

THE CROCODYLIAN FAMILY TREE

Impressive though the crocodylian survivors are, they are only a fragment (a 'biased sample') of a very diverse and geographically widespread group of crocodile-like reptiles that originated on land way back in the Triassic, 250 Mya. Some of them loped about on long limbs, some were bipedal, some were quite small and others were enormous. Most were carnivores but some were herbivorous. Most were terrestrial but there were marine groups too and some may even have been endothermic. It is an exciting history: the crocs were as diverse as the dinosaurs! So, those stories about crocodiles and alligators 'surviving unchanged since the age of dinosaurs' are misleading if taken to imply that crocs represent a group that didn't evolve much. The crocs we live with today are very different from their relatives living alongside dinosaurs. That's probably a good thing: some of the early critters grew to 13 m!

The fossil history of crocodylians and other archosaurs is a very active research field and much of the literature cited in this chapter has been published since 2000. New fossils are being discovered and described and analysed in new ways, and molecular analytical techniques are being applied to the extant species – all leading to reinterpretations of previous understandings about taxonomic affinities.

This chapter reviews the relationships between surviving species, as well as summarising high-

lights of their ancient history – the crocodylian evolutionary tree.

THE MODERN CROCODYLIANS AND THEIR RELATIONSHIPS

EXTANT CROCODYLIA

Today's Crocodylia are survivors of three groups that were differentiated and widespread in the late Cretaceous: the Gavialoidea, Crocodyloidea and Alligatoroidea (see Fig. 2.3). Many reptile groups became extinct with the end of the Cretaceous (mosasaurs, plesiosaurs, pliosaurs, pterosaurs and, more famously, the non-avian dinosaurs). These extinctions are usually linked to a cataclysm that marked the end of the Cretaceous, at the well known K–Pg boundary (previously known as the K–T boundary). This was caused by a massive asteroid impact in what is now the Gulf of Mexico (Shulte *et al.* 2010). The ejecta would have darkened the skies, lowered temperatures, inhibited photosynthesis and are believed to have disrupted the entire planetary ecology. Nevertheless, the crocodylians were apparently little affected by the K–Pg extinction event and many snakes, lizards, tuataras and turtles also survived (Buffetaut 1990). Sebecids (see Fig. 2.25) also survived the end of the Cretaceous, until the Miocene.

Cast of type specimen (AMNH 3160) of Sebecus icaeorhinus, an Eocene mesoeucrocodylian from Patagonia. Unlike crocodylians, which were mostly aquatic, sebecids were terrestrial predators with a laterally compressed, dog-like skull. A reconstruction of this specimen can be seen in Fig. 2.25. (Photo DSK at American Museum of Natural History)