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Cretaceous theropod paleobiogeography revisited

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In recent years, our understanding of theropod evolution, diversity and distribution has increased dramatically thanks to new discoveries worldwide. The Early Cretaceous Chinese feathered theropods have finally shown the origins for the unusual evolutionary novelties of the Northern Hemisphere's Late Cretaceous flesh-eating dinosaurs. Dromaeosaurids, oviraptorids and tyrannosaurids are examples of long-known theropods whose origins have been difficult to trace because they were so different from known Jurassic and Early Cretaceous forms. It now seems that coelurosaurs (feathered theropods) underwent explosive diversification between the Tithonian and Hauterivian, and on the northern continents completely replaced many earlier lineages by the end of the Early Cretaceous. The situation in the Southern Hemisphere is less dramatic, and it appears that Jurassic theropod lineages continued to exist into the Late Cretaceous. But although South American, African and Indian Cretaceous theropods are more ancient lineages than the northern novelties, they continued to evolve and are no less diverse or spectacular. Abelisaurids include medium-sized genera with bizarre head ornamentation (*Carnotaurus*, *Majungotholus*) and small dromaeosaurid-like forms (*Noasaurus*), while carcharodontosaurids (*Carcharodontosaurus*, *Giganotosaurus*) became as large or larger than the northern tyrannosaurids. For most of this time, there seem to have been barriers (physical and/or ecological) that prevented theropod movement across the equator. These were not impervious however, as avian theropods had already established worldwide distribution early in the Cretaceous. Although this is easy to understand because of their mode of locomotion, the distribution of obligatory cursorial forms like alvarezsaurids - known from Asia, North America and South America - is not. Isolated teeth, bones and partial skeletons of possible abelisaurids, dromaeosaurids, ornithomimids, oviraptorids, troodontids and tyrannosaurids from Argentina, Australia, Brazil, France, Sudan and Venezuela suggest that more mixing of theropods was going on than is presently apparent. Determination of whether these reports represent true trans-equatorial migrations or examples of convergent evolution requires the