

3D models related to the publication “3D topography as an indicator of change in food processing ability in the conodont genus *Palmatolepis* elements”

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Abstract

The present 3D dataset contains 15 specimens selected from the 69 3D models analyzed in the paper “3D topography as an indicator of change in food processing ability in the conodont genus *Palmatolepis* elements”. 3D topographic analysis of *Palmatolepis* P₁ conodont elements from the Late Devonian period revealed an increase in blade sharpness together with a reduction in platform size. This indicates morphofunctional adaptation to more efficient prey processing.

Keywords: Famennian, food processing, Late Frasnian, sharpness

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INTRODUCTION

This contribution presents 3D models of 15 P₁ conodont elements (see table 1) belonging to the *Palmatolepis* genus of the Col des Tribes section (CT, Montagne Noire, France) dating from the uppermost Frasnian and Famennian (Late Devonian). The use of 3D topographic indices provides quantitative insights into shape variation within the genus *Palmatolepis*, providing a quantitative perspective on changes in the ventral blade and the platform morphologies in their P₁ elements over a 10-million-year interval. Our results highlight a covariation between increased ventral blade sharpness (estimated by the ARC index) and progressive platform reduction (Form index) through time in *Palmatolepis* (Figure 1). The conodont *Palmatolepis* genus exemplifies how morphological strategies can evolve to meet changing ecological and functional demands, illustrating the adaptability of conodont oral element shape during the Late Devonian.

METHODS

Frasnian and Famennian *Palmatolepis* specimens from the Col des Tribes section (Montagne Noire, France) were mounted on wooden sticks and scanned using a Phoenix Nanotom S X-ray microtomograph (μCT, AniRA-Immos platform, SFR Biosciences, UMS 3444, ENS Lyon) at a voxel resolution of 1.2 μm. Three-dimensional reconstructions of the element surfaces were generated using Avizo software, and images from multiple viewing angles were captured using MeshLab (Figure 1). After uniform orientation of specimens, methods proposed by Assema et al. (2023) were applied to avoid noise and reduce surface irregularities and bias introduced by disparate triangles size on Late Devonian conodonts. First, the aboral surface of

Inv nr.	Taxon
UM CTB 144	<i>Palmatolepis manticlepis</i>
UM CTB 151	<i>Palmatolepis manticlepis</i>
UM CTB 078	<i>Palmatolepis manticlepis</i>
UM CTB 172	<i>Palmatolepis rhomboidea</i>
UM CTB 080	<i>Palmatolepis glabra</i>
UM CTB 177	<i>Palmatolepis glabra</i>
UM CTB 178	<i>Palmatolepis glabra</i>
UM CTB 179	<i>Palmatolepis glabra</i>
UM CTB 186	<i>Palmatolepis gracilis</i>
UM CTB 187	<i>Palmatolepis perlobata</i>
UM CTB 189	<i>Palmatolepis perlobata</i>
UM CTB 190	<i>Palmatolepis gracilis</i>
UM CTB 191	<i>Palmatolepis perlobata</i>
UM CTB 197	<i>Palmatolepis gracilis</i>
UM CTB 200	<i>Palmatolepis gracilis</i>

Table 1. List of models. Collection: Institut des Sciences de l'Évolution, Université de Montpellier, France.

the element was cropped, and second only the ventral blade was considered. Topographical indices were calculated and mapped using the *doolkit* package in R (Thiery et al. 2021).

