Brehm's Animal Life: General Overview of the Animal Kingdom, 3rd Edition, Volume 7, *Reptiles and Amphibians* (1892)

Abstract

This essay on the zoology of reptiles appeared in *Brehms Tierleben* [*Brehm's Animal Life*], a reference work that was central in popularizing scientific knowledge in German households. The essay communicated central claims of the biological enterprise: that the natural world should be understood by rational analysis of observable facts and internal functions; that such analysis proceeded from dissection and other reductive techniques of experiment; that the knowledge gleaned by such methods allowed species to be classified through taxonomic distribution in schemes of evolutionary relationships. That this type of nature reading became a regular part of domestic leisure testifies to the German public's eagerness for scientific learning.

Source

Most reptiles develop from eggs that are essentially similar to those of birds; they have a large, oil-rich yolk and a more or less significant protein layer, and are enclosed within a leathery, often pliable shell upon which a varying amount of calcium is deposited. The development of the eggs begins for the most part already before they are laid, in the oviduct of the mother. In a few instances, the embryo even fully develops there: the offspring breaks out of the egg membrane still in the oviduct and is thus born alive. Certain species, which otherwise lay their eggs long before that point, can be induced to retain them until the complete development of the young if they are deprived of the opportunity to lay them. The fertilized egg shows a roundish disk with a blurred border on the surface of the yolk. It is white in color and corresponds to those parts of a hen's egg commonly referred to as the *Hahnentritt* or germinal disk This disk consists of tiny cells that are almost colorless and, in contrast to the yolk, give rise to the light coloring; it represents the first stage of development and the crux of the formations that convey the structure of the embryo. […]

According to A. Völtzkow, the development of crocodiles is closely related to that of birds. The tail, which is already quite long at the outset of development, is conspicuous. At first, it is rolled up like a coil; later, when the embryo has assumed greater curvature, it is wrapped around the neck.

When it comes to reptiles, we can almost say that they used to exist: for our current knowledge of prehistoric animals reveals that entire orders – such as fish lizards (ichthyosauria), sea dragons (Sauropterygia), Theromores (Theromora), giant lizards (Dinosauria), and flying lizards (Pterosauria) – have gone extinct, while only four orders of scaled reptiles, crocodiles, turtles, and tuatara have persisted to the present day. The fossilized remains of earlier species of the class that we know today point to a long lineage of different, quite strange animals, who in body structure and way of life are reminiscent partly of mammals (Theromora), partly of birds (flying lizards), amphibians, and fish (fish lizards).

According to K. von Zittel, the distribution of the old reptiles shows that this class appeared on earth only after the fish and the amphibians, and that their oldest representatives were the Proterosauridae and the Mesosauridae.

They inhabited the lands or coastlines at the time of the Rotliegend [red rock] and Kupferschiefer [copper shale], and in terms of external appearance, skeletal structure, and way of life, they probably most closely resemble the still living tuatara. This very fact already suggests that the sea-dwelling reptiles of the Mesozoic Era, like fish lizards, sea dragons, and the oldest crocodiles, are more distant from the original primordial image of reptiles than the terrestrial and freshwater forms, and should be seen as singularly developed side branches of the reptile class, like the flying dinosaurs, turtles, and giant dinosaurs.

Alongside the primordial tuatara and the first Theromores, we should thus be looking firstly for the ancestors of the more recent reptiles. And in fact, precisely these two groups show a mixture of characteristics that enabled them to develop in the most varied directions.

The reptiles of the Karoo formation in South Africa, as well as the coeval layers in southern India and Brazil, do belong to the Theromores and the primordial tuatara. However, they already display a much greater one-sidedness in body structure, with the result that some of their phyla (*Anomodontia*) appeared incapable of further development and presumably already went extinct in the Triassic Period, during which the still poorly understood placodonts also appeared and vanished again.

The Triassic also sees the beginning of sea lizards with the Nothosaurs and Pistosaurs, and fish lizards with *Mixosaurus*. Both orders are likely to have emerged from ancestors that resembled the tuatara, though their lineage cannot yet be determined with certainty; their oldest forms are already quite distant from the Paleozoic reptiles and evidently traversed a long path in further development, though we are not able to trace it through prehistoric finds. The oldest crocodiles from the Keuper in Europe, India, and North America (*Parasuchia* and *Pseudosuchia*) are still significantly closer to the tuatara than the Eusuchia that begin in the Lias [Early Jurassic Period], whose direct precursors are likewise still unknown, though all crocodiles alive today are descended from them. In addition to crocodiles, giant lizards exist as their closest phylum relatives; they, too, probably evolved out of either tuatara or, even more likely, out of the Theriodonts. Their division into *Sauropoda* and *Theropoda* already took place in the Triassic; during the Jurassic Period they were joined by the more one-sidedly developed orthopods, which peaked during the Upper Cretaceous Period and also became extinct then.

