

Proceeding Paper

# Mechanisms of Biodeterioration of Structural Materials by *Streptomyces* spp.: A Review <sup>†</sup>

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**Abstract:** The processes of microbial damage to materials lead to a number of environmental problems. To prevent the development of eco-trophic corrosively active groups of micro-organisms, “green” biocides/inhibitors are being developed. Actinobacteria of the genus *Streptomyces* are actively studied from the point of view of usefulness/harmfulness in relation to human activity, in particular, in the processes of microbial damage to materials. To summarize the results of available scientific research and reviews devoted to the participation and supposed mechanisms of structural materials damage caused by streptomycetes, the presented study was performed. The possible role of streptomycetes in the biodeterioration of structural materials was speculated. The obtained data indicate the need for further studies on streptomycetes as participants in the corrosion process, with special attention to their production of secondary metabolites and nanoparticles of metal and metal oxides with antimicrobial and inhibitory properties, which will contribute to the expansion of the list of “green” biocides/inhibitors.

**Keywords:** Actinobacteria; construction materials; “green” biocides/inhibitors; mechanisms of biodeterioration; *Streptomyces*



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## 1. Introduction

The processes of the biodegradation of materials, harmful from the point of view of practical human activity, are considered through their bi damage, which should be prevented and eliminated. Material deterioration leads to a number of environmental problems [1]. Biocides/inhibitors used to protect against corrosion, including microbial corrosion, are often toxic compounds [2,3]. Eco-friendly “green” biocides/inhibitors are being developed today based on the requirements of ensuring the preservation of the quality of the environment [3–5]. It is known that representatives of the genus *Streptomyces* play an active part in the destruction of materials: wall paintings suffer from the growth and colonization of *Streptomyces* [6,7], the biodegradation of rubber latex occurs with the participation of *Streptomyces* labedae isolated from the soil [8], and streptomycetes have been isolated from damaged film and oil-bitumen coatings of gas pipelines and underground tanks [9,10]. At the same time, sulfate-reducing and thione bacteria are considered the main corrosively active groups of micro-organisms [10–12]. Streptomycetes are considered as heterotrophic bacteria companions of the main groups of material damagers [13].

A study of the diversity, richness, and composition of microbial communities on a steel surface in marine conditions showed that Proteobacteria accounted for 83.1% of the

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Biodegradation Technology of Organic and Inorganic Pollutants Kassio Ferreira Mendes,Rodrigo De Sousa,Kamila Cabral Mielke,2022-04-20 Bioremediation technologies for environments contaminated by organic and inorganic pollutants are a major focus of researchers and scientists worldwide The chemical control of agricultural pests and advocacy for sustainable agriculture have led to the development of new paradigms in environmental remediation This book covers recent advances in the bioremediation technology of organic and inorganic pollutants in the environment *Book catalog of the Library and Information Services Division* Environmental Science Information Center. Library and Information Services Division,1977

Handbook of Material Biodegradation, Biodeterioration, and Biostablization Michalina Falkiewicz-Dulik,Katarzyna Janda,George Wypych,2015-04-28 Handbook of Material Biodegradation Biodeterioration and Biostabilization Second Edition gives extensive information on the microorganisms involved in the biodegradation of materials along with the biocides which are permitted for use according to the most up to date worldwide legislation Mechanisms of biodegradation and biodeterioration results of biodeterioration and methods of biostabilization are covered for a large number of products making the title relevant for a range of industries and applications including construction coatings paints medical and pharmaceutical applications and electronics In addition the health and safety aspects of biocide

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