

NEWS AND VIEWS

Changing Dinosaurs—but not in Mid-stream

THE dinosaurs are still evolving—or, at least, our view of their way of life is still changing. Twenty to thirty tons in weight and nearly one hundred feet long, the great herbivorous dinosaurs known as sauropods are inevitably the most impressive exhibit in any natural history museum that is large enough to house them. Almost any book about dinosaurs will have a reconstruction of such a sauropod as *Apatosaurus* (often incorrectly called *Brontosaurus*), half submerged in a lake and inaccessible to its great carnivorous relatives such as *Tyrannosaurus*, while placidly browsing on soft aquatic plants.

Some questioning voices against the belief that the sauropods were aquatic have been raised in the past. Dr Kenneth Kermack of University College, London, pointed out twenty years ago that if one of these animals had stood on the bottom of a deep lake, as is so frequently shown in illustrations, with its neck stretched upwards so that its head reached the surface, then its thorax would have been at a depth of about twenty feet.

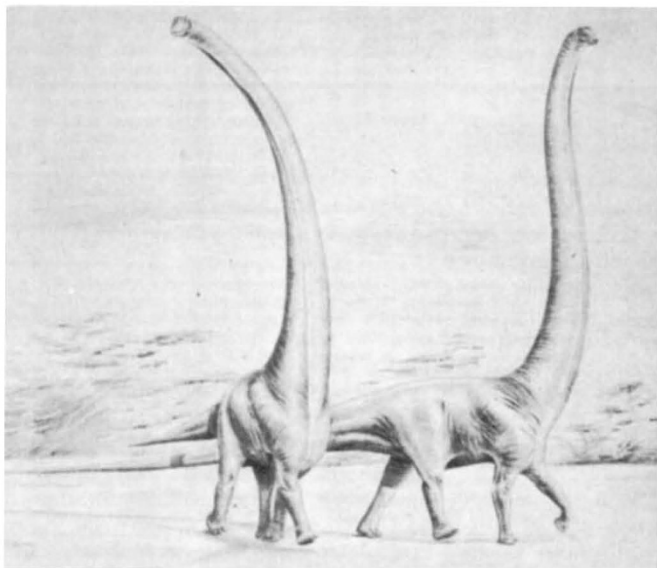


Fig. 1 Bakker's restoration of the sauropod *Barosaurus* which was about 85 feet long and about 40 feet high (from *Discovery, Peabody Mus.*, 3, 15; 1968).

On page 170 of this issue of *Nature*, Robert Bakker of Yale University convincingly demolishes the belief in the aquatic mode of life of sauropods. He discusses the size of their nostrils, the wear of their teeth, the shape of their body, the structure of their vertebral column, limbs and feet, and the sedimentology of the beds in which they are most common. He concludes that none of these features support the accepted view of their habits, and that they instead unequivocally indicate that the sauropods lived on land and fed on fairly coarse food.

If sauropods were land dwellers, why did they have long necks? Bakker points out that both the largest extinct mammals and the largest living ones are adapted for browsing over a greater vertical range of food than is accessible to shorter herbivores. A long neck is of little use to an aquatic herbivore, because water plants do not grow at great depths—the living hippos are notably short

necked. It seems, then, that the sauropods were reptilian giraffes, browsing off the conifers and cycads which have been found in the same deposits.

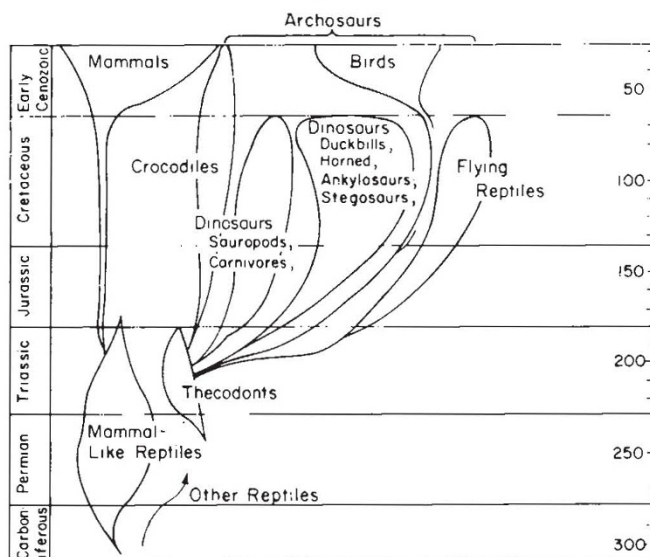


Fig. 2 Relationships of dinosaurs to mammal-like reptiles and the early mammals. Numbers at right indicate millions of years before present (from *Discovery, Peabody Mus.*, 3, 12; 1968).

If it was not their inaccessibility in the water that made the sauropods safe from the attentions of carnivores, how did they protect themselves? Bakker, in an earlier article (*Discovery, Peabody Mus.*, 3, 11; 1968), suggested that they could swing the long, muscular tail with a force sufficient to severely injure an attacker, and also rear on their hind limbs and use their fore limbs to strike at or to crash down upon their adversary. A herd of such creatures must have been formidable though, as Bakker shows in his restoration (see Fig. 1), they probably had to hold their tails clear of the ground to prevent other members of the herd stepping on them!

It is interesting to note that the sauropods are not the only dinosaurs which palaeontologists have recently dragged ashore. The sauropods belong to the Saurischia, one of the two great independent groups which together make up the assemblage popularly called dinosaurs. The other group, the Ornithischia, also includes a family, the duckbills or hadrosaurs, which were thought to be aquatic or, at least, amphibious. Dr. John Ostrom, also of Yale University, showed in 1964 (*Amer. J. Sci.*, 262, 975) that, like Bakker's sauropods, the hadrosaurs were largely terrestrial and probably browsed on land plants.

If the sauropods were really terrestrial, the anti-continental drift lobby has thus lost another small prop. Until now, the presence of sauropods in areas now violated by sea, such as Madagascar and Australia, required little explanation: such semi-aquatic animals could surely have swum there, as may the living hippo of Madagascar. Now that the sauropods seem to have had as little long distance swimming ability as the elephant, we can conclude that they instead reached these areas by the dry-land routes which the geophysicists have now thoughtfully provided.