On the origin of flight in *Archaeopteryx* and in pterosaurs

By

Klaus Ebel, Markdorf

With 5 figures in the text


Abstract: A new idea concerning the origin of flight is presented. Contrary to the currently prevailing glider or cursor models this hypothesis is based on the idea that flight has evolved in *Archaeopteryx* or in its immediate precursors as well as in rhamphorhynchoids because they were specialized in diving and hunting fish. Underwater flying led to basically similar forms due to convergence in *Archaeopteryx*, rhamphorhynchoids, and also in some rays.

Zusammenfassung: Ein neues Modell zur Entstehung der Flugfähigkeit wird vorgestellt. Im Gegensatz zu den bisher vertretenen Hypothesen, daß sich die Flugfähigkeit über den Gleitflug bei Baumbewohnern oder bei Bodenläufern entwickelte, basiert diese Vorstellung darauf, daß *Archaeopteryx* bzw. ihre Vorläufer ebenso wie die Rhamphorhynchoideen die Flugfähigkeit entwickelten, weil sie sich auf die Unterwasserjagd auf Fische spezialisiert hatten. Das Fliegen unter Wasser führte infolge von Konvergenz bei *Archaeopteryx*, den Rhamphorhynchoideen und auch bei manchen Rochen zu ähnlichen Formen.

Introduction

In 1984, a conference was held in Eichstätt, Bavaria, which dealt exclusively with *Archaeopteryx*, the oldest known bird-like creature. Most participants of this conference agreed that *Archaeopteryx* was a true bird (HECHT et al. 1985). An important topic of this conference was the problem of the evolution of flight, which was controversially discussed. Essentially, two views are adopted. One group of researchers pleads for an arboreal origin of avian flight via a gliding stage. Other workers have expressed the opinion that bird flight evolved in an agile bipedal ground-dweller which used its flapping wings more and more during running until it could eventually take off. None of these suppositions is beyond doubt. Therefore, controversies persist (CHARIG 1985). Since all of the assumptions concerning the evolution of flight presented so far exhibit considerable plausibility problems, presumably none of them comes close enough to the reality to preclude further efforts to find a more convincing explanation.