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Dataset

# 3D models related to the publication: Patterns of bilateral asymmetry and allometry in Late Devonian *Polygnathus* conodonts

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**Abstract**
This contribution contains the 3D models of the set of Famennian conodont elements belonging to the species *Polygnathus glaber* and *Polygnathus communis* analyzed in the following publication: Renaud et al. 2021: Patterns of bilateral asymmetry and allometry in Late Devonian *Polygnathus.* Palaeontology, https://doi.org/10.1111/pala.12513.

**Keywords:** Conodonts, Late Devonian, *Polygnathus communis*, *Polygnathus glaber*

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| Inv. Nr | Taxon | Description |
|---|---|---|
| UM BUS 001 | *Polygnathus glaber* | right P1 element |
| UM BUS 002 | *Polygnathus glaber* | right P1 element |
| UM BUS 003 | *Polygnathus glaber* | right P1 element |
| UM BUS 004 | *Polygnathus glaber* | left P1 element |
| UM BUS 005 | *Polygnathus glaber* | left P1 element |
| UM BUS 006 | *Polygnathus glaber* | right P1 element |
| UM BUS 007 | *Polygnathus glaber* | right P1 element |
| UM BUS 008 | *Polygnathus glaber* | left P1 element |
| UM BUS 009 | *Polygnathus glaber* | left P1 element |
| UM BUS 010 | *Polygnathus glaber* | right P1 element |
| UM BUS 011 | *Polygnathus glaber* | right P1 element |
| UM BUS 012 | *Polygnathus glaber* | right P1 element |
| UM BUS 013 | *Polygnathus glaber* | left P1 element |
| UM BUS 014 | *Polygnathus glaber* | left P1 element |
| UM BUS 015 | *Polygnathus glaber* | left P1 element |
| UM BUS 016 | *Polygnathus glaber* | right P1 element |
| UM BUS 017 | *Polygnathus glaber* | left P1 element |
| UM BUS 018 | *Polygnathus glaber* | left P1 element |
| UM BUS 019 | *Polygnathus glaber* | left P1 element |
| UM BUS 020 | *Polygnathus glaber* | left P1 element |
| UM BUS 021 | *Polygnathus glaber* | right P1 element |
| UM BUS 022 | *Polygnathus glaber* | left P1 element |
| UM BUS 023 | *Polygnathus glaber* | left P1 element |
| UM BUS 024 | *Polygnathus glaber* | left P1 element |
| UM BUS 025 | *Polygnathus glaber* | left P1 element |
| UM BUS 026 | *Polygnathus glaber* | left P1 element |
| UM BUS 027 | *Polygnathus glaber* | right P1 element |
| UM BUS 028 | *Polygnathus glaber* | right P1 element |
| UM BUS 029 | *Polygnathus glaber* | right P1 element |
| UM BUS 030 | *Polygnathus glaber* | right P1 element |
| UM CTB 001 | *Polygnathus communis* | right P1 element |
| UM CTB 002 | *Polygnathus communis* | right P1 element |
| UM CTB 003 | *Polygnathus communis* | right P1 element |
| UM CTB 004 | *Polygnathus communis* | right P1 element |
| UM CTB 005 | *Polygnathus communis* | left P1 element |
| UM CTB 006 | *Polygnathus communis* | left P1 element |
| UM CTB 007 | *Polygnathus communis* | left P1 element |
| UM CTB 008 | *Polygnathus communis* | left P1 element |
| UM CTB 009 | *Polygnathus communis* | right P1 element |
| UM CTB 010 | *Polygnathus communis* | left P1 element |
| UM CTB 011 | *Polygnathus communis* | right P1 element |
| UM CTB 012 | *Polygnathus communis* | right P1 element |
| UM CTB 013 | *Polygnathus communis* | right P1 element |
| UM CTB 014 | *Polygnathus communis* | right P1 element |
| UM CTB 015 | *Polygnathus communis* | right P1 element |
| UM CTB 016 | *Polygnathus communis* | left P1 element |
| UM CTB 017 | *Polygnathus communis* | right P1 element |
| UM CTB 018 | *Polygnathus communis* | right P1 element |
| UM CTB 019 | *Polygnathus communis* | right P1 element |
| UM CTB 020 | *Polygnathus communis* | right P1 element |
| UM CTB 021 | *Polygnathus communis* | left P1 element |
| UM CTB 022 | *Polygnathus communis* | left element |
| UM CTB 023 | *Polygnathus communis* | left P1 element |
| UM CTB 024 | *Polygnathus communis* | left P1 element |
| UM CTB 025 | *Polygnathus communis* | left P1 element |
| UM CTB 026 | *Polygnathus communis* | left P1 element |
| UM CTB 027 | *Polygnathus communis* | left P1 element |
| UM CTB 028 | *Polygnathus communis* | left P1 element |
| UM CTB 029 | *Polygnathus communis* | left P1 element |
| UM CTB 030 | *Polygnathus communis* | left P1 element |
| UM CTB 031 | *Polygnathus communis* | left P1 element |
| UM CTB 032 | *Polygnathus communis* | left P1 element |
| UM CTB 033 | *Polygnathus communis* | left P1 element |
| UM CTB 034 | *Polygnathus communis* | right P1 element |

