Cleaning up the Gomphotheriidae “trash basket”: a phylogenetic review

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Gomphotheriidae includes all Neogene proboscideans with bunodont molars, being labeled as the “waste-basket” of Proboscidea and recovered frequently as paraphyletic. Nevertheless, updated classification, a large sample of specimens or polymorphisms are usually neglected in such phylogenetic studies. Thus, we conducted a phylogenetic analysis of proboscidean taxa related to Gomphotheriidae, reviewing data matrix available from literature. The new matrix has 45 homologies and 22 taxa and was analyzed under the Maximum Parsimony criterion on TNT software (implicit enumeration algorithm). One most parsimonious tree was recovered (128 steps, RI: 0,702, CI: 0,477), where “traditional" Gomphotheriidae still resulted as paraphyletic. In order cleaning up the “waste-basket”, we reduced its diversity, including as monophyletic group the taxa “*Aybelodon*”, *Gomphotherium* and the amebelodontids. *Stegomastodon*, *Sinomastodon*, *Rhynchotherium*, *Cuvieronius* and *Notiomastodon* resulted all together in a distinguished clade, Far from the monophyletic Gomphotheriidae, which was recognized as a new family of Proboscidea. It is supported by the synapomorphies: 1) pentalophodont bunodont third molars; 2) shallow incisive fossa; 3) brevirostrine mandible; and 4) the atlas with robust dorsal tuberosity. This study recognize a new family within Proboscidea, a sister-group of a clade including *Eubelodon*, tetralophodont bunodont proboscideans, stegodontids and elephantids. The clade comprising these both (Elephantoidea) is closely related to Gomphotherioidea, which includes *Gnathabelodon* and the monophyletic Gomphotheriidae. These results points out that brevirrostrine trilophodont bunodont proboscideans are not gomphotheres.