



**UNIVERSITI PUTRA MALAYSIA**

**EFFECTS OF ENVIRONMENTAL FACTORS ON VIBRIOSIS IN  
SEABASS (*LATES CALCARIFER BLOCH*) AT A FLOATING  
CAGE CULTURE FARM.**

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SEABASS (*LATES CALCARIFER* BLOCH) AT A FLOATING  
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by

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*Dedicated to*

*nature,*

*it's beauty,*

*mysteries and*

*the many challenges*

*it poses to*

*science and mankind.*



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## TABLE OF CONTENTS

|   | PAGE  |
|---|-------|
| <b>ACKNOWLEDGEMENTS</b> .....   | iii   |
| <b>LIST OF TABLES</b> .....   | viii  |
| <b>LIST OF FIGURES</b> .....  | x     |
| <b>LIST OF PLATES</b> .....   | xiii  |
| <b>LIST OF ABBREVIATIONS</b> .....                                      | xx    |
| <b>ABSTRACT</b> .....   | xxiii |
| <b>ABSTRAK</b> .....  | xxvi  |
| <b>CHAPTER</b>  |       |
| <b>I</b>  |       |
| <b>GENERAL INTRODUCTION</b> .....                                       | 1     |
| Background.....   | 1     |
| Objectives.....   | 6     |
| <b>II</b>   |       |
| <b>LITERATURE REVIEW</b> .....  | 9     |
| Cage Aquaculture.....   | 9     |
| Vibriosis.....  | 11    |
| Aetiology of Vibriosis.....   | 13    |
| Environmental Factors and Vibriosis....                                 | 14    |
| Pathogenicity of Vibriosis.....   | 15    |
| Pathogenicity Mechanism of Vibrios....                                  | 20    |
| Histopathology.....   | 23    |
| Bacterial Population and<br>the Environment.....                        | 24    |
| <b>III</b>  |       |
| <b>ISOLATION AND IDENTIFICATION OF<br/>    BACTERIAL ISOLATES</b> ..... | 30    |
| Materials and Methods.....  | 30    |
| Study Area.....   | 30    |
| Management Practices.....   | 32    |
| Collection and Isolation<br>of Samples.....                             | 32    |
| Identification of Isolates.....   | 35    |
| Results.....  | 39    |
| Management Practices.....   | 39    |
| Isolation of Bacteria.....  | 40    |



|            |   |            |
|------------|---|------------|
|            | Distribution.....                             | 45         |
|            | Discussion.....                               | 46         |
| <b>IV</b>  | <b>VIRULENCE STUDIES.....</b>                 | <b>56</b>  |
|            | Materials and Methods.....                    | 56         |
|            | Strains.....                                  | 56         |
|            | Maintenance of Experimental                   |            |
|            | Fish.....                                     | 57         |
|            | Virulence Assay.....                          | 58         |
|            | Results.....                                  | 63         |
|            | General Observation.....                      | 63         |
|            | Assay 1.....                                  | 65         |
|            | Assay 2.....                                  | 69         |
|            | Discussion.....                               | 72         |
| <b>V</b>   | <b>FLUCTUATIONS AND EFFECTS OF</b>            |            |
|            | <b>ENVIRONMENTAL FACTORS ON BACTERIAL</b>     |            |
|            | <b>POPULATION.....</b>                        | <b>81</b>  |
|            | Material and Methods.....                     | 81         |
|            | Bimonthly sampling.....                       | 81         |
|            | Total Bacterial and Presumptive               |            |
|            | Vibrio Counts.....                            | 83         |
|            | Nutrients and Chlorophyll                     |            |
|            | (phaeo-pigments).....                         | 85         |
|            | Total Alkalinity.....                         | 86         |
|            | Fish Mortalities.....                         | 86         |
|            | Rainfall, Solar Radiation                     |            |
|            | And Wind.....                                 | 86         |
|            | Statistical Analysis.....                     | 86         |
|            | Results.....                                  | 87         |
|            | Physical Parameters.....                      | 87         |
|            | Nutrient Concentrations.....                  | 92         |
|            | Bacterial Counts.....                         | 99         |
|            | Fish Mortalities.....                         | 108        |
|            | Rainfall, Solar Radiation                     |            |
|            | and Wind.....                                 | 110        |
|            | Statistical Analysis.....                     | 110        |
|            | Discussion.....                               | 113        |
| <b>VI</b>  | <b>SEQUENTIAL HISTOLOGY OF SEABASS</b>        |            |
|            | <b>FOLLOWING ADMINISTRATION OF BACTERIAL</b>  |            |
|            | <b>CELLS AND EXTRACELLULAR PRODUCTS (ECP)</b> |            |
|            | <b>OF VIBRIO ALGINOLYTICUS.....</b>           | <b>133</b> |
|            | Materials and Methods.....                    | 133        |
|            | Results.....                                  | 134        |
|            | Pathology of the Skin.....                    | 134        |
|            | Internal Organs.....                          | 144        |
|            | Discussion.....                               | 174        |
| <b>VII</b> | <b>GENERAL DISCUSSION AND CONCLUSION.....</b> | <b>181</b> |