**Table 1.** 3D models of *Polygnathus glaber* and of *Polygnathus communis*. Collection: University of Montpellier, France.

## INTRODUCTION

This contribution presents 3D models of 64 Famennien (Late Devonian) conodont elements belonging to two *Polygnathus* species (see Table 1 and Fig. 1). All elements correspond

to platform (P1) elements, located at the rear of the conodont feeding apparatus. *Polygnathus communis* was sampled by 34 elements from two levels of the Col des Tribes section (CTB; Montagne Noire, France) (Girard *et al.* 2014) and *Polygnathus glaber* by 30 elements from one level of the Buschteich section (BUS; Saxo-Thuringia, Germany) (Girard *et al.* 2017). They illustrate the morphological variation between and within the species, including bilateral asymmetry and growth.

The 3D surface of these elements were used in a geometric morphometric analysis complementing an extensive 2D quantitative study (Renaud *et al.* 2021). Based on a set of sliding semi-landmarks located at the edge of the platform and on the carina, this study aimed at disentangling the different components of the morphological variation in Late Devonian *Polygnathus* P1 elements. The 3D morphometric analysis improved the description of the geometric changes involved in growth and bilateral asymmetry and provided evidence that the balance between the two components of shape variance varies across species. Allometry was most pronounced in *Polygnathus communis*, leading from small, heart-shaped to large, lanceolate platforms. In contrast, bilateral asymmetry was most pronounced in *Po. glaber*, suggestive in this species of a strict directional asymmetry. On the mean shape of left elements, the posterior margin extended more ventrally, the posterior platform was more elevated and displayed a shallower groove, as confirmed by the example of actual elements (Fig. 1). The reverse is true for the right element, with, however, less offset between the ventral extension of the posterior and anterior margins. Knowing that the left blade is assumed to insert behind the right one, based on existing clusters (Donoghue and Purnell 1999; Martínez-Pérez *et al.* 2016), the geometric differences between right and left elements, evidenced on the 3D models, could be associated with the asymmetrical pairing of the elements during occlusion.

## METHODS

Digitization of the specimens was performed using an X-ray microtomograph (µCT) Phoenix nanotomeS on the AniRA-Immos platform of the SFR Biosciences (UMS 3444, ENS Lyon) at a cubic voxel resolution of 1 µm. The scanning parameters were as follow: 100 kV, 70 µA, 3000 projections at 360° with no filter. The 3D surfaces were extracted semi-automatically within AVIZO 9 (Thermofisher Scientific) using the segmentation threshold selection tool. The 3D surfaces are provided in .ply format, and can therefore be opened with a wide range of freeware.

