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I-CReST 2025:164-122 – Polychaete-Mediated Synthesis and Characterization of Gold Nanoparticles (AuNPs) Using *Marphysa moribidii* Extract from Different Age Classes

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ABSTRACT

The utilization of *Marphysa moribidii,* a local marine baitworm (Polychaeta), as a possible biogenic reducing agent in the synthesis of AuNPs was successfully performed. In this particular study, different age classes of *M. moribidii* based on their body widths that classified as Class I (3 – 5 mm), Class II (6 – 8 mm), and Class III (9 – 11 mm) were employed in the biosynthesis of AuNPs. The use of different age classes of *M. moribidii* for the biosynthesis of AuNPs is a fascinating approach that takes advantage of the varying metabolic activities of the different age groups. The colour change of the solution from yellow to red ruby is the initial observation for the successful biosynthesis of AuNPs where AuNPs_II shows the fastest changes of colour after 2 h incubation and maintains stability for over 1 month of storage. Further confirmation was depicted from the existence of surface Plasmon resonance (SPR) absorption peaks in a range of 545 – 552 nm from UV-Vis spectroscopy. TEM analysis shows the formation of spherical-like shapes of biosynthesis AuNPs with average particle size around 42 – 57 nm where AuNPs_II had the smaller particle size. Lastly, the antibacterial assessment of biosynthesized produced from different age classes of *M. moribidii* had good antibacterial activity against Gram-negative bacteria, but poor activity against Gram-positive bacteria. AuNPs produced from Class II *M. moribidii* (AuNPs_II) provide the highest ZOI value of 13 mm. The utilization of different age classes of *M. moribidii* for the biosynthesis of metal nanoparticles is an interesting pathway for designing a novel method that can be considered nature-friendly, safe, and hopeful for the future.

Keywords: Gold nanoparticles; *Marphysa moribidii*; Polychaetes; Antimicrobial activity