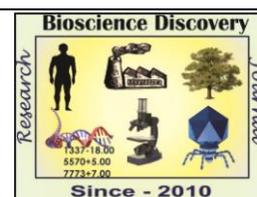


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Short Communication



Possibility of Baltic bacterium in waters of Jiribam, Manipur, India: serendipity

Khomdram Bijoya Devi^{1*} and Khomdram Niren Singh²

¹Molecular Biology Laboratory, Department of Biotechnology, Assam University, Silchar-788011

²Metagenomics Laboratory, Department of Botany, Gauhati University, Guwahati-781014

*khhbijoyadevi1085@rediffmail.com

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Abstract

This is the first record on the possibility of occurrence of, a bacterium generally found in the Baltic Sea, in the waters of Jiribam, Manipur, India. The specimen was identified accidentally while carrying out mitochondrial DNA sequencing of some fish species being caught from Sorok atingbi area of Jiribam sub division, Manipur state, India. Three sequences matched well (100% homology) with those of *Shewanella baltica* in NCBI.

INTRODUCTION

According to the North-east India microbial database, no records were found for genus *Shewanella* until now. A total of 300 microbes were recorded including bacteria, fungi and actinomycetes (<http://www.mblabnehu.info/nemid/>).

The genus *Shewanella* is comprised of more than 20 species inhabiting a wide range of environments including spoiled food, oil field wastes, redox interfaces in marine and freshwater, cold waters and sediments of the deep sea, and mesophilic ones all around the planet. (Kenneth *et al.*, 2006).

Shewanella baltica (*baltica* of the Baltic Sea) is both an aerobic and anaerobic bacterium. *Shewanella* is the sole genus in the Shewanellaceae family of marine bacteria. *Shewanella baltica* is fast growing and easy to be cultivated and shows a fast onset of growth even after prolonged periods of starvation. It also shows good growth at low organic carbon concentration (Vogel *et al.*, 2005). The marine bacteria rapidly adapt themselves to different environmental conditions because of their ability to form adaptive enzymes produced by the

influence of new substrates of the surrounding environment (Sridevi and Kondalarao, 2011).

Mesophilic *Shewanella* (which are often *Shewanella algae*) commonly occurs in the waters around Denmark during periods of high water temperatures and has been associated with infections in humans. *Shewanella algae* also predominate on fish during the warm summer months (Vogel *et al.*, 2005). *Shewanella algae* can grow up to a temperature of 42°C. *Shewanella* bacilli that's the main phenotypic feature is the production of hydrogen sulfide gas (Vogel *et al.*, 2005). *Shewanella baltica* can grow at 4°C, but not at 37°C. Due to its temperate nature, *Shewanella baltica* has been found to play a major role in the spoilage of aerobically stored fish in ice (Vogel *et al.*, 2005). *Shewanella baltica* is a marine bacteria and found mainly in the waters of the Baltic Sea, near Denmark. During the summer months, the mesophilic human pathogenic *Shewanella algae* dominates as the H₂S-producing bacterial population. In the winter, however, after ice storage, a shift in the *Shewanella* species was found, and most of the H₂S-producing strains were identified as *Shewanella baltica* (Vogel *et al.*, 2005).

FINDINGS

While we were performing DNA barcoding analyses of ornamental fishes from Manipur, some strange and unbelievable result came up. When barcode sequences were being blasted with sequences in NCBI by BLASTn search, we found three of our fish sequences a 100% match with *Shewanella baltica*. Instead of being matched with any of the microbial sequences reported from North east India or other parts of India, the sequence shows 100% similarity with *Shewanella baltica*.

The nucleotide sequences were deposited in GenBank under accession numbers [JQ913015.1](#), [JQ913016.1](#), and [JQ913017.1](#).

POSSIBLE PREDICTION

The reason how the strain come into the fish tissue sample may be the following

1. The fish sample was collected on the first week of March when the temperature is likely to be more than 30°C.
2. The tissue sample was taken and kept into a refrigerator at 4°C for about 2 weeks.
3. As studies suggest that mesophilic *Shewanella* strains which are often *Shewanella algae* (Not actually algae but a bacterium) commonly occurs in the waters around Denmark during periods of high water temperatures and has been associated with infections in humans . The present study demonstrates that *Shewanella algae* also predominate on fish during the warm summer months.
4. Therefore , if *Shewanella algae* is found in the waters of Jiribam (water temperature>30°C), there is possibility of predicting Strains of *Shewanella baltica* in the ice stored fish since after ice storage, a shift in *Shewanella* species was found, and most of them were identified as *Shewanella baltica*.

FUTURE PROSPECTS

If our prediction is really true and there is *Shewanella sp.* in our North east India, we could have many advantages and could design strategies to avoid unwanted situations like diseases. PUFAs (polyunsaturated fatty acids) is essential for the development and growth in infants and for improvement of brain function in adults, visual acuity, prevention and treatment of cancer and other chronic disease, in particular cardiovascular disease. Today fish oil is the main source of PUFAs; the source is not satisfactory because it can be contaminated with heavy metals, retain a flavour

and odour fishy, and worldwide declining fish stocks. Therefore, there is a need for alternative sources of PUFAs, such as, living organisms, including bacteria, microalgae and fungi, these microorganisms are being explored to get these essential fatty acids. Bacteria from the genera *Shewanella*, *Collwellia*, *Moritella* are known to produce PUFAs (Dominguez et al., 2012). Therefore, if it is confirmed that *Shewanella sp.* is found then we could use it as a good agent to produce PUFAs by isolating and culturing properly. Many bacteria in the facultatively aerobic genus *Shewanella* have the capacity to respire some metal oxides, such as iron oxide, by way of a variety of oxide-binding proteins lodged in their outer membrane. They can be used to identify the sites of nascent corrosion (Waters et al., 2009).

The application of probiotics on aquatic animals is increasing for a better fish welfare status as well as an environment-friendly activity which are actual demands of modern aquaculture industry. *Shewanella putrefaciens* Pdp11 due to its beneficial effects could be used in the aquaculture activity as a probiotic (Tapia-Paniagua et al., 2012).

In humans, *Shewanella algae* is responsible for wound infection. *Shewanella putrefaciens* causes a rare case of pneumonia. Widespread in the environment, both *Shewanella putrefaciens* and *Shewanella algae* species are rare human bacteria although they are reported with increasing frequency as a cause of opportunistic infection in humans, such as skin and soft tissue infections and bacteremia (Vignear et al, 2013) We could, in case, when found infected with the said bacteria, use the best antibiotic to properly get rid of it.

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