|   |            |
|---|------------|
| <b>BIBLIOGRAPHY.....</b>                    | <b>191</b> |
| <b>APPENDICES.....</b>                      | <b>207</b> |
| <b>APPENDIX A : ADDITIONAL TABLES.....</b>  | <b>208</b> |
| <b>APPENDIX B : ADDITIONAL FIGURES.....</b> | <b>236</b> |
| <b>BIOGRAPHICAL SKETCH.....</b>             | <b>253</b> |





## LIST OF TABLES

| Table |   | Page |
|-------|---|------|
| 1     | Production Of Aquaculture By Systems<br>in 1992.....  | 10   |
| 2     | Production Of Brackishwater<br>And Marine Fish 1992.....  | 10   |
| 3     | Major Bacterial Pathogens Of<br>Seabass/Seabream.....   | 12   |
| 4     | Annual Losses of Mariculture<br>to Vibriosis in Japan.....                                      | 19   |
| 5     | Primary Differentiation of Gram-Negative<br>Bacteria Isolated on General<br>Purpose Media.....  | 35   |
| 6     | Primary Differentiation of Gram-Positive<br>Bacteria Isolated on General<br>Purposes Media..... | 36   |
| 7     | List of Biochemical Tests Carried Out<br>At 30°C.....   | 52   |
| 8     | Bacterial Isolates From Sediment.....   | 42   |
| 9     | Bacterial Isolates From Water.....  | 43   |
| 10    | Bacterial Isolates From Fish.....   | 44   |
| 11    | Colour and Growth of Other<br>Isolates on TCBS.....   | 54   |
| 12    | Chosen Bacterial Isolates for<br>Virulence Assay.....   | 57   |
| 13    | Virulence of Chosen Isolates From<br>The Cage Culture Farm.....                                 | 65   |
| 14    | Mortalities Vs. Time for Isolate 196.....   | 66   |
| 15    | Mortalities Vs. Time for Isolate 80.....  | 67   |



