

## Assessing the flight performances of the first gliding reptiles

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The Weigeltisauridae, known from the Lopingian of Madagascar, Germany, England and Russia, are the first known gliding reptiles – and amniotes. While their aerial lifestyle is commonly accepted, very little is known about their ecology and flight performance.

The detailed examination of specimens from the Permian of Madagascar and Germany allows for the redescription of the cranial and postcranial anatomy of these enigmatic animals. The almost complete Ellrich specimen, housed in the Karlsruhe Museum of Natural History (Germany), was studied using Computed Laminography (CL). This technique, developed for the study of flat material, is uniquely suited to examine highly compressed specimens preserved on slabs and allows for the observation and description of novel anatomical features. These observations highlight significant osteological differences between weigeltisaurid taxa, most interestingly in the trunk and patagium regions. We observe different patterns in the bones supporting the patagium. This might suggest different flight adaptations. Furthermore, the CL data has revealed the position, organization and anchoring of the patagium, which we also describe in detail for the first time.

These anatomical data will be incorporated into a new 3D skeletal and *in vivo* (i.e. with muscles and skin) reconstructions of these reptiles. These 3D models will then be used in wind tunnel experiments to quantify the flight performance of weigeltisaurids, and enhance our understanding of the first flight adaptations in amniotes.

**Mots-Clés :** Gliding reptiles, Weigeltisauridae, Wing, Flight, Computed laminography, Wind tunnel.

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