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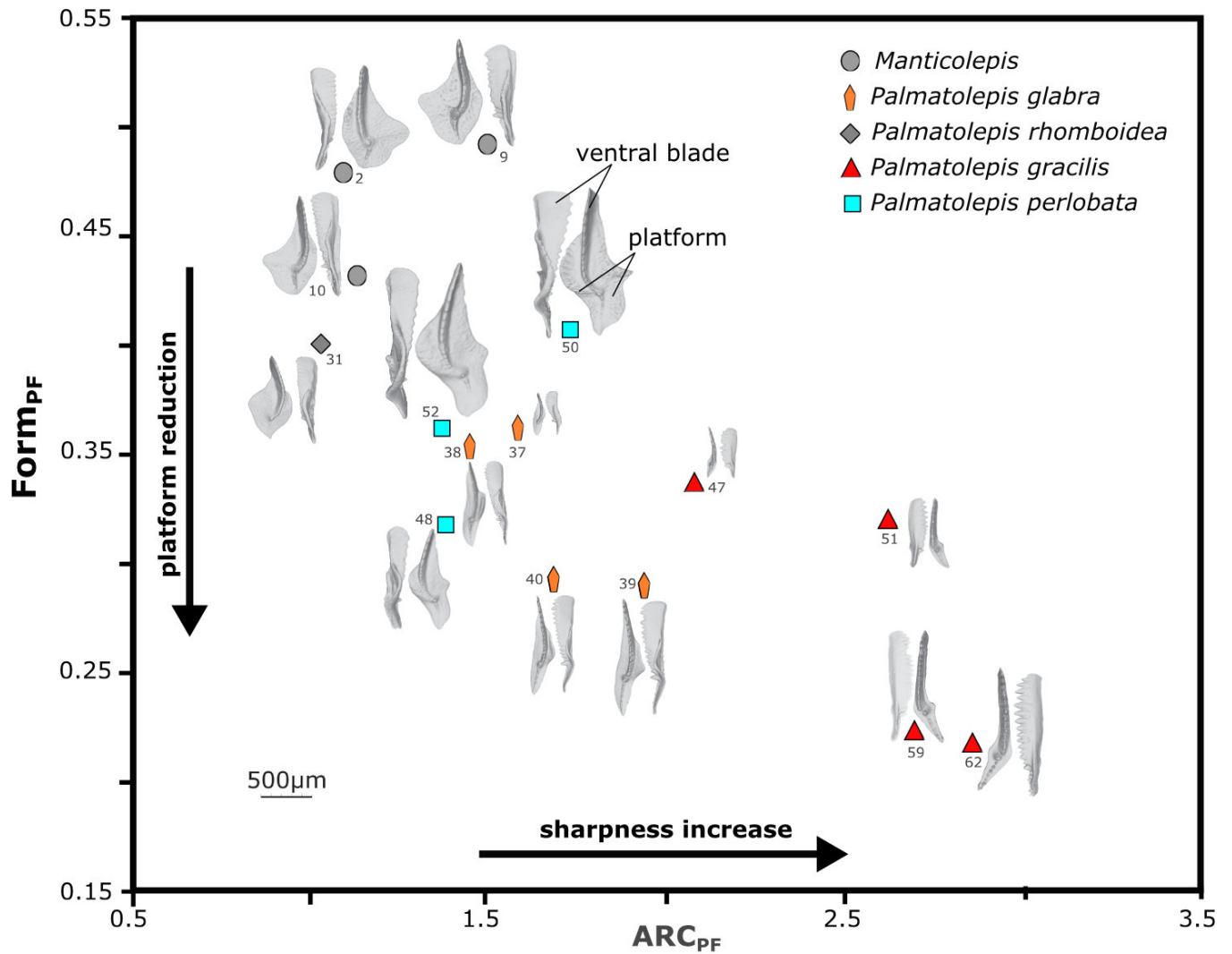


Figure 1. Scatterplot of ARC relative to Form of the platform (PF) of *Palmatolepis* specimens. Numbers next to the dot refer to the specimens' numbers in Goudemez et al. (2026). The specimens figured are the following: 2: UM CTB 144; 9: UM CTB 151; 10: UM CTB 078; 31: UM CTB 172; 37: UM CTB 080; 38: UM CTB 177; 39: UM CTB 178; 40: UM CTB 179; 47: UM CTB 186; 48: UM CTB 187; 50: UM CTB 189; 51: UM CTB 190; 52: UM CTB 191; 59: UM CTB 197; 62: UM CTB 200. For each specimen, oral and caudal views are provided to highlight the co-variation between the reduction of the platform (oral view) and the increase in the sharpness of the ventral blade (caudal view).

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