|    |  |     |
|----|--|-----|
| 16 | Mortalities Vs. Time for Isolate 28.....   | 67  |
| 17 | Mortalities Vs. Time for Isolate 7.....  | 67  |
| 18 | Mortalities Vs. Time for Isolate G.....  | 68  |
| 19 | Mortalities Vs. Time for Isolate M.....  | 68  |
| 20 | Mortalities Vs. Time for Isolate 18.....   | 68  |
| 21 | LD <sub>50</sub> Values for the Virulence Assay.....   | 69  |
| 22 | Mortalities in Assay 2 Through<br>Intraperitoneal Injection.....                                       | 70  |
| 23 | Mortalities in Assay 2 Through<br>Intramuscular Injection.....   | 70  |
| 24 | LT <sub>50</sub> Values for Assay 2.....   | 72  |
| 25 | Results Of The Regression Analysis.....  | 111 |
| 26 | Some Physical and Chemical Properties<br>in the Coastal Waters off Port Dickson<br>(1986-1990).....    | 117 |
| 27 | Comparison of Inorganic Nitrogen and<br>Phosphorus in the World Oceans and<br>Seas.....                | 118 |
| 28 | Results of Biochemical Tests For<br>Isolates From Sediment.....  | 209 |
| 29 | Results of Biochemical Tests For Isolates<br>From Water.....   | 211 |
| 30 | Results of Biochemical Tests For Isolates<br>From Fish.....  | 214 |
| 31 | API 20E Profiles For Some of the<br>Bacteria Isolated From The Floating<br>Cage Culture Fish Farm..... | 217 |
| 32 | Computer Print Out For Regression<br>Analysis.....   | 221 |
| 33 | Data Collected During The Study.....   | 231 |
| 34 | Some Inorganic Nutrients in The<br>Coastal Waters off Port Dickson.....                                | 234 |
| 35 | Solar Radiation and Wind at<br>Port Klang for 1994.....  | 235 |



## LIST OF FIGURES

| Figure |  | Page |
|--------|--|------|
| 1      | Location Of Seabass Culture At Pulau Ketam.....                  | 31   |
| 2      | Cage Site With Sampling Station Positions.....                   | 41   |
| 3      | Calibration Curve for Protein Concentrations.....                | 62   |
| 4      | Temperature Variation at St.1 and St.2.....                      | 89   |
| 5      | Conductivity Variation at St.1 and St.2.....                     | 89   |
| 6      | Dissolved Oxygen Variations at St.1 and St.2.....                | 91   |
| 7      | Salinity Variations at St.1 and St.2.....                        | 91   |
| 8      | PH Variations at St.1 and St.2.....                              | 93   |
| 9      | Nitrite Concentrations at St.1 and St.2.....                     | 93   |
| 10     | Phosphate Concentrations at St.1 and St.2...                     | 95   |
| 11     | Alkalinity Variations at St.1 and St.2.....                      | 95   |
| 12     | Ammonia Concentrations at St.1 and St.2.....                     | 98   |
| 13     | Nitrate Concentrations at St.1 and St.2.....                     | 98   |
| 14     | Chlorophyll Concentrations at St.1 and St.2.....                 | 100  |
| 15     | Total Bacterial Counts in the Sediment at St.1 and St.2.....     | 100  |
| 16     | Total Bacterial Counts in the Water Column at St.1 and St.2..... | 104  |
| 17     | Presumptive Vibrio Counts in the Sediment at St.1.....           | 104  |



|    |   |     |
|----|---|-----|
| 18 | Presumptive Vibrio Counts in the Water<br>Column at St.1..... | 107 |
| 19 | Presumptive Vibrio Counts in the Sediment<br>at St.1.....     | 107 |
| 20 | Presumptive Vibrio Counts in the Water<br>Column at St.1..... | 109 |
| 21 | Fish Mortalities at the Floating Cage<br>Culture Farm.....    | 109 |
| 22 | Rainfall at Port Klang Area.....                              | 110 |
| 23 | Cummulative Mortalities Vs. Time For<br>Isolate 196.....      | 237 |
| 24 | Cummulative Mortalities Vs. Time For<br>Isolate 28.....       | 237 |
| 25 | Cummulative Mortalities Vs. Time For<br>Isolate 7.....        | 238 |
| 26 | Cummulative Mortalities Vs. Time For<br>Isolate 80.....       | 238 |
| 27 | Cummulative Mortalities Vs. Time For<br>Isolate G.....        | 239 |
| 28 | Temperature Variations With Depth at St.1...                  | 240 |
| 29 | Temperature Variations With Depth at St.2...                  | 240 |
| 30 | Conductivity Variationst With Depth<br>at St.1.....           | 241 |
| 31 | Conductivity Variations With Depth<br>at St.2.....            | 241 |
| 32 | Dissolved Oxygen Variations With Depth<br>at St.1.....        | 242 |
| 33 | Dissolved Oxygen Variations With Depth<br>at St.2.....        | 242 |
| 34 | Salinity Variations With Depth at St.1.....                   | 243 |
| 35 | Salinity Variations With Depth at St.2.....                   | 243 |
| 36 | PH Variations With Depth at St.1.....                         | 244 |
| 37 | PH Variations With Depth at St.2.....                         | 244 |
| 38 | Nitrite Concentrations With Depth at St.1...                  | 245 |
| 39 | Nitrite Concentrations With Depth at St.2...                  | 245 |



