

## **(Sub-)Fossil whale barnacles (Coronulidae) provide indirect evidence about the presence of baleen whale populations in the southern North Sea and about the routes followed towards their subtropical breeding grounds**

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### Abstract

The return to the aquatic environment of small-sized even hoofed mammals more than 50 My ago resulted, after about 15 My of evolution, in the appearance of echo locating toothed whales (Odontoceti) on the one hand and of filter-feeding baleen whales (Mysticeti) on the other hand. In the course of their evolutionary history, mysticetes progressively acquired a series of morphological, physiological, and behavioural traits corresponding to adaptations to bulk filter-feeding (benthic feeding in gray whales, gulp feeding in rorquals, and skim feeding in right whales). In addition, many extant mysticetes are known to repeatedly undertake long migrations from their cold feeding grounds in the Arctic and Southern oceans to warmer (subtropical) areas where they breed and give birth. The history of the acquisition of a migrating behaviour is extremely difficult to investigate based on the baleen whale fossil record and data demonstrating past migratory behaviour is virtually absent. Epibiont commensal barnacles (Crustacea, Cirripedia, Coronuloidea) first colonised slow moving turtles. Later they spread to sirenians (dugongs and manatees) and sea snakes, and finally they adapted to life on whale skin. Nowadays, each barnacle species has its favourite host species. Monitoring the fossil and subfossil record of the epibiont commensals of northern hemisphere mysticete whales gives us clues about the routes the migrating whale populations followed to their southern winter breeding grounds and possibly also about the size of these populations. Indeed, fossil (Middle Pliocene) and subfossil (about 400 BC) whale barnacles from the genera *Cryptolepas*, *Cetopirus* and *Coronula* recently discovered in the Scheldt estuary (Dutch coast) and in the Antwerp region (Belgium) prove to be useful tracers, providing indications about the former presence in the southern North Sea, and especially in the Scheldt estuary, of their respective hosts: the gray whale, the right whale and rorquals, all absent from the North Sea now (except for *Balaenoptera acutorostrata* a species that is not infected by Coronulidae).