# ISOLATION, CHARACTERIZATION AND SCREENING FOR BIOACTIVE COMPOUNDS PRODUCED BY MARINE *Streptomycetes*

**By**

**AYATOLLAH SAMIR ABDEL-MONIEM EL-ZAYAT**
**B.Sc. Agric. Sci. (Biotechnology), Fac. Agric., Cairo Univ., 2009**

## THESIS

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**APPROVAL SHEET**

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APPROVAL COMMITEE

**Dr. MOHAMED ELSAYED ELHADDAD**.....
**Professor of Agric. Microbiology, Fac. Agric., Ain-Shams University**

**DR. NABIL ABRAHIM ELSAYED HEGAZI**.....
**Professor of Agric. Microbiology, Fac. Agric., Cairo University**

**Dr. FERIAL MOHAMED RASHAD**.....
**Professor of Agric. Microbiology, Fac. Agric., Cairo University**

**Date: 24 /5/2015**

**SUPERVISION SHEET**

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**Dr. FERIAL MOHAMED RASHAD**
**Professor of Agric. Microbiology, Fac. Agric., Cairo University**

**Dr. HAYAM MOHAMED FATHY**
**Lecturer of Agric. Microbiology, Fac. Agric., Cairo University**

# *DEDICATION*

*I dedicate this thesis with my all deepest love and appreciation to all my family especially to my parents: To my father, for his deep prayers, help, patience, continuous encouragement and support; to my late mother, for her deep prayers and love; to my husband and my son for their love, patience, care, help and permanent encouragement to be ambitious during my study and for helping me throughout my life.*

*Also I dedicate this work to my beloved brother for his love and help.*

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## ABSTRACT

Different strategies have been employed for selective isolation of *Streptomycetes* from twenty marine samples varied in their biological nature. The recovery of *Streptomycetes* isolates (112) was influenced preferentially by different strategies; sediment samples were the best source of potential candidate *Streptomycetes*. All isolates exhibited antimicrobial activities with variable spectrum; the most promising isolates (31) were phenotypically characterized and identified as *Streptomyces* spp.; these isolates exhibited variable capacity for secretion of numerous hydrolytic enzymes such as catalase, protease, amylase, lipase, lecithinase, asparaginase, chitinase and pectinase. Based on the morphological, cultural, physiological, biochemical and chemotaxonomical characteristics, isolates were strongly identified as belong to genus *Streptomyces* and tentatively to different species; using the UPGMA program, the 31 strains were assigned to 10 hierarchical clusters: one major cluster consists of 14 strains, 6 minor clusters consist of 4 or 2 strains and 3 single membered clusters. All the strains resisted both penicillin and streptomycin, 29 were sensitive to neomycin; the majority of strains (25) showed multiple antibiotic resistance index greater than 0.2; 23, 22 and 13 degraded the shrimp shell, chicken feather and corn cob, respectively, producing bioactive substance(s) which indicates their diversity and their ecological role in the marine ecosystem. At least 28 strains exhibited nematicidal activity *in vitro* and *in vivo* against root-knot nematode and supported plant growth. In vitro, the assessed *Streptomyces* species exhibited the ability to produce gibberellic acid, indole acetic acid, abscisic acid, kinetin and benzyladenine. Phylogenetic analysis of the prominent strains based on 16S rRNA gene sequences showed highest similarity with *Streptomyces* spp. (100%); they were deposited in the GenBank under the accession numbers of KM596717, KM596718, Kp064548, Kp064549, KM596719 and Kp140845. Except for indole acetic acid, this is the first report concerning the ability of marine *Streptomyces* to produce such phytohormones and the use of shrimp shell waste as a mono component medium for production of phytohormones. The study is efficacious in selecting effective biodiverse strains of marine *Streptomyces* that may work under diverse agro-ecological conditions as a useful element in plant nutrition and as biocontrol agents involved in integrated management programs.

**Keywords:** Marine *Streptomyces*, Antimicrobial activity, Nematicidal activity, Numerical taxonomy, Phytohormones, IAA, $GA_3$, ABA, kinetin, Benzyladenine, 16S rRNA, Biodegradation.

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