



FLUORODATABASE: AN OPEN ACCESS DATABASE RELATED TO UNVEILING OF FLUORIDE

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ABSTRACT

Fluorosis is an unbearable and debilitating disease caused by fluoride intake. Fluoride enters the body through water, food, toothpaste, mouth rinses; fluoride fumes, and drugs and dust from industries using fluoride compounds. Various skilled defluoridation methods has decreased fluoride level while biological methods explore the potent microorganisms which could be a auspicious and eco-friendly way to remediate fluoride pollutants. The FDB-FluoroDataBase is created to provide meaningful information so that researchers can use the information and may come with a great output. FDB is the first database devoted to understand fluoride information. It provides all-inclusive knowledgebase to search query related to fluoride. The information in database results under different classes, that is, about fluoride, areas affected, detection and treatment of fluoride, fluoride toxicity, biodegradation, and microorganisms involved in degradation where user can search out research papers on above entries. Under the news section of the database, a user can access the URL of news published in paper or online. Some entries are also linked to other databases such as National Center for Biotechnology Information (NCBI), Kyoto Encyclopedia of Genes and Genomes (KEGG), Google, providing extensive information. The database is one of its own kinds. It provides novel information. It would be an easy online search regarding fluoride affected areas. This database thus provides easy and complete access to information and will be helpful for research communities.

KEYWORDS: Fluorodatabase; Fluoride; Fluorosis; Biodegradation

INTRODUCTION

Biodegradation of fluoride compounds by microorganisms presents one of the best mechanism by which fluoride contaminants are removed from the environment. The problem of fluorosis is all-embracing and almost 25 nations of the world are under its dreadful fate. The occurrence of high fluoride concentrations in groundwater and risk of fluorosis is faced by many countries, notably India, Sri Lanka and China, the Rift Valley countries in East Africa, Turkey and parts of South Africa.

India has witnessed problems of fluorosis in the past as well as at present with 66 million cases reported to be affected by it alone (Jha et al. 2008). High fluoride concentrations in groundwater, up to more than 30 mg^l⁻¹ occur widely, notably in the United States of America, Africa and Asia (Emmanuel et al. 2015). The World Health Organization guideline value for fluoride in drinking water is 1.5mg^l⁻¹. Fluoride is present in the form of naturally occurring minerals as Fluorite, Cryolite, Fluorapatite, Topaz, and Biotite (Msonda et al. 2007). With heavy rainfall, leaching of fluoride occurs from minerals in rocks and soils. Groundwater is considered as the major resource of drinking water in nearly all places on earth. The presence of fluoride in groundwater is

mainly due to specific fluoride rich minerals such as mica and amphiboles which are common in crystalline rocks like granites. The F⁻ concentration is directly proportional to Na⁺ content and inversely with Ca⁺ content due to the dominance of the ion-exchange process. During this process, calcium ions present in water may exchange with sodium ions present in minerals (sodium montmorillonite), thus increasing the concentration of Na⁺ in groundwater (Hounslow 1995). Traditionally, the fluoride was removed from contaminated water is by liming and accompanying precipitation of fluoride (Harrison 2005). One of the most popular techniques for defluoridation in India is Nalgonda technique (Ayoob et al. 2008). These methods produce chemical waste in the environment system. Thus, microbial methods are to be applied. Different scientists had worked on fluoride degrading microorganisms like *Ancylobacter sp.*, *Burkholderia sp.*, *Cupriavidus sp.* and *Staphylococcus sp.* *Aspergillus penicilloides* and *Mucor racemosus*, *Micrococcus luteus*, *Aeromonas hydrophilla*, *Micrococcus varians* and *Pseudomonas aeruginosa* (Camboim 2012; Chouhan et al. 2010).

The status of fluoride level should be updated area wise. It is important to study the condition of the

interface allows users to write query of interest. The output of the search shows list of links to matching assembly products. A navigation menu at the top of the page allows users to: (a) obtain information about FDB, and its salient (b) Features access pages where one can search degradation pathway of fluoride degrading microorganisms (Fig.V) (c) write to help desk for any comment, question or suggestion (d) obtain contact information for FDB developers.

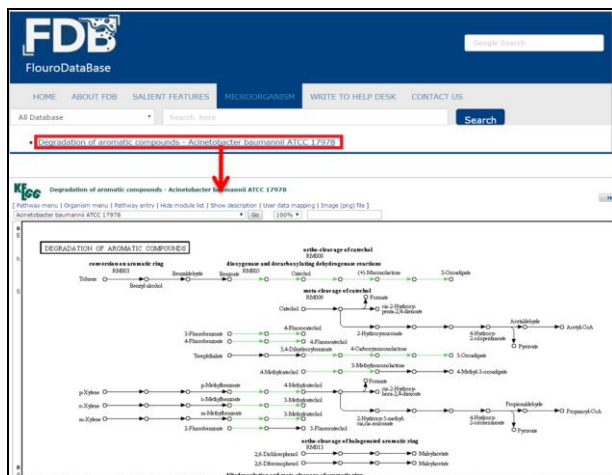


Fig. V FDB microorganism link gives users access to the KEGG site where degradation pathway is given

CONCLUSION

The FDB is an effort to provide meaningful information which can be used to achieve great output in research. It convinces the condition of working as a useful repository and resource that can inspire researchers to develop new microbial based technologies for remediation of fluoride compounds. Database will be extended more to keep swiftness with new scientific reaching in the ground. It may help in developing a keen interest in the field of fluoride and may attract researchers to come in to the field and research.

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