

A NEW PROTOCETID CETACEAN FROM THE EOCENE OF SOUTH CAROLINA,
U.S.A.; PHYLOGENETIC AND BIOGEOGRAPHIC IMPLICATIONS

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Members of the family Protocetidae are the most primitive members of the cetacean suborder Archaeoceti, most having been found in Middle Eocene sediments in the Tethys region. With the exception of a single vertebra from Texas purported to belong to a protocetid, remains of these primitive cetaceans were unknown in the Western Hemisphere until the discovery of a protocetid skull and related postcranial elements in Georgia in 1983. The Georgia specimen is now under study by Richard Hulbert.

In 1994, field reconnaissance in the Martin Marietta Cross quarry, Berkeley County, South Carolina, resulted in the discovery of the second protocetid partial skeleton from the Western Hemisphere. The remains consist of a partial skull (including the anterior end of the rostrum and a relatively complete petrosal), major portions of both mandibular rami, 7 complete teeth, a partial atlas vertebra, 1 cervical vertebra, 5 thoracic vertebrae, and elements of 13 ribs. The specimen was collected from the Lower Upper(?) Eocene Cross Formation. Prominent cetacean characters include an inflated and pachyosteosclerotic ectotympanic bulla, elongate rostrum with incisors aligned in two parallel rows, anterior extension of tegmen tympani, basioccipital crests, and broad and tabular supraorbital processes of the frontals.

Protocetids are a paraphyletic assemblage of early cetaceans that are diagnosed by the absence of basilosaurid synapomorphies. The following plesiomorphic character states, relative to basilosaurids, support the diagnosis as a protocetid: anterior extension of tegmen tympani completely overlapped by falciform process of squamosal; absence of accessory cusps on lower premolars; deep and narrow external acoustic meatus; and a well defined fossa for attachment of the tensor tympani muscle. This specimen clearly represents a new taxon based on 1) a unique combination of ancestral and derived traits and 2) the presence of several autapomorphies, i.e., diameter of alveous for I3 half that of other incisors, a posterodorsal lip of the mastoid process visible in posterior view, and p4 with high posteriorly-angled paraconid. Preliminary phylogenetic analyses produced an unresolved multichotomy between the South Carolina specimen, *Protocetus atavas*, the Georgia specimen, and *Remingtonocetus harudiensis*. Several characters suggest that the South Carolina specimen occupies an intermediate position between *Rodhocetus kasrani* and *Protocetus atavas*, including: nasal opening over canines, ascending process of premaxilla terminating over P1, and anterior edge of coronoid process of mandible posterior to m3. That hypothesis suggests that the Western and not the Eastern Tethys was the center for post-*Indocetus* cetacean evolution.