|    |   |     |
|----|---|-----|
| 40 | Phosphate Concentrations With<br>Depth at St.1.....   | 246 |
| 41 | Phosphate Concentrations With<br>Depth at St.2.....   | 246 |
| 42 | Alkalinity Variations With Depth at St.1....          | 247 |
| 43 | Alkalinity Variations With Depth at St.2....          | 247 |
| 44 | Ammonia Concentrations With Depth at St.1...          | 248 |
| 45 | Ammonia Concentrations With Depth at St.2....         | 248 |
| 46 | Nitrate Concentrations With Depth at St.1...          | 249 |
| 47 | Nitrate Concentrations With Depth at St.2...          | 249 |
| 48 | Chlorophyll Concentrations With Depth<br>at St.1..... | 250 |
| 49 | Chlorophyll Concentrations With Depth<br>at St.2..... | 250 |
| 50 | Total Bacterial Counts With Depth at St.1...          | 251 |
| 51 | Total Bacterial Counts With Depth at St.2...          | 251 |
| 52 | Presumptive Vibrio Counts<br>With Depth at St.1.....  | 252 |
| 53 | Presumptive Vibrio Counts<br>With Depth at St.2.....  | 252 |



## LIST OF PLATES

| Plate |   | Page |
|-------|---|------|
| 1     | Pulau Ketam ; A Typical Fishing Community.....  | 8    |
| 2     | A Typical Cage Culture Fish Farm at Pulau Ketam.....  | 8    |
| 3     | Study Area; Cage SS 52.....   | 33   |
| 4     | Colonies On Marine Agar After 24 Hours Incubation at 30°C.....  | 34   |
| 5     | Colonies On TCBS After 24 Hours Incubation at 30°C; A: Yellow Colonies, B: Green Colonies.....  | 50   |
| 6     | A ; Rhizoid Shaped Colony.<br>B ; Round Colonies Spreading In A Halo.....   | 37   |
| 7     | A; Colonies Resembling Fried Eggs<br>B; Fine Star Shaped Colony.....  | 38   |
| 8     | A: Inflammation Caused by IP Injection of ECP<br>B: Suffocation as Seen in The Gaping Mouth<br>C: Haemorrhages on Abdomen and Tail Region<br>D: Tail and Fin Rot..... | 64   |
| 9     | Spring Tide At The Floating Cage Culture Fish Farm. Note the Strong Currents Flushing Through The Cage.....   | 82   |
| 10    | Neap Tide At The Floating Cage Culture Fish Farm. Note The Calm Waters In The Cage.....   | 82   |
| 11    | Station 1.....  | 84   |
| 12    | Station 2.....  | 84   |
| 13    | Spreading Bacteria That Caused Problems In Enumeration Seen On Plate Count Agar After 20 Hours of Incubation At 30°C...   | 102  |



