes of North America: In Echelle, A. A. and Kornfield, I. (eds.), *Evolution of Species Flocks*, University of Maine at Orono Press, Orono, p. 27-44.
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