

The analysis resulted in newly-recognized diagnostic features for *Colymbosaurus* that include; mid-cervical vertebrae that are marginally anteroposteriorly shorter than dorsoventrally tall and lacking a longitudinal ridge on the lateral surface; mid-caudal centra that are sub-rectangular in anterior view due to a flat ventral surface and possessing widely-spaced chevron facets; an extensive postaxial flange on the propodials; a diamond-shaped fibula in dorsal view; a proximodistally short ulna that is anteroposteriorly wider than the radius. New diagnostic characters for *C. svalbardensis* include; proximodistally short hind limb epipodials; mid-dorsal vertebrae with a taller than wide neural canal; a relatively gracile femoral shaft compared to *C. megadeirus*. The strict consensus tree from the phylogenetic analysis recovered robust support for both species of *Colymbosaurus* as sister taxa. Ongoing studies of other recently discovered material from the Slottsmøya Member promises to expand the diversity and clarify the phylogenetic relationships within Cryptoclididae across the Jurassic-Cretaceous boundary.

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**EVIDENCE FOR A *SIMOLESTES*-LIKE PLESIOSAURIAN FROM THE BERRIASIAN  
(LOWER CRETACEOUS) LIMNIC-BRACKISH BÜCKEBERG GROUP  
OF NORTHWESTERN GERMANY**

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The middle to late Berriasian Bückeberg Group of northwestern Germany has yielded a number of plesiosaurian fossils. These include Europe's most complete Lower Cretaceous plesiosaurian, *Brancasaurus brancai*, in the fine grained, argillaceous Isterberg Formation near Gronau in Westfalen. Recently a second taxon, *Gronausaurus wegneri* was identified from the same locality and stratum (Hampe 2013). A higher diversity in the Bückeberg Group plesiosaurian assemblage is indicated by pliosauromorph and other plesiosaurian vertebrae from strata in the upper part of the sequence (see e.g. Koken 1896; Hornung *et al.*, 2013), and both vertebrae and rib components described as *Plesiosaurus degenhardti*, from sandstones of the more marginal Deister Formation near Obernkirchen, Lower Saxony (Koken 1896).

The only plesiosaurian cranial remains thus far documented from the Bückeberg Group were with the holotype specimens of *B. brancai*, and *G. wegneri*. These collectively characterize the classical "plesiosauromorph" morphology of a comparatively small head, long neck and slender conical teeth. Here we report on a newly discovered incomplete mandible representing a large-skulled, macrophagous plesiosaurian found within the coarse-grained nearshore facies from the Deister Formation of the Bückeberge range, probably near Obernkirchen. The more complete mandibular ramus of this specimen measures 315 mm. It also displays a terminal rosette-like procumbent tooth array in the symphyseal region, which is curiously reminiscent of Lower Jurassic rhomaleosaurids and the Middle Jurassic pliosaurid *Simolestes vorax*. The tooth rosette has a maximum diameter of 90 mm and comprises five large circular to ovoid alveoli and a smaller caudalmost alveolus. The most complete second alveolus on the left side measures 15 mm in labiolingual diameter. A prominent lateral concavity at the caudal end of the rosette probably accommodated a large caniniform tooth from the upper jaw. Comparison of the Deister Formation "pliosauromorph" mandible with

those of *Simolestes vorax* suggests a maximum cranial length of about 600 mm.

As is typical for the Deister Formation sandstones, the "pliosauromorph" jaw is preserved as a highly detailed, undeformed impression remaining after removal of the soft, clay-like replacement of the skeletal material. This preservation mode commonly preserves structures in 3D, including in this case details of the vascular canals, dental lamina foramina and caudomedial symphyseal articulation. As a method to obtain a positive representation of these specimens, classically artificial casts in gypsum or latex were prepared. We employed photogrammetry to create a high-resolution 3D model, which then was inverted in order to generate a digital cast of the specimen.

Although incomplete, the Deister Formation "pliosauromorph" provides new insights into the surprising diversity of the Bückeberg Group plesiosaurian assemblage, which occupied limnic to brackish epicontinental settings incorporating only temporary connections to the sea. The sauropterygians competed in their role as aquatic predators with an abundant crocodilian fauna.

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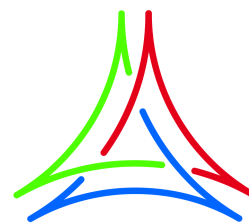
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