

# MOUNTJOY CARBONATE RESEARCH CONFERENCE III

AUGUST 14-18, 2022 | Banff Centre, AB, Canada

## Keratolite-stromatolite, the earliest known invertebrate-microbial reef community

Jeong-Hyun Lee  
Chungnam National University

Robert Riding  
University of Tennessee

Late Cambrian–early Ordovician keratolite sponges (keratolite) form domes and columns in close association with microbial carbonates. These consortia have historically been confused with stromatolites (Luo and Reitner, 2016), including late Cambrian *Cryptozoön* in the USA, Cambrian–Ordovician columns and domes in Canada, and Early Ordovician columns in Korea. These examples show that keratolite and microbial carbonate in roughly equal proportions form domes and columns that can macroscopically be indistinguishable from stromatolites. This close association suggests a mutualistic relationship between sponges and microbes that shared similar environmental tolerances and requirements (Lee and Riding, 2021a, b). Tonian (1000–850 Ma) keratolite-microbial consortia (Turner, 2021) represent the earliest currently identified invertebrate-microbial reef community. Widespread well-preserved keratolite in the Late Cambrian–Early Ordovician of Laurentia and North China, intimately associated with microbial and lithistid sponge reefs, contributed to the development of complex fabrics hitherto widely regarded as purely microbial. This interval may have reprised relatively high-temperature/low oxygen marine conditions not experienced since the Early Proterozoic. Keratolite-stromatolite carbonate was a forerunner of sponge-microbial reefs that remained important for much of the Phanerozoic.

Lee, J.-H., Riding, R. 2021a. The ‘classic stromatolite’ *Cryptozoön* is a keratose sponge-microbial consortium. *Geobiology* 19, 189–198.

Lee, J.-H., Riding, R., 2021b. Keratolite–stromatolite consortia mimic domical and branched columnar stromatolites. *Palaeogeography, Palaeoclimatology, Palaeoecology* 571, 110288.

Luo, C., Reitner, J., 2016. ‘Stromatolites’ built by sponges and microbes - a new type of Phanerozoic bioconstruction. *Lethaia* 49, 555–570.

Turner, E.C., 2021. Possible poriferan body fossils in early Neoproterozoic microbial reefs. *Nature* 596, 87–91.

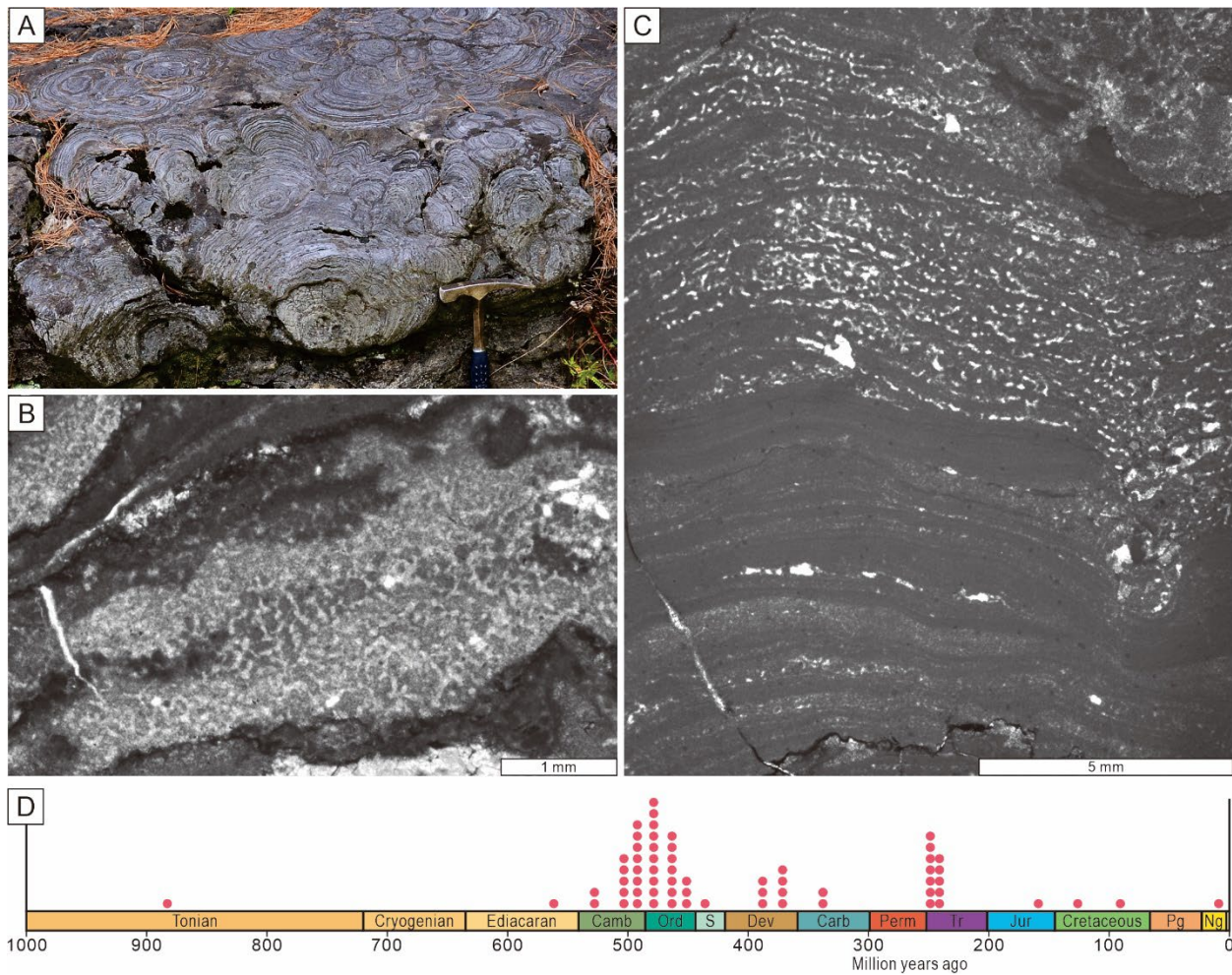


Fig. 1. (A) *Cryptozoön*, upper Cambrian Hoyt Limestone, New York, USA. (B) Keratolite in *Cryptozoön* (Lee and Riding, 2021a, fig. 5a). (C) Keratolite (top) and stromatolite (bottom), uppermost Cambrian Berry Head Formation, Newfoundland, Canada (Lee and Riding, 2021b, fig. 5a). (D) Reported occurrences of keratolite. Modified after Lee and Riding (2021b, fig. 9).