

TITLE: ISOLATION, CHARACTERIZATION AND PHYLOGENY OF SPONGE-ASSOCIATED BACTERIA WITH ANTIMICROBIAL ACTIVITIES FROM CABO FRIO COAST – RJ, BRAZIL

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ABSTRACT:

Sponges are sessile animals and important filter feeders belonging to the phylum Porifera. These organisms have developed efficient defense mechanisms, harboring bacterial communities capable of producing bioactive compounds. These compounds may aid in antibiotic production research, since they were shown to be active against bacteria of medical importance. The aim of this study was to isolate and identify sponge-associated bacteria and to characterize them according to the production of antimicrobial substances. Thus, in 2015, samples of the sponges *Chondrilla nucula* MNRJ 19243, *Darwinella* sp. MNRJ 19251, *Darwinella* sp. MNRJ 19284, *Oscarella* sp. MNRJ19280 and four morphotypes of *Plakina* sp., nominated *Plakina* MNRJ 19264 (morphotype pink), *Plakina* MNRJ19261 (morphotype blue), *Plakina* MNRJ 19268 (morphotype beige) and *Plakina* MNRJ19272 (morphotype orange) were collected in the coast of Cabo Frio city, RJ. Two hundred forty-seven colony forming units (CFU) were selected, cryopreserved and used for further assays. To date, 45 bacteria were identified: 41 by sequencing analysis of the gene *rrs* (16S rRNA) and four by matrix-assisted laser desorption/ionization time-of-flight (MALDI-TOF) mass spectrometry. The 16S rRNA sequences obtained were deposited in the GenBank database. Twenty-three CFU were affiliated to Proteobacteria, 16 being *Vibrio* sp., four *Photobacterium damsela* and three *Oceanimonas* sp.; and 22 strains belonged to phylum Firmicutes, genus *Bacillus*. All 247 bacteria were assayed for antimicrobial activity by agar diffusion method. Twenty marine strains demonstrated antimicrobial activity against *Staphylococcus aureus* ATCC 29213, five were active against *S. epidermidis* ATCC 35984 (biofilm producer), and five were active against multiresistant *Escherichia coli* (resistant to ampicillin, chloramphenicol, trimethoprim/sulfamethoxazole and tetracycline). Three isolates were active against *S. epidermidis* ATCC 12228, two against *Streptococcus pyogenes* and one was active against *Enterococcus faecium* ATCC 19434, *S. epidermidis* multiresistant (resistant to penicillin, ciprofloxacin, ampicillin and tetracycline), and *Enterococcus* sp. resistant to vancomycin and teicoplanin. These findings suggest the marine bacteria may represent a new source of antimicrobial substances, as an important strategy for developing alternative therapies to treat infections caused by multidrug-resistant bacteria.

Keywords: antimicrobial activity, biotechnological potential, resistance, sponge-associated bacteria

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