PROTEOMIC ANALYSIS OF BACILLUS SP.

SUPACHAI TOPANURAK

2/52/03/

A CMAI **DOCTOR OF PHILOSOPHY**

IN BIOTECHNOLOGY

Copyright C GRADUATE SCHOOL A University CHIANG MAI UNIVERSITY

ISBN 974-9894-74-X

PROTEOMIC ANALYSIS OF BACILLUS SP.

SUPACHAI TOPANURAK

A THESIS SUBMITTED TO THE GRADUATE SCHOOL IN

PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

IN BIOTECHNOLOGY

A L L CHIANG MAI UNIVERSITY SEPTEMBER 2006

ISBN 974-9894-74-X

PROTEOMIC ANALYSIS OF BACILLUS SP.

SUPACHAI TOPANURAK

THIS THESIS HAS BEEN APPROVED

TO BE A PARTAIL FULLFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

IN BIOTECHNOLOGY

EXAMING COMMITTEE

CHAIRPERSON

Assoc. Prof. Dr. Suree Phutrakul

MEMBER

MEMBER

Asst. Prof. Dr. Boonyaras Sookkheo

-lw

Prof. Dr. Shui-Tien Chen

H. Nioman

MEMBER

MEMBER

Asst. Prof. Dr. Hataichanoke Niamsup

by Chiang Mai

a

Lecturer Dr. Dararat Tongkao

20 September 2006

© Copyright by Chiang Mai University

ACKNOWLEDGEMENTS

I would like to express my sincere thanks and appreciation to advisor, Assoc. **Prof. Dr. Suree Phutrakul**, for her kind advice, invaluable guidance and encouragement throughout this research work

Also, I appreciated the kindness of **Prof. Dr. Shui-Tein Chen**, Institute of Biological Chemistry, Academia Sinica, supporting the equipments even the budgets when I stayed in Taiwan including **Dr. Supachok Sinchaikul**, he gives worthy suggestions for paper publications even paper corrections.

Thank for **Prof. Dr. Joseph A. Loo**, Director of Proteomics and Mass spectrometry core facilities at University of California, Los Angeles, United states. He indeed made me feel invaluable impressive since I have been in Los Angeles, and kindly aided me not only for research but also the accommodation in Los Angeles. I am gratefully thanks for **Asst. Prof. Dr. Boonyaras Sookkheo**, Department of Chemistry, Rangsit University, **Asst. Prof. Dr. Hataichanoke Niamsup** as well as **Dr. Dararat Tongkao** for giving usefully advice. Thank for my friends, both in Taiwan and United states, they helped my life in each place was going smoothly.

I am gratefully acknowledged for **The Thailand Research Fund (TRF)** for supporting the scholarship through the Royal Golden Jubilee Ph.D. program.

Finally, I would like sincerely express lovely thanks for my family, father, mother as well as my sister. They are really the wind beneath my wings.

Supachai Topanurak