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Isolation and Characterization of Bacterial Strains Identified from *Oreochromis niloticus*, *Channa striata*, *Puntius sophore*, *Channa punctatus* and *Mystus bleekeri*

Deepa N.^{1*}, Anuanandhi K.¹, Sankar D.², Ashok K.³, Babu M.³ and Usha R.¹

¹Department of Zoology, Presidency College, Chennai, Tamil Nadu, India

²Dr. MGR Educational and Research Institute, Maduravoyal, Chennai, Tamil Nadu, India

³Department of Microbiology and Biotechnology, Faculty of Arts and Science, Bharath Institute of Higher Education and Research, Chennai-600073, Tamil Nadu, India

*Corresponding Author

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Abstract: Gram stain, colony shape, motility, capsule stain, endospore stain, alkaline protease producing strains have been found in *Bacillus* species producing bacterial strain. Gram stain, CFU, motility, capsule staining, endospore staining were identified. Our results showed biochemical characterizations examined for potent strains of *Bacillus fluxus* and *Bacillus cereus*.

Keywords: *Bacillus fluxus*, *Bacillus cereus*, CFU, Gram staining, Bacterial strains

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Introduction

In the establishment of multiple major protein groups- acidic, neutral and alkaline proteins (Olaniyi *et al.*, 2019), microbial sources play an important role. Acid proteins are associated mainly with fungal sources and function well at a pH range of 2 and 5. Proteases with an optimum pH of 7.0 or less are referred to as neutral proteins. These neutral proteins are highly linked to origins from plants. Proteases with an optimum pH range of 8.0 and above are known as microorganism-formed alkaline proteins (Kato *et al.*, 2016). Since proteins are abundant, microbes

are the perfect source to obtain them, as their continued expansion, limited space necessary for their cultivation. Genetics can alter the application of microorganisms (Spellberg *et al.*, 2016).

Immersion is perhaps the most common way to process alkaline proteases due to continuous enzyme output with mild, decent processing conditions and improved downstream processing (Poletto *et al.*, 2018), this is more advantageous than other strategies. The microbial industry is still on the lookout for innovative and less costly ways to improve protein production while also

lowering the market value of these species. The use of cost-effective growth in the development of alkaline proteins from alkaline microorganisms is highly relevant because the production of enzymes from these organisms account for about 25% of the globally use of enzymes (Choorit and Prasertsan, 1992; Todorov *et al.*, 2011; Rodrigues *et al.*, 2012; Shivanne *et al.*, 2016; Rialita *et al.*, 2019; Ilesanmi *et al.*, 2020).

Keeping in view the above fact, the possible isolates for the morphological characters of the isolate have been further described for the identification of the isolate. The structure, margin, elevation, surface, density texture, and colour of all the isolates shaped on nutrient agar plates were inspected visually using a hand magnifying lens to determine their configuration, margin, elevation, surface, density texture, and colour. Using Gram's staining method, bacterial staining was carried out. Scale of both the step and ocular micrometry determined isolated bacteria.

In the present study we have isolated and characterized bacterial strains obtained from the fish-- *Oreochromis niloticus*, *Channa striata*, *Puntius sophore*, *Channa punctatus* and *Mystus bleekeri*.

Materials and Methods

The stranded methods of Bergey's manual of determinative bacteriology were used to stain and classify potent bacterial isolates, with minimal modifications (Yang *et al.*, 2014). The bacterial strains identified from the selective fishes (*Oreochromis niloticus*, *Channa striata*, *Puntius sophore*, *Channa punctatus* and *Mystus bleekeri*) are *Proteus mirabilis* and *Providencia rettgeri* which can be used for various industrial applications for enzyme production.

Results and Discussion

Manikandan *et al.* (2017) reported biochemical characterization of bacterial strains in *C. punctatus*. Muthazhagan and Thangaraj (2014) identified *Bacillus* sp. as gram-positive through biochemical confirmation. The protease producing

marine bacterium was identified based on morphological and biochemical characterization as *Bacillus subtilis* (Trotel-Aziz *et al.*, 2019). Shaini and Jayasree (2016) analysed the lipase positive colonies through biochemical study. Taylor *et al.* (2012) identified five protease producing strains by Grams staining, size, margin, elevation, formation, pigmentation and texture. Lele and Deshmukh (2016) characterized the *Bacillus* sp. Pathak *et al.* (2016) reported *Cyclobacterium*'s morphological characters such as shape, size, margin, surface, elevation, consistency, colour and opacity (Fig. 1).

Fig. 1: (A) Culture of *Proteus mirabilis* (CP5) and *Providencia rettgeri* (MB3), (B) Biochemical tests performed on *Proteus mirabilis* (CP5), and (C) Photomicrograph showing Gram staining of *Proteus mirabilis*.

Lipase producing bacterial strain of *Bacillus* sp. were studied for biochemical characterization of Gram's staining, colony shape, motility, capsule staining, endospore staining by Patel (2017). Purohit *et al.* (2017) reported alkaline protease producing strains and identified morphological and cultural characteristics like Gram's staining, colony shape, motility, capsule staining, endospore staining. Ramlath *et al.* (2018) screened biochemical characterizations for potent strains *B. fluxus* and *B. cereus*.

Conclusion

This present investigation hampers the tempo of various applications of biologically isolated and partially purified enzymes such as lipase and protease from *Proteus mirabilis* and *Proteus rettgeri* which would have tremendous scope in the near future. This, present study, envisaged that the necessity of complete purification and possible utilization of enzymes with their spectrum of biological, industrial applicability will certainly revolutionize the industry by manipulating the clean and green environment.