|    |  |     |
|----|--|-----|
| 14 | Comparison Of A Sample Of The<br>Total Bacterial Count In The Sediment<br>At St.1(A)and St.2(B).....   | 102 |
| 15 | Comparison Of A Sample Of The<br>Total Bacterial Counts in The Water Column<br>At St.1(A) and St.2 (B).....  | 103 |
| 16 | Presumptive Vibrio Counts During A<br>Sampling Run In The Sediment At<br>St.1(A) And St.2 (B).....   | 106 |
| 17 | Presumptive Vibrio Counts During A<br>Sampling Run In The Water Column At<br>St. 1(A) And St.2 (B).....  | 106 |
| 18 | Skin Six Hours After IM<br>Injection Of Bacterial Cells Showing<br>Infiltration Of RBC's (R) And<br>Degeneration Of Sarcoplasm. Focal<br>haemorrhages are also noted (H).<br>(H & E X 720).....                                      | 135 |
| 19 | Skin Six Hours After IM<br>Injection Of Bacterial Cells Showing<br>Bacteria In The Stratum Compactum As<br>Shown By The Arrow. (H & E X 1400).....   | 135 |
| 20 | Skin Six Hours After IM Injection<br>Of ECP Showing Severe Degeneration Of The<br>Muscle (DG). In The Fore Ground, Normal<br>Muscle Tissue Is Observed (N)<br>(H & E X 720).....   | 137 |
| 21 | Skin Twelve Hours After IM<br>Injection Of Bacteria Showing Necrosis<br>(D) Of Collagen Fibres And The Seperation<br>Of The Fibres Indicated By The Arrow.<br>(H & E x 1400).....  | 137 |
| 22 | Skin Twelve Hours After IM<br>Injection Of ECP Showing Degeneration (D)<br>Of Muscle And Seperation Of Stratum<br>Compactum From Muscle Layer(S).<br>(H & E x 720).....  | 138 |
| 23 | Skin Eighteen Hours After IM<br>Injection Of Bacteria Showing Haemorrhages<br>(H & E x 1400).....  | 139 |
| 24 | Skin Eighteen Hours After IM<br>Injection Of ECP Showing Degeneration (D)<br>Of Muscle And Seperation Of A Normal<br>Stratum Compactum From Muscle Layer.<br>Also Note The Melanin (M) Containing<br>Macrophages. (H & E x 720)..... | 139 |



|    |  |     |
|----|--|-----|
| 25 | Skin Two Days After IM Injection<br>Of Bacteria Showing Fibroblast Cells In<br>The Stratum Compactum. (H & E x 720).....   | 141 |
| 26 | Skin Four Days After IM<br>Injection Of Bacteria. Formation Of<br>Fibrous Tissue (FT) With Fibroblast<br>Cells (F). (H & E x 1400).....  | 142 |
| 27 | Skin Four Days After IM<br>Injection Of Bacterial Cells Showing<br>Formation Of New Capillaries (C) With RBC,s<br>(R). (H & E x 720).....  | 142 |
| 28 | Skin Six Days After IM Injection<br>Of Bacteria Showing Skin Healing And<br>Formation Of Fibroblastic (F) Tissue<br>Around Lesion (A). Formation Of Epidermis<br>Is Evident (E). (H & E x 360).....  | 143 |
| 29 | Skin Six Days After IM Injection<br>Of Bacteria Showing Bridging Of Stratum<br>Compactum To The Muscle Layer (B).<br>(H & E x 1400).....   | 143 |
| 30 | Heart Twelve Hours After IM<br>Injection Of Bacteria Showing Multifocal<br>Thrombosis (MT). (H & E x 360 ).....  | 145 |
| 31 | Heart 12 Hours Post Injection Of<br>Bacteria. Close-up of Ventricle<br>Showing Multifocal Haemorrhages (M)<br>(H & E x 1400).....  | 146 |
| 32 | Heart 12 Hours Post Injection<br>Of ECP. Note Severe Degeneration (D) And<br>Vacuolation In The Stratum Compactum (V).<br>(H & E x 720).....   | 146 |
| 33 | Heart 18 Hours Post Injection Of<br>Bacteria Showing First signs of Lesions In<br>The Form of Fibrinous Epicarditis(F) With<br>RBC's(R) Within. Note The Extensive<br>Degeneration (D) Of Cardiac Muscle<br>Around The Lesion.(H & E x 720)..... | 148 |
| 34 | Heart Eighteen Hours After IM<br>Injection Of ECP Showing Extensive  |     |





