



Comparative analysis of drilling and crushing predation on present-day brachiopod-rich assemblages from two subtropical bays on the Southern Brazilian Shelf

M. G. SIMÕES¹, S. C. RODRIGUES² and E. M. HARPER³

Documentation of drill holes in modern brachiopods increased in the last few years, but crushing predation is less frequently investigated. Unlike drillings, crushing may not leave a clear signature on shells and may be confused with fragmentation due to other agents. Here, we identify patterns of crushing damage on brachiopod shells (*Bouchardia rosea* Mawe) and document a comparative study between drilling and crushing predation. The specimens come from Ubatuba (UBA) and Picinguaba (PIC) Bays, South West Atlantic Ocean, Brazil. Crushing damages (unrepaired) are represented by one small semi-circular crack, and another large semi-circular crack, both near the anterior end of a single shell. This pattern is the same observed in brachiopod shells attacked by xanthid crabs in aquaria. A total of 3024 shells (mainly disarticulated) sampled at 9 stations (depth range: 0-45m) were analyzed. Drill holes occur on eight shells (both valves are equally drilled) from four stations (UBA1, PIC2-4-12). Drilling frequency (DF) ranged from 1.1 to 1.4. A total of 314 shells displayed crushing, which was recorded on valves from the same stations of the drilled ones, and also from UBA4-5-9-14 and PIC6. Crushing frequency (CF) ranged from 9.8 to 54.9. Crushing damages appear more on ventral valves, especially considering the total number of each valve type per station. This is probably because ventral shells are thinner than the dorsal ones. Hence, DF is very low for the studied brachiopods (up to 1.4%), whereas CF is surprisingly high (up to 54.9%). This reaches the assemblage-level drilling predation estimates for the late Mesozoic, Cenozoic, and recent bivalve assemblages. The differences between DFs and CFs in brachiopod shells may reflect the relative evolutionary or ecological influences of crushing on prey populations. The recognition of this type of shell fragmentation may facilitate the comparison of crushing among prey species, across habitats, and over time.

1 Sao Paulo State University, Botucatu Campus, SP, Brazil. btsimoes@ibb.unesp.br

2 Federal University of Uberlandia, Ituiutaba Campus, MG, Brazil. scrodrigues@ufu.br

3 Department of Earth Sciences, Downing Street Cambridge, CB2 3EQ, UK. emh21@cam.ac.uk