The turtles begin in the Upper Triassic, namely with already highly developed forms (*Proganochelys* and *Psephoderma*). The sparse Triadic precursors are followed in the Jurassic and Cretaceous periods by numerous representatives of Cryptodira and side-necked turtles, who persist to the present day without any substantial changes in their overall structure. The branching-off of the turtles probably already took place in the Paleozoic Era, at a time not far removed from the origins of the Anomodonts, with whom they share several congruencies.

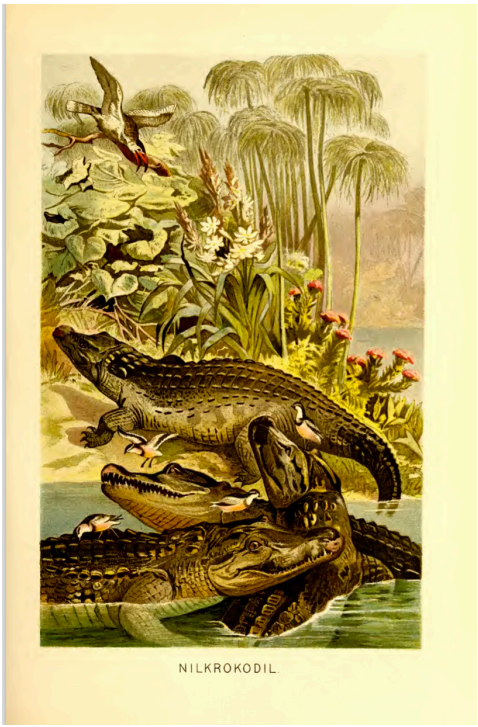
The flying lizards form an independent side branch that already went extinct in the Upper Cretaceous. They, too, seem to have already been endowed with all their peculiar characteristics in the Lias. Until they die out in the Upper Cretaceous, however, they depart substantially from the original reptile model due to atrophy of the teeth and certain changes in the skull. Because of a similar way of life, they acquire certain characteristics reminiscent of birds, though they do not reveal any closer consanguinity.

Lizards can be seen as an offshoot of the tuatara, which begin in the Purbeck and Wealden strata but achieve full development only in the Tertiary Period and the present. During the Cretaceous Period, the sea-dwelling Pythonomorphs and, in the opposite direction, the snakes branched off from the lizards. Only the latter have persisted to the present day, along with the chameleons, for which we have no fossil representatives. As forms with a highly one-sided development, the Pythonomorphs already disappeared at the end of the Cretaceous.

The lineage of the reptiles thus leads back in all likelihood to primeval forms of lizard-like shape, which possessed a long tail, hollowed-out fish vertebrae in the front and back, a sacrum with two vertebrae, a five-toed walking leg, a skull narrowed in the front with upper and lateral temporal vacuities and parietal foramen, teeth soldered onto the rims of the jaw, and scaly skin. Out of these primeval reptiles, the first to develop were probably the Theriodonts and tuatara; and out of the latter came the lizards, along with their three side branches, the Pythanomorphs, chameleons, and snakes. All other orders likely already branched off in the Paleozoic Era or at the beginning of the Mesozoic Era and changed so quickly in body structure that their kin relationships both amongst one another and with primeval reptiles became rather blurred.

Today, incidentally, around 3,500 different types of reptiles are still alive: about 1,645 types of lizards, 55 chameleons, about 1,575 snakes, 23 crocodiles, 201 turtles, and 1 tuatara; and every year witnesses the discovery of previously unknown types, especially among lizards and snakes.

[…]



Nile Crocodile, Illustration, p. 504.

Source: *Brehms Tierleben. Allgemeine Kunde des Tierreichs*, third edition, volume 7, *Kriechtiere und Lurche*, edited by Eduard Pechuël-Loesche. Leipzig and Vienna: Bibliographisches Institut, 1892, pp. 9–12, 504.

Translation: Thomas Dunlap

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