

## i7 Mammallike reptiles of Pangea < therapsids, pelycosaur >

The more I looked at the fossil, the more I became convinced that here, at last, was definite evidence of *Lystrosaurus* [in Antarctica]. —Edwin H. Colbert.<sup>1</sup>

Pangea reached from pole to pole during the early Mesozoic and it was drifting slowly north. The climate was a “hothouse” with no ice at the poles. In tropical Pangea, times of drought or flood with Melankovitch cyclical durations are recorded by Newark Supergroup sediments.<sup>2</sup> Northern Pangea was mostly submergent accumulating sediments in and about extensive epeiric seas. Southern Pangea was mostly emergent accumulating terrestrial sediments interiorly.<sup>3</sup>

Dinosaurian dominance followed after a great mass-extinction event at the end of the Triassic. Other terrestrial reptilian groups to survive were lizards and small (<2 m long) crocodylians as then possibly warm-blooded, now extinct, long-legged *Terrestrisuchus* and bipedal *Saltoposuchus*.<sup>4</sup>

The Late Triassic extinction of most (a lineage survived into the Palaeocene)<sup>5</sup> mammallike reptiles (order Therapsida) that had appeared mid-Permian was once thought to have been because of 1) predation by the dinosaurs and their relatives that had become progressively more abundant, diverse, and larger from their start as swift bipedal carnivores, and 2) by displacement by large rhynchosaur, which “land-living vertebrates, or tetrapods,” Paul Eric Olsen writes, “had largely continued the Paleozoic-style dominance of the oxymoronically-named ‘mammal-like reptiles’—more properly called ‘synapsids’,”<sup>6</sup> a clade of extinct reptiles with a single pair of lateral temporal openings in the skull.<sup>7</sup> But outside of cladistics, the world is otherwise. In the Middle Triassic, the synapsids were already relatively rare.<sup>8</sup> Some had earlier evolved to become primitive mammals (subclass Prototheria).<sup>9</sup> These did not go extinct (just as well for us!). But which therapsids made the transition is not clear as the fossil record for them during the Middle Triassic is poor. Increasing aridity during the Triassic throughout Pangea could have been a factor in the decline of the therapsids.

Therapsids known from the Early Triassic, nearest to the line that can reasonably be imagined (in the absence of definitive fossils) to have led to mammals, were persisting *primitive* mammallike reptiles (cynodonts),<sup>10</sup> such as genus *Cynognathus* (Harry Govier Seeley, 1895).<sup>11</sup> Cynodonts were the first land vertebrates to chew. This was made possible by an evolved character, that of a sliding jaw. Horny material, which lined their jaws, allowed for tough forage to be shredded and crushed before it was swallowed. However, the first true mammals were tiny and were, perforce, insectivores.

Not on the line to mammals were *advanced* mammallike reptiles (class Dicynodonta). The name dicynodon (means “two doglike teeth”) refers to a feature that one sex (the male?) displayed.<sup>12</sup> The last numerously fossilized of these specialized creatures are Early Triassic genera *Kannemeyeria* and *Lystrosaurus*. *Lystrosaurus* evidently lived wherever water was plentiful. They were diverse in form, with skulls in some species a few centimeters, and in others a meter in length. With a bill to crop, all were vegetarians and may have had a hippo-like life style. From their great latitudinal range, heat or cold was no problem for them. *Lystrosaurus* fossils are found even in Antarctica. This discovery by Edwin Harris Colbert (1905-2001) in the Coalsack Bluff nunatak, during the 1969/70 summer, where the day is months long but equally, in freezing winter, the night is months long, persuaded many paleontologists to accept (belatedly) the reality of drift. *Lystrosaurus* had burgeoned in numbers after end-Permian extinctions. And before then, during the Late Permian, thirty-five genera of dicynodonts ruled on Earth.<sup>13</sup> Their (specifically *Dicynodon*) extinction marks the end-Permian.<sup>14</sup>

Late Permian dicynodonts include, in shape and size, polecat-like carnivores and, more numerously, squat, barrel-bodied, lumbering, hippolike herbivores. All had reptilianlike forelegs sprawled out from the chest, and mammallike hindlegs more upright and rotated in beneath the body.<sup>15</sup> □