

# 3D models related to the publication: Head anatomy and phylogenomics show the Carboniferous giant *Arthropleura* was a relative to both millipedes and centipedes

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## Abstract

The present 3D Dataset contains the 3D models analyzed in the publication: Head anatomy and phylogenomics show the Carboniferous giant *Arthropleura* was a relative to both millipedes and centipedes. Lhéritier Mickaël, Edgecombe Gregory D., Garwood Russell J., Buisson Adrien, Gerbe Alexis, Mongiardino Koch Nicolás, Vannier Jean, Escarguel Gilles, Adrien Jérôme, Fernandez Vincent, Bergeret-Medina Aude, Giupponi Alexandra and Perrier Vincent. Sciences Advances. <https://www.science.org/doi/10.1126/sciadv.adp6362>

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## INTRODUCTION

These models are the results of the reconstitution of two specimens of *Arthropleura* sp. (see figure 1 and table 1) from the Upper Carboniferous Montceau-les-Mines Lagerstätte (Briggs & Almond, 1994; Lhéritier et al. 2024). The specimens are preserved in sideritic nodules in three dimensions with internal parts. The interest of microCT-scanning was to discover the first complete head of this genus with the antennae, mandibles, maxillae and stalked eyes that helped to precise its phylogenetic affinities with other myriapods. This discovery allowed to run total-evidence analyses that demonstrate that *Arthropleura* could be a stem-group Diplopoda (millipedes) or a stem-group pectinopodan (Chilopoda i.e. centipedes + Diplopoda).

## METHODS

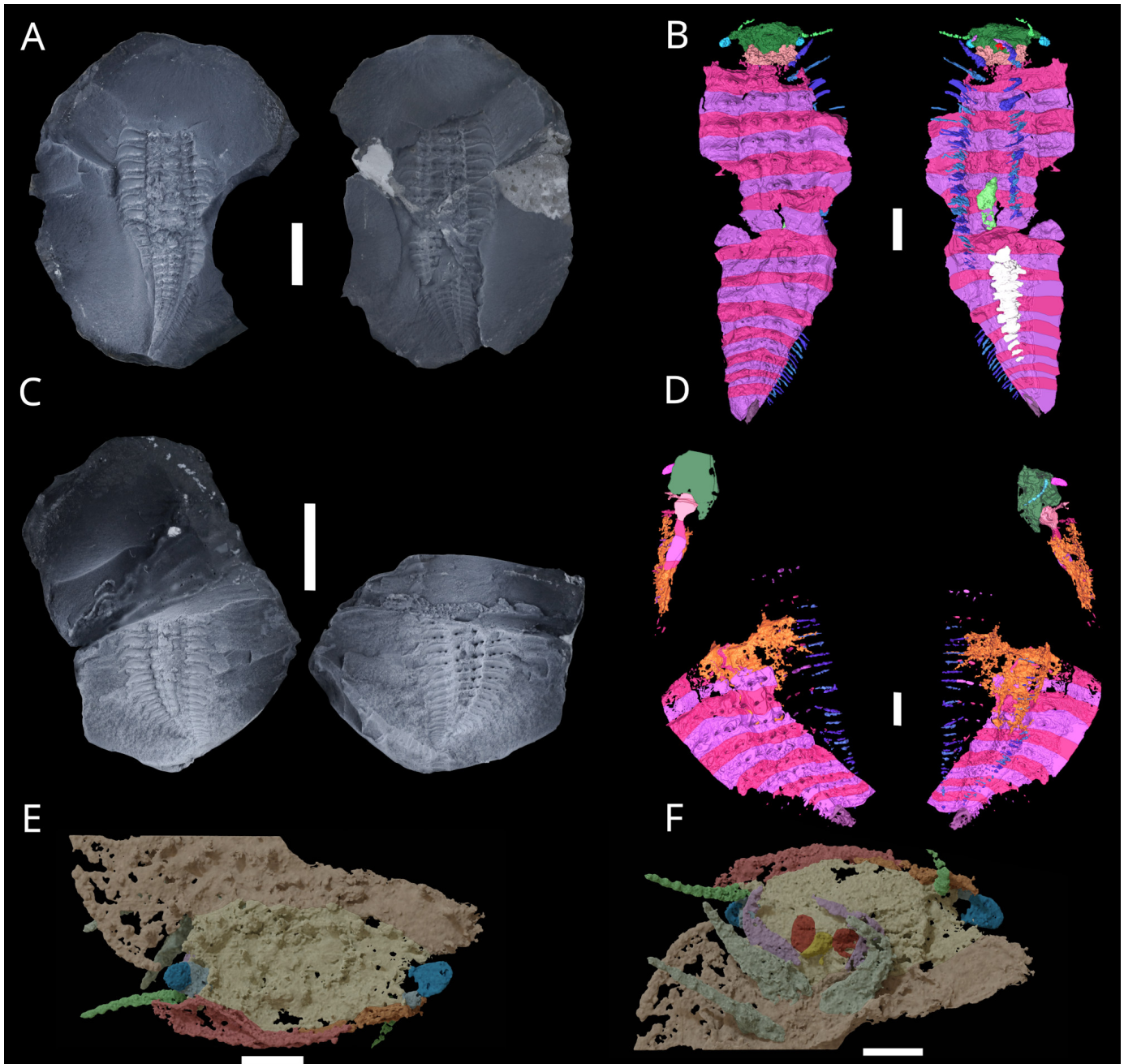
The 3D surfaces were extracted semi-automatically within AVIZO 8.1.1 using the segmentation threshold selection tool for the CT-scan data and with VGStudiomax 2023 using the “paint and segment” tool (i.e. deep learning approach) for the synchrotron data. The 3D surface models are provided in .ply format, and can therefore be opened with a wide range of freeware. The Ct-scan data are provided in .vol format and can also be opened in a wide range of freeware. The synchrotron data is provided in .raw format.

