

TITLE Inferring feeding dynamics of Cambrian archaeocyath reefs

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Context

The Archaeocyatha are an extinct group of aspiculate sponges that appear very early in the Cambrian, forming enormous reef communities (1). Given their abundance and global distribution, archaeocyaths have become important index fossils, meaning that we have detailed knowledge of their taxonomy and systematics (2). Less well known are the details of their feeding ecology, and how changes in feeding ecology are linked to archaeocyath evolution and eventual extinction. As suspension feeders, the archaeocyaths were filtering plankton and organic matter from the water column (1). Recent research in the ANOM Lab at UNIL developed a method to use pore size in archaeocyath skeletons to estimate the size of plankton being consumed by the sponge, allowing us to evaluate feeding dynamics and prey partitioning in the earliest known animal reefs (3). This project will use the pore size method to examine evolutionary dynamics in archaeocyath reef communities using fossil material from Siberia, Morocco and other localities.

Objectives and Methods

The objectives of the project are to assess the role of feeding dynamics (e.g. intraspecific competition, interspecific competition, prey partitioning, etc.) in the radiation and eventual extinction of archaeocyaths. This project will examine thin sections of archaeocyath material borrowed from the extensive collections housed at the Muséum National d'Histoire Naturelle in Paris, France. Localities to be studied could include Siberia, Morocco, Australia, or other sites of interest. High resolution digital images of thin sections of archaeocyaths will be taken with scale, and multiple pore size measurements will be taken from these photographs for numerous pores per specimen. Average pore size will be compared statistically using t-tests, ANOVA, and correlation statistics to identify significant trends in pore size within and between geographic areas, and through the different stages of the Cambrian geological time period.

Literature

1. Debrenne, F., Zhuravlev, A.Y. & Kruse, P.D. 2012. Part E, revised, volume 4, Chapter 18: general features of the Archaeocyatha. *Treatise Online*, 38, 1-102.
2. Debrenne, F., Zhuravlev, A.Y. & Kruse, P.D. 2012. Part E, revised, volume 4, Chapter 19: systematic descriptions: Archaeocyatha. *Treatise Online*, 50, 1-186.
3. Antcliffe, J.B., Jessop, W., & Daley, A.C. 2019. Prey fractionation in the Archaeocyatha and its implications for the ecology of the first animal reef systems. *Paleobiology*, 4, 652-675.



WEB sites

ANOM Lab Website (Allison Daley's lab):
<https://wp.unil.ch/paleo>

Online knowledge base about Archaeocyatha:
<http://archaeocyatha.infosyslab.fr/>

Choice of orientation : (supprimer les orientations qui ne conviendraient pas)

- 1) Sedimentary, Environmental and Reservoir Geology



ECOLE LEMANIQUE DES SCIENCES DE LA TERRE
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Master ès Sciences in
Earth sciences