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A new kogiid sperm whale from northern Italy supports psychrospheric conditions in the early Pliocene Mediterranean Sea

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Among living cetaceans, dwarf and pygmy sperm whales (*Kogia*) are the only members of the family Kogiidae, regarded as diminutive and elusive relatives of the great sperm whale *Physeter* . Kogiids are known as fossils by several skulls, teeth, and ear bones from Neogene deposits of the Northern Hemisphere and Peru. We report on a fossil kogiid specimen collected at Sant'Andrea Bagni (northern Italy) from Zanclean marine mudstone; these deposits also yielded a rich deep-water elasmobranch assemblage depicting the presence of Atlantic-derived psychrospheric waters. The kogiid specimen, consisting of a partial cranium, one detached tooth, one vertebra, and one fragmentary rib, is here referred to *Pliokogia apenninica* gen. et sp. nov. *Pliokogia* is mostly characterised by a long and dorsally flattened rostrum and by the presence of two well-distinct fossae on the right side of the supracranial basin, including an elongated peripheral maxillary fossa on the posterior portion of the right maxilla. Our phylogenetic analysis recovers *Pliokogia* as a member of the subfamily Kogiinae, which includes *Kogia* , *Koristocetus*, *Nanokogia*, and *Praekogia*. A low temporal fossa and the absence of dental enamel suggest that, like extant *Kogia, Pliokogia* was a suction feeder. Since living kogiids do not inhabit the Mediterranean waters, and considering that they feed on deep-water prey in open-sea areas, the association of *Pliokogia* with a psychrospheric elasmobranch assemblage with Atlantic affinities is noteworthy. Indeed, in early Pliocene times, the Gibraltar connection was controlled by estuarine dynamics, thus allowing the entrance of deep-water organisms (including the putative prey of *Pliokogia*) in the Mediterranean Basin. The subsequent abandonment of the Mediterranean Sea by kogiids might therefore be related to the definitive establishment of the present-day antiestuarine circulation at Gibraltar, which likely led to a limited deep nutrient supply and resulted in the strong depletion of most Mediterranean deep-water ecosystems.

Key words: Mammalia, Cetacea, Odontoceti, Physeteroidea, Kogiinae, oceanisation, Pliocene, Northern Apennines.

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