

Supplementary information 1

Body mass reconstruction

The body mass at death of each individual was calculated using the equation for standard quadrupeds from Anderson et al. (1985). This equation estimates body mass from the circumference of the humerus and femur of the same individual. It is expected to reveal robust estimates of body mass in mammalian and non-avian reptilian taxa (Campione and Evans 2012). Its applicability is untested for secondarily marine vertebrates, which are not standard quadrupeds due to e.g., differences in body shape and gravity. However, body masses of varanids and iguanians were tested in the study of Campione and Evans (2012), which might have a body shape similar to Pachypleurosauria. If not mentioned otherwise the circumference was measured from thin sections and not directly from the bones due to their small size or their embedment in the sediment.

No complete femur is preserved together with a diagnostic specimen of *Dactylosaurus*. To reveal a reliable length of a femur that would correspond to the humerus of the *Dactylosaurus* “*schroederi*” specimen (Nopsca 1928; Sues and Carroll 1985) an average humerus to femur ratio of *Neusticosaurus* spp. (1.05; Sander 1989) was taken, because *Dactylosaurus* has a greater length of the humerus relative to the femur as these taxa also have (contrary to *Anarosaurus*). This resulted in a femur length of ~ 2 cm by a given humerus length of 2.1 cm. The circumference for the humerus was taken from MB.R. 771.5. That specimen has a similar size and morphology when compared to *D. “schroederi”* and originates from a locality of Upper Silesia as the holotype does. The circumference for the femur was estimated. The longest humerus is 4.4. cm long (MB.R 786). The specific equation that was used to estimate body mass is:

$$W = 0.078 \times (1.1 + 1)^{2.73} = 591\text{g.} \quad [\text{Anderson et al. 1985}]$$

Body mass reconstruction for *Anarosaurus heterodontus* was based on specimen StIPB R 595 that has a humerus length of 1.73 cm (Klein 2012). The longest humerus known so far measures nearly 5 cm in length. The specific equation that was used to estimate body mass is:

$$W = 0.078 \times (1.3 + 1.1)^{2.73} = 850\text{g.} \quad [\text{Anderson et al. 1985}]$$

For body mass reconstruction of *Neusticosaurus pusillus* and aff. *N. pusillus* an average humerus to femur ratio was used (0.995; Sander 1989). Body mass reconstruction was based

on specimen T 3566 that has a humerus length of 2.13 cm, which is the longest humerus known for this taxon so far. The specific equation that was used to estimate body mass is:

$$W = 0.078 \times (1.4 + 1.35)^{2.73} = 1230\text{g} (=100\%). \quad [\text{Anderson et al. 1985}]$$

Body mass reconstruction of *Neusticosaurus edwardsii* is based on specimen T 4758 that has a humerus length of 2.87 cm and a corresponding femur length of 1.81 cm (Hugi et al. 2011). The largest humerus is 8.26 cm and the corresponding femur is 4.55 cm (T 3437; Hugi et al. 2011). The specific equation that was used to estimate body mass is

$$W = 0.078 \times (1.2+0.9)^{2.73} = 600\text{g}. \quad [\text{Anderson et al. 1985}]$$

Body mass reconstruction of *Serpianosaurus mirigiolensis* is based on specimen T 131 that has a humerus length of 1.27 cm and a femur length of 1.13 cm (Hugi et al. 2011). The largest humerus is 3 cm (T 4510; Hugi et al. 2011). The specific equation that was used to estimate body mass is

$$W = 0.078 \times (0.77+0.5)^{2.73} = 150\text{g}. \quad [\text{Anderson et al. 1985}]$$