|    |  |     |
|----|--|-----|
|    | Degeneration Of The Stratum Compactum (D)<br>And Separation Of The Stratum Compactum<br>From The Stratum Spongiosum (S).<br>(H & E x 1440).....  | 148 |
| 35 | Heart One Day Post Injection Of<br>Bacteria Showing Degeneration Of The<br>Stratum Spongiosum With The Infiltration Of<br>RBC's (R) Released From Damaged<br>Capillaries (H & E x 720).....  | 149 |
| 36 | Heart One Day Post Injection Of<br>ECP. The Stratum Compactum Has Sloughed<br>Off (S) And The Stratum Spongiosis Shows<br>Vacuolation (V). (H & E x 720).....                                | 149 |
| 37 | Heart One Day Post Injection Of<br>ECP Showing Severe Degeneration Of<br>Cardiomuscle In The Bulbous Arteriosus<br>With Severe Haemorrhages (H).<br>(H & E x 720).....                       | 151 |
| 38 | Heart Day Four After IM<br>Injection Of Bacteria Showing A Possible<br>Trapping Mechanism In The Ventricle Forming<br>A Nest (C) With RBC's Within (R).<br>(H & E x 1440).....               | 151 |
| 39 | Heart Six Day Post Injection Of<br>Bacteria Showing Numerous Nests (C) And<br>Fibrous Tissue (F) Around the Nest.<br>(H & E x 720).....  | 152 |
| 40 | Heart Six Days After IM<br>Injection Of Bacteria Showing A Close Up<br>Of The Nest (C) Showing Possible<br>Bacterial Cells (B) Within.<br>(H & E x 1440).....                                | 152 |
| 41 | Heart Eight Days After IM Injection Of<br>Bacteria Showing Numerous Nests (N).<br>(H & E x 720).....   | 153 |
| 42 | Heart Eight Days After IM Injection Of<br>Bacteria Showing Macrophages (M)<br>(H & E x 1440).....  | 153 |
| 43 | Kidney Six Hours Post Injection<br>Of ECP Showing Numerous Immature Blood<br>cells (C) And Fusing Of Renal Tubules (T)<br>With Large Number Of Focal Haemorrhages<br>(H). (H & E x 720)..... | 155 |
| 44 | Kidney Twelve Hours After IM Injection Of<br>Bacteria Showing Necrosis Of Renal<br>Tubules Thus Causing Epithelial Cells   |     |



|    |  |     |
|----|--|-----|
|    | To Collapse (T) And Granular Matter<br>Within The Epithelial Cells (G).<br>(H & E x 1400).....   | 155 |
| 45 | Kidney Twelve Hours After IM<br>Injection Of ECP Showing Degeneration Of<br>Tubules(D). Pyknotic Nuclei (P) Was<br>Present And Fusion Of Epithelial Cells<br>Was Observed (F). (H & E x 1400).....   | 156 |
| 46 | Kidney Eighteen Hours After IM<br>Injection Of Bacteria Showing Large<br>Numbers Of Bacteria(B) With Large Numbers<br>Of RBC's (R) Agglutinating Around The<br>Bacteria. Loss Of Epethelial Tubule cells<br>Continued (F). (H & E x 1440).....                         | 156 |
| 47 | Kidney Eighteen Hours Post<br>Injection Of ECP Showing Extensive<br>Degeneration And Vacuolation Of<br>Epethelial Cells Surrounding Lumen Of<br>Kidney Tubules. (H & E x 720).....   | 158 |
| 48 | Kidney One Day After IM<br>Injection Of Bacteria Showing Acute Tubular<br>Necrosis. The Glomeruli Are Shrunken (G)<br>With Sloughed Necrotic Glomerular Lining (L)<br>In The Lumen. High Number Of Immature<br>Erythrocytes Were Also Noted (I).<br>(H & E x 720)..... | 159 |
| 49 | Kidney One Day After IM Injection Of ECP<br>Showing Extensive Degeneration Of Tubules (D)<br>With The Presence OF Large Melano-Macrophage<br>Centres Undergoing Necrosis (M). Pyknotic<br>Debris (P) And Melanin Granules (G) Were<br>Scattered. (H & E x 720).....    | 159 |
| 50 | Kidney Two Days After IM<br>Injection Of Bacteria Showing Extensive<br>Degeneration And Large Numbers Of RBC's (R).<br>Large Number Of Vacuoles Were Present (V).<br>Note The Haemapoetic Depletion.<br>(H & E x 720).....   | 160 |
| 51 | Kidney Third Day After IM<br>Injection Of ECP Showing Regeneration.<br>(H & E x 1440).....   | 161 |
| 52 | Kidney Fourth Day After IM<br>Injection Of Bacteria Showing Bacterial<br>Cells (B) Within Melano-Macrophage<br>Centre (C). (H & E x 1440).....   | 162 |



