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Tapping into Deep-Water Reservoirs to Overcome Antibiotic Resistance through Bacteria-Producing Unique Secondary Metabolites

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The marine microorganisms including bacteria, fungi, and microalgae have received increasing attention over past ten years due to their tremendous potential to produce new bioactive secondary metabolites [1,2].

Indeed, marine microorganisms comprise a comparatively untapped reservoir of commercially valuable compounds with antibacterial, antiviral and anticancer properties [3], which attracts both academic and industrial organizations [4]. Marine microorganisms are particularly attractive because they fit the traditional pharmaceutical 'model' of a natural product drug source.

A number of antibiotics from marine microorganisms have been reported, including loloatins from *Bacillus* [5], Agrochelin and Sesbanimides from *Agrobacterium* [6], Pelagiomicins from *Pelagiobacter variabilis* [7]. Methicillin-resistant *Staphylococcus aureus* (MRSA) remains the most problematic gram-positive bacterium in public health not only because it is highly prevalent but also because it has become resistant to almost all available antibiotics except vancomycin and teicoplanin [8]. Recently, its susceptibility to vancomycin has decreased, and vancomycin-resistant *S. aureus* has increasingly been found in several countries. The evidence of MRSA resistance to vancomycin and teicoplanin, which are antibiotics of last resort, has resulted in the need for alternative antibiotics and chemotherapeutics. I am confident that tapping into deep-water reservoirs would be an asset to overcome antibiotic resistance through the identification and characterization of new bacteria-producing unique secondary metabolites.

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