TETRAPOD FOOTPRINT BIOSTRATIGRAPHY AND BIOCHRONOLOGY: PERSPECTIVES AND PROBLEMS

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Tetrapod footprints occur as fossils in rocks of Devonian-Recent age. Unlike the body fossil record of tetrapods, the track record is heavily facies controlled. So, not only can there be paleobiogeographic provincialization of any track-based biochronology, but there are extensive facies-based restrictions. Tracks rarely allow identification of a genus or species known from the body-fossil record. Indeed, almost all tetrapod footprint ichnogenera are equivalent to a family or higher taxon (order, superorder, etc.) based on body fossils. This means that ichnogenera will almost necessarily have much longer temporal ranges than body-fossil genera, so the tracks will not allow as refined a subdivision of geological time as do the body fossils. The single largest drawback to using tetrapod footprints for biostratigraphy and biochronology is their ichnotaxonomy, which has generally been grossly oversplit, largely due to a failure to appreciate extramorphological variation. At best, a Devonian-Recent global biochronology based on tetrapod footprints resolves geologic time about 20-40% as well as does the tetrapod body fossil record.The following 13 global time intervals can be based on the track record: (1) Devonian; (2) Mississippian; (3) Pennsylvanian; (4) Early Permian; (5) Late Permian; (6) Early Triassic; (7) Middle Triassic; (8) Late Triassic; (9) Early Jurassic; (10) Middle-Late Jurassic; (11) Early Cretaceous; (12) Late Cretaceous; (13) Cenozoic.Ironically, tetrapod body fossils (those of mammals) provide the basis for their most precise biochronology in the Cenozoic, but footprints only discriminate one interval of Cenozoic time.