References

- Choorit W and Prasertsan P. (1992) Characterization of proteases produced by newly isolated and identified proteolytic microorganisms from fermented fish (Budu). *World J Microbiol Biotech.* 8(3): 284-286.
- Ilesanmi OI, Adekunle AE, Omolaiye JA, Olorode EM and Ogunkanmi AL. (2020) Isolation, optimization and molecular characterization of lipase producing bacteria from contaminated soil. *Sci African* 8: e00279.
- Kato CD, Mugaanyi MB, Majalija S, Tamale A, Musisi NL and Sengooba A. (2016) Isolation and identification of potential probiotics bacteria from the gut of *Oreochromis niloticus* and *Clarias gariepinus* in Uganda. *Microbiol Res J Int.* 17(5): 1-8.
- Lele OH and Deshmukh PV. (2016) Isolation and characterization of thermophilic *Bacillus* sp. with extracellular enzymatic activities from hot spring of Ganeshpuri, Maharashtra, India. *Int J Appl Res.* 2: 427-430.
- Manikandan B, Ravindran J, Vidya PJ, Shrinivasu S, Manimurali R and Paramasivam K. (2017) Resilience potential of an Indian Ocean reef: an assessment through coral recruitment pattern and survivability of juvenile corals to recurrent stress events. *Environ Sci Poll Res.* 24(15): 13614-13625.
- Muthazhagan K and Thangaraj M. (2014) Production and FTIR analysis of bio-polymer by *Bacillus* sp. isolated from vellar estuary sediment. *Int J Sci Invention Day* 3: 625-638.
- Olaniyi FT, Akaniro IR, Oguh CE, Fashina CD, Ahmed I and Ezech CC. (2019) Characterization and antimicrobial resistance profile of pathogenic bacteria isolated from freshly sold *Amaranthus viridis* in Ile-Ife, Southwest Nigeria. *J Adv Microbiol.* 18(1): 1-8.
- Patel T. (2017) Multiparadigmatic studies of culture: needs, challenges, and recommendations for management scholars. *Eur Manag Rev.* 14(1): 83-100.
- Pathak AP, Mahindrakar PR and Rathod MG. (2016) Defatted seed meal of soybean- an inexpensive substrate for alkaline protease production from selected isolate. *Int J Res Agricult Food Sci.* 2(4): 37-49.
- Poletto TV, Vieira CRW, Silva CP and Fracalossi DM. (2018) Isolation and identification of a potential amylolytic probiotic bacterium from the gut of Jundiá Catfish, *Rhamdia quelen*. *Brazilian Arch Biol Technol.* 61. <https://doi.org/10.1590/1678-4324-2018161205>.
- Purohit MR, Chandran S, Shah H, Diwan V, Tamhankar AJ and Stålsby Lundborg C. (2017) Antibiotic resistance in an Indian rural community: a 'One-Health' observational study on commensal coliform from humans, animals, and water. *Int J Environ Res Public Hlth.* 14(4): 386.
- Ramlath L, Keerthana PP, Safvana Fathima P and Mashhoor K. (2018) Bacteria from coral ecosystem of Kiltan Island, Lakshadweep: Resource for hydrolytic enzymes. *Int J cell Sci Biotech.* 7: 1-9.
- Rialita T, Sukarminah E, Yuliana T, Sumanti DM, Kurnianingrum I, Octaviani FN, Santoso MB and Susanto HF. (2019) Isolation and identification of lactic acid bacteria producing biopreservative bacteriosin from smoked Fish. In: *IOP Conference Series: Earth and Environmental Science*, 347(1), p. 012031, IOP Publishing.
- Rodrigues APO, Gominho-Rosa MDC, Cargnin FE, de Francisco A and Fracalossi DM. (2012) Different utilization of plant sources by the omnivores jundiá catfish (*Rhamdia quelen*) and Nile tilapia (*Oreochromis niloticus*). *Aquacult Nutr.* 18(1): 65-72.
- Shaini VP and Jayasree S. (2016) Isolation and characterization of lipase producing bacteria from windrow compost. *Int J Curr Microbiol App Sci.* 5(5): 926-933.
- Shivanne Gowda SG, Narayan B and Gopal S. (2016) Bacteriological properties and health-related biochemical components of fermented fish sauce: An overview. *Food Rev Int.* 32(2): 203-229.
- Spellberg B, Hansen GR, Kar A, Cordova CD, Price L and Johnson JR. (2016) Antibiotic resistance in humans and animals. *Nat Acad Med.* <https://nam.edu/antibiotic-resistance-in-humans-and-animals/>
- Taylor CR, Hardiman EM, Ahmad M, Sainsbury PD,

- Norris PR and Bugg TDH. (2012) Isolation of bacterial strains able to metabolize lignin from screening of environmental samples. J Appl Microbiol. 113(3): 521-530.
- Todorov SD, Rachman C, Fourrier A, Dicks LM, Van Reenen CA, Prévost H and Dousset X. (2011) Characterization of a bacteriocin produced by *Lactobacillus sakei* R1333 isolated from smoked salmon. Anaerobe 17(1): 23-31.
- Trotel-Aziz P, Abou-Mansour E, Courteaux B, Rabenoelina F, Clément C, Fontaine F and Aziz A. (2019) *Bacillus subtilis* PTA-271 counteracts Botryosphaeria dieback in grapevine, triggering immune responses and detoxification of fungal phytotoxins. Front Plant Sci. 10: 25.
- Yang W, Meng F, Peng J, Han P, Fang F, Ma L and Cao B. (2014) Isolation and identification of a cellulolytic bacterium from the Tibetan pig's intestine and investigation of its cellulase production. Electron J Biotech. 17(6): 262-267.