M3 id	Inv nr.	Description
M3#1481	MNHN.F.SOT002123	Surface reconstruction based on $\mu$ CT data
M3#1482	MNHN.F.SOT002123	Ct-scan (X-ray Phoenix V tome x)
M3#1484	MNHN.F.SOT002123	Surface reconstruction made from synchrotron data
M3#1485	MNHN.F.SOT002123	Synchrotron data (bin4)
M3#1480	MNHN.F.SOT002118	Surface reconstruction based on $\mu$ CT data
M3#1483	MNHN.F.SOT002118	Ct-scan (X-ray Phoenix V tome x)

**Table 1.** List of 3D data of *Arthropleura* sp. Collection : Muséum d'Histoire Naturelle d'Autun.

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**Figure 1.** *Arthropleura* sp. specimens and their associated reconstructions. A-B: specimen MNHN.F.SOT.002123. C-D: specimen MNHN.F.SOT.002118. E-F: details on the head of MNHN.F.SOT.002123 through the synchrotron. Colour code for B: beige= collum; blue= even legs; brown= telson; cyan=ocular fields; light green=antennae; dark blue=odd legs; dark green=head; green= digestive tract; light purple= odd terga; light red=even terga; purple=second maxillae; red=first maxillae; white=sternites. Colour code for D: cyan=left antenna; orange=pyrite; pink=ocular fields. Colour code for E-F: blue=ocular fields; dark red=first maxillae; green= antennae; light blue=stalks; light green=legs; light red=body; light yellow=head; orange=left ventral sclerite; purple=second maxillae; red=right ventral sclerite; yellow=first maxilla coxosternite. (B) and (C) are reconstructions made from Phoenix X-ray Phoenix V—tome—x CT-scan. (E) and (F) are reconstructions made from synchrotron X-ray micro-Computed tomography. Scale bars represent: 1 cm (A, C); 5 mm (B); 2 mm (D-F).

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