UNIVERSITAS GADJAH MADA
ISOLATION AND IDENTIFICATION OF ANTIBACTERIAL COMPOUNDS AGAINST STAPHYLOCOCCUS AUREUS, ESCHERICHIA COLI AND BACILLUS SUBTILIS FROM THE MARINE SPONGE XESTOSPONGIA TESTUDINARIA COLLECTED FROM PROBOLINGGO
Demas Ezra Arianto, Respati Tri Swasono, S.Si., M.Phil., Ph.D. ; Keiichi Konoki, Ph.D.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

TABLE OF CONTENTS

UNDERGRADUATE THESIS i
APPROVAL PAGE ii
DECLARATION PAGE iii
PREFACE iv
TABLE OF CONTENTS vi
LIST OF TABLES viii
LIST OF FIGURES ix
LIST OF ATTACHMENTS x
ABSTRACT xi
INTISARI xii
CHAPTER I INTRODUCTION 1
I.1 Background 1
I.2 Research Objectives 5
I.3 Research Benefits 5
CHAPTER II LITERATURE REVIEW AND HYPOTHESIS FORMULATION 6
II.1 Literature Review 6
II.1.1 Sea Sponges 6
II.1.2 Disk Diffusion 10
II.1.3 Column Chromatography 13
II.1.4 Preparative thin-layer chromatography (PTLC) 16
II.1.5 Fourier-Transform Infrared (FTIR) Spectroscopy 17
II.1.6 Liquid Chromatography–Mass Spectrometry (LC-MS) 18
II.1.7 Nuclear Magnetic Resonance (NMR) Spectroscopy 21
II.2 Hypothesis Formulation 24
II.2.1 Formulation of hypothesis 1 25
II.2.2 Formulation of hypothesis 2 26
II.2.3 Formulation of hypothesis 3 27
II.2.4 Research design 29
CHAPTER III RESEARCH METHODS 32
III.1 Materials 32
III.2 Apparatus 32
III.3 Procedure 33
III.3.1 Taxonomic Identification of the Sponge 33
III.3.2 Sponge Sample Preparation 33
III.3.3 Extraction by Maceration and Liquid–Liquid Partitioning 33
III.3.4 Thin-Layer Chromatography (TLC) Analysis 34
III.3.5 Antimicrobial Activity by Disk Diffusion Method 34
III.3.6 Fractionation by Gravity Silica Gel Column Chromatography 35
III.3.7 Fractionation by Sep-Pak C18 Cartridge Chromatography 35
III.3.8 Purification by Preparative Thin-Layer Chromatography (PTLC) 35

UNIVERSITAS GADJAH MADA
ISOLATION AND IDENTIFICATION OF ANTIBACTERIAL COMPOUNDS AGAINST STAPHYLOCOCCUS AUREUS, ESCHERICHIA COLI AND BACILLUS SUBTILIS FROM THE MARINE SPONGE XESTOSPONGIA TESTUDINARIA COLLECTED FROM PROBOLINGGO
Demas Ezra Arianto, Respati Tri Swasono, S.Si., M.Phil., Ph.D. ; Keiichi Konoki, Ph.D.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

III.3.9 Structural Identification by LC-MS and NMR Spectroscopy 36
CHAPTER IV RESULTS AND DISCUSSION 38
IV.1 Isolation of the Marine Sponge Extract 38
IV.2 Antimicrobial Activity of the Crude Ethyl Acetate Extract 39
IV.3 Separation of the Crude Extract by Silica Gel Column Chromatography 41
IV.4 Antimicrobial Activity of the Silica Gel Column Fractions 42
IV.5 Separation by Sep-Pak C18 Cartridge Chromatography 44
IV.6 Antimicrobial Activity of the Sep-Pak C18 Fractions 46
IV.7 Purification by Preparative Thin-Layer Chromatography (PTLC) 48
IV.8 Antimicrobial Activity of the PTLC Fractions 49
IV.9 Identification of the Active Compound 50
CHAPTER V CONCLUSION AND SUGGESTION 58
V.1 Conclusion 58
V.2 Suggestion 59
REFERENCES 60