

## The largest ghost shrimps ever: evidence from the fossil record and implications for the maximum size estimate of callianassoid burrowing ghost shrimps

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Callianassoid burrowing ghost shrimps are mostly small animals, with a total length (from the tip of the rostrum to the end of the tailfan) typically not exceeding a few centimetres. Representatives of some species in the families Anacalliidae, Callianassidae, Callichiridae, Ctenochelidae, and possibly also Callianopsidae, however, may grow to relatively large sizes, reaching 10 and more centimetres in length. The maximum size each of these species can attain remains a mere estimate because it is difficult to catch ghost shrimps, particularly the large-sized tropical representatives. Since large individuals have a greater fossilization potential, the ghost shrimp fossil record could contribute to our knowledge about how large these animals can grow. The largest extant ghost shrimp reported to date is an individual of the species *Glypturus armatus* (Callichiridae), with an estimated total length of 175 mm (based on the extrapolation from an isolated ischium). The existence of even larger animals reaching a total length of approximately 200 mm is documented herein from the Maastrichtian of Madagascar and the middle Eocene of Hungary, with both fossil individuals belonging to the genus *Karumballichirus* (Callichiridae) and appearing to be closely related to the extant *Karumballichirus karumba*. An overview of both extant and fossil ghost shrimp species suggests that a total length of 200 mm is rarely, if ever, exceeded by these animals. We suggest that physiological limits imposed by the specialized burrowing lifestyle might prevent ghost shrimp from growing any larger.

**Key words:** Malacostraca, Decapoda, Axiidea, body length, burrowing shrimps, decapod crustaceans, fossilization potential, physiological limits.

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