|    |  |     |
|----|--|-----|
| 53 | Spleen One Day After IM<br>Injection Of Bacteria Showing Large Areas<br>Of White Pulp. (H & E x 1440).....   | 163 |
| 54 | Spleen One Day Post Injection Of<br>ECP Showing Increased White Pulp And Melanin<br>Granules (M). (H & E x 720).....   | 163 |
| 55 | Spleen Two Days After IM Injection<br>Of Bacteria Showing Degeneration Of<br>Ellipsoids. (H & E x 1440).....   | 164 |
| 56 | Spleen Two Days After IM<br>Injection Of Bacteria (B) Trapped<br>Within The Epillipsoids. (H & E x 1440).....  | 165 |
| 57 | Spleen Two Days After IM<br>Injection Of Bacteria Showing Close-Up<br>Of The Bacteria (B) And Agglutinating<br>(A) RBC's. (H & E x 3600).....  | 165 |
| 58 | Spleen Two Days Post Injection<br>Of ECP Showing Haemosiderin Granules (H).<br>(H & E x 720).....  | 166 |
| 59 | Spleen Two Days After IM<br>Injection Of Bacteria Showing Extensive<br>Degeneration Of Ellipsoids.<br>(H & E x 1440).....  | 166 |
| 60 | Liver Eighteen Hours Post<br>Injection Of Bacteria Showing Cloudy<br>And Swollen Hepatocytes (H).<br>(H & E x 1440).....   | 168 |
| 61 | Liver Eighteen Hours After IM<br>Injection Of ECP Showing Extensive<br>Degeneration Of Hepatocytes.<br>(H & E x 1440).....   | 168 |
| 62 | Liver One Day After IM Injection<br>Of Bacteria Showing Pyknotic Nuclei Of<br>Hepatocytes Indicating Degeneration (P).<br>(H & E x 1440).....  | 169 |
| 63 | Liver One Day After IM Injection<br>Of ECP Showing Severe Degeneration Of The<br>Liver With Abnormal Rounded Hepatocytes (R).<br>(H & E x 720).....  | 169 |
| 64 | Liver Two Days Post Injection<br>Of Bacteria Showing Fatty Infiltration<br>And Abnormal Rounded Hepatocytes<br>Numerous Inclusion Bodies With Clumps Of<br>RBC's (I) Were Observed .(H & E x 720)..... | 171 |



|    |  |     |
|----|--|-----|
| 65 | Liver Two Days After IM Injection<br>Of ECP Showing Severe Vacuolation (V).<br>(H & E x 720).....  | 171 |
| 66 | Liver Six Days After IM<br>Injection Of Bacteria Showing Regeneration<br>Processes With Cord Like Structures (C).<br>(H & E x 720).....                            | 172 |
| 67 | Liver Six Days After IM Injection<br>Of Bacteria Showing Numerous RBC,s (R) In<br>Intrahepatic Bile Ducts And Thickening Of<br>The Externa (E). (H & E x 720)..... | 173 |
| 68 | Liver Eight Days Post Injection Of<br>Bacteria Showing Normal Hepatocytes Present.<br>(H & E x 720).....   | 173 |



## LIST OF ABBREVIATIONS

|      |                          |
|------|--------------------------|
| *ADH | - Arginine               |
| *AMY | - Amygdalin              |
| *ARA | - Arabinose              |
| C    | - Carbon                 |
| CFU  | - Colony forming units   |
| CIT  | - Citrate                |
| D.O. | - Dissolved oxygen       |
| ECP  | - Extracellular products |
| *Gel | - Kochn's Gelatin        |
| Hrs  | - Hours                  |
| IM   | - Intramuscular          |
| *INO | - Inositol               |
| IP   | - Intraperitoneal        |
| *LDC | - Lysine                 |
| MA   | - Marine agar            |
| *MAN | - Mannitol               |
| *Mel | - Melibiose              |
| MR   | - Methyl red             |
| t    | - Metric Ton             |
| N    | - Nitrogen               |
| n    | - Neap tide              |
| NaCl | - Sodium chloride        |



\*ODC - Ornithine  
O.D. - Optical Density  
O/F - Fermentative/Oxidative test  
\*ONPG- Ortho-nitro-phenyl-galactoside  
P - Phosphorus  
PPT - Parts per thousand  
PV - Presumptive vibrio counts  
RHA - Rhamnose  
RM - Ringgit Malaysia  
s - Spring tide  
SAC - Sucrose  
St. - Station  
SOR - Sorbitol  
TBC - Total bacterial counts  
TCBS - Thiosulphate citrate bile salt sucrose agar  
TDA - Tryptophan  
TSA - Trypticase soy agar  
TSB - Typtic soy broth  
URE - Urease  
VP - Voges Proskeur

\* Abbreviations in API strips

#### **Terms In Statistical Analysis**

Pho - Phosphate  
Tc - Total Counts  
Sed - Sediment  
SEDG1/2 - Green colonies in sediment  
SEDY1/2 - Yellow colonies in sediment  
Chlo - Chlorophyll a



Nitri - Nitrite  
Nitra - Nitrate  
CON - Conductivity  
SAL - Salinity  
StG1/2 - Green colonies in the water column  
Temp - Temperature  
Mid - Middle of water column (6m)  
Bot - Bottom of the water column (12m)



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**THE EFFECTS OF ENVIRONMENTAL FACTORS ON VIBRIOSIS IN  
SEABASS (*LATES CALCARIFER* BLOCH) AT A CAGE CULTURE FARM.**

By

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The present study indicates that the evolution of intensive marine cage culture farms in Malaysia can be a potential risk for outbreaks of vibriosis under unfavourable environmental conditions. The cage culture farm harboured significantly higher numbers of bacteria in the sediment and underlying waters compared to the surrounding waters indicating that the farm serves as a reservoir for bacteria. This is due to the rapid build up of organic waste from feed and excretion matter from fish.

Vibrios isolated from the cage culture farm were found to be virulent to sea bass fingerling. Intraperitoneal injections of whole live bacterial cells of the chosen isolate, *Vibrio alginolyticus* caused higher mortalities compared to the extracellular products (ECP) of the bacteria. In the intramuscular injection (IM), only whole live bacterial cells of *V. alginolyticus* caused





50% mortalities when injected into sea bass fingerlings. This indicates that even though ECP plays a role in the pathogenesis of *V. alginolyticus*, whole live bacterial cells are required to maintain infection.

Fluctuations in the environment at the cage culture farm were found to influence bacterial population and distribution in the sediment and water column. However, physical parameters studied did not seem to influence bacterial population. It was observed that nutrient concentrations such as ortho-phosphate, ammonia-N, nitrate-N and nitrite-N as well as chlorophyll a concentrations play an active role in determining the distribution and population of bacteria in the environment throughout the year. Significant correlations were found between the nutrient concentrations and bacterial population in the environment.

Intramuscular injections of *V. alginolyticus* and its ECP caused severe pathological changes in the internal organs of *L. calcarifer* indicating that the bacteria causes systemic infection. Pathological changes were also observed at the site of injection but were less severe. Intramuscular injection of ECP caused detrimental changes faster compared to IM injections of the bacteria. In histological samples obtained from the administration of ECP, such pathological changes involved in eliminating bacteria such as nests which were observed in the heart