## ACKNOWLEDGEMENTS

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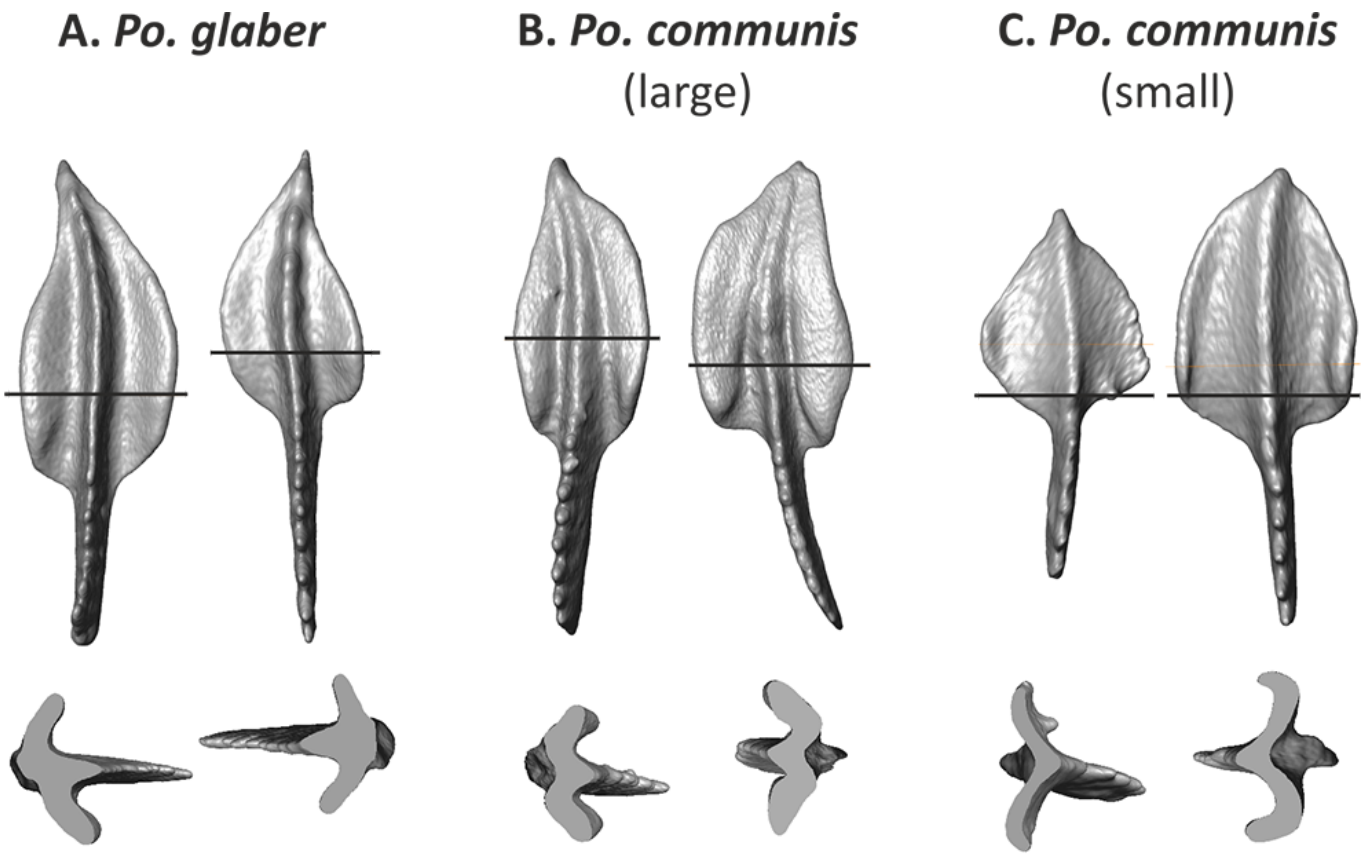


**Figure 1.** Illustrations based on isolated right and left elements of *Po. glaber* (A), large *Po. communis* (B) and small *Po. communis* (C). (A, B, C) left element to the left and right element to the right. Top panels, oral view; bottom panels, profile view. The position of the slice corresponding to the profile view is marked by a line on the oral view. Elements not to scale. Specimens figured: (A) *Po. glaber* right (UM BUS 027) and left (UM BUS 026); (B) large *Po. communis* left (UM CTB 010) and right (UM CTB 009); (C) small *Po. communis* left (UM CTB 006) and right (UM CTB 003).


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