

**INVESTIGATION OF THE ANTIBACTERIAL POTENTIALS OF THE
BLACK SOLDIER FLY (*HERMETIA ILLUCENS*) LARVAE**

By

YANG SHUN KAI

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ABSTRACT

INVESTIGATION OF THE ANTIBACTERIAL POTENTIALS OF THE BLACK SOLDIER FLY (*HERMETIA ILLUCENS*) LARVAE

YANG SHUN KAI

The black soldier fly larvae (BSFL) can be used for waste management as they are detritivores, thus enabling them to carry out bioconversion. The ability to thrive in pathogen-infested environment suggests that BSFL have antimicrobial potentials. This study hypothesized and investigated the possible antