

Shoulder height, body mass and shape of proboscideans

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In recent decades there has been a growing interest in proboscideans' body size, given that mass is highly correlated with biological functions. Different allometric equations have been proposed in the recent decades to estimate their body masses, based on a large number of living examples. However, the results obtained by these formulae are not accurate because extinct animals often had different body proportions and some were outside the size range of extant samples. Here the body mass of a large number of extinct proboscideans has been calculated by the Graphic Double Integration volumetric method which is based on technical restorations from graphical reconstructions of fossils employing photos, measurements and comparative anatomy of extant forms. The method has been tested on extant elephants with highly accurate results. The reconstructions necessary to apply this method give important information such as body proportions. On the other hand, equations to calculate the skeletal shoulder height have been developed, with a large number of published shoulder heights being recalculated. From the shoulder heights, several equations were created to find out the body mass of a series of extant and extinct species. A few of the largest proboscideans, namely *Mammuth borsoni* and *Palaeoloxodon namadicus*, were found out to have reached and surpassed the body size of the largest indricotheres. Bearing this in mind, the largest land mammal that ever existed seems to be within the order of Proboscidea, contrary to previous understanding.

Key words: Mammalia, Proboscidea, *Mammuthus*, *Palaeoloxodon*, *Deinotherium*, elephants, mammoths, mastodons, body mass, shoulder height.

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