



Contribution ID: 58

Type: Oral

New insights into the tooth structure of pelycosaurs by means of neutron tomography

Tuesday, 4 September 2018 11:10 (20 minutes)

Pelycosaurs are the most primitive members of the Synapsida, which is the clade that includes mammals. Consequently, pelycosaurs are of special interest with respect to our early evolution. We investigated a skull of *Varanosaurus acustirostris* for the first time by means of neutron tomography at the facility ANTARES at FRM II in Munich. *Varanosaurus acustirostris* was a representative of the primitive pelycosaur group Varanopseidae. It derives from Early Permian deposits of Texas. As the most remarkable result we found that *Varanosaurus* possessed plicidentine, i.e. infolded dentine at the base of the tooth roots. With the exception of the spenacodontid pelycosaur *Dimetrodon*, plicidentine is unknown in Synapsida (Brink et al., 2014). Hitherto, plicidentine has been observed only in fishes (sarcopterygians and actinopterygians) and some basal tetrapod groups. Our results suggest that plicidentine was more widespread among basal synapsids than previously thought. Functionally, the infolded dentine layer provided an increased area for attachment for the shallow tooth roots in the pulp cavities of the jaw. Now, neutron tomography allows non-destructive investigation of the tooth structure of these valuable fossils.

References:

Brink, K.S., LeBlanc, A.R.H. & Reisz, R.R. 2014. First record of plicidentine in Synapsida and patterns of tooth root shape change in Early Permian spenacodontians. *Naturwissenschaften*, DOI 10.1007/s00114-014-1228-5.

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Session Classification: Speaker Sessions and Seminars

Track Classification: Palaeontology