

## MORPHOMETRIC ANALYSES OF PARATORNOCERATIDS (GONIATITIDA) FROM THE EARLY FAMENNIAN OF SOUTHERN MOROCCO

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Large collections of ammonoids from single beds can be used for detailed morphometric analyses. They give insights into intraspecific variabilities within or between assemblages, allow the distinction of closely related taxa, or enable the recognition of chronomorphoclines in evolution. Statistical results affect taxonomy, stratigraphy, autecological interpretation, and the question of migrational events versus phyletic gradualism.

Two systematically excavated populations from the basal *Maeneceras* Zone (Upper Devonian II-G) of Dar Kaoua (Tafilalt) have been investigated to clarify the intraspecific variability in oxyconic members of the Dimeroceratidae (paratornoceratids s.l.). Measurements of more than 270 specimens showed that the successive faunas belong to two distinct species of *Acrimeroceras*, each with narrow but partly identical fields of variation of shell parameters such as whorl height, apertural height, whorl and umbilical width. In both taxa, the relative whorl width decreases constantly with size but *Acri* n.sp. from Bed H is significantly more compressed and on average larger than *Acri. falcisulcatum* Becker of Bed J. Juveniles can be distinguished by narrower umbilici and the lack of ribbing in the latter. The new species is close to forms previously identified as compressed morphotypes of *Paratornoceras lentiforme* but shows weakly developed shell thickenings which may form star-like mould constrictions around the umbilicus. Biphasic allometric growths is expressed in both species up to ca. 10 mm diameter by a rapid ontogenetic change from three early evolute, depressed whorls to mature compressed, oxyconic stages.

The restricted shell variability suggests a strict selection on conch growth as can be expected from active swimmers. The razor-sharp acute venters gave good streamlining, whilst the irregular shell thickenings indicate that regular contact with shell-breaking predators still occurred, perhaps during regular descents to the seafloor. The morphological change from longidomic ancestral *Praemeroceras* with convex growth lines to mesodomic paratornoceratids with secondary small ocular sinus probably reflects an evolutionary transition from suprabenthonic (demersal) to fully pelagic lifestyle at maturity. This radiation took place after the sudden extinction of thinly oxyconic tornoceratids. It can be argued that both homoemorphic groups occupied the same principal ecological niche which had become vacant after the Upper Condros Event.

The size distribution of the two population indicates that both species lived permanently in the region of the Tafilalt Platform. There is no evidence of dimorphism. Shell growth did not stop with a maximum size after reaching maturity (at 15-25 and 20-40 mm diameter) but continued throughout life. This explains a minority of very large individuals with identical whorl expansion which measure up to more than twice the size as the majority of specimens. Since the more advanced *Acri* n. sp. is the older of the two species, both probably represent immigrants that dominated the southern Moroccan shelf occasionally and alternatively after the somewhat earlier main phase of paratornoceratid evolution (*Paratornoceras* Zone, UD II-F).