

Biofilm Eradication and Bactericidal Activity of the Red Sea Sponge *Acarnus Wolffgangi* against MRSA and Other Skin Pathogen

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ABSTRACT

The escalating threat of antibiotic-resistant Gram-positive bacteria, such as *Staphylococcus aureus* (including MRSA) and *Streptococcus pyogenes*, necessitates the discovery of novel antimicrobial agents. Marine sponges, particularly from the biodiverse Red Sea, are promising sources of bioactive secondary metabolites. This study investigates the antibacterial and antibiofilm properties of organic extracts from two under-explored Red Sea demosponges, *Acarnus wolffgangi* and *Dragmacidon durissimum*, against skin infection-causing pathogens. *A. wolffgangi* exhibited promising activity against *S. aureus*, MRSA, and *S. epidermidis*, with MIC values as low as 125 µg/mL and notable biofilm inhibition at sub-MIC concentrations. In contrast, *D. durissimum* showed no significant activity. SEM imaging revealed bacterial membrane alterations consistent with a bactericidal effect. HPLC confirmed the presence of gallic acid, though its role in the observed bioactivity remains unclear. These findings position *A. wolffgangi* as a candidate for further bioassay-guided investigation into novel antimicrobial agents from Red Sea sponges.

Keywords: *Marine sponges; Red Sea; Acarnus wolffgangi; Dragmacidon durissimum; Methicillin-resistant Staphylococcus aureus (MRSA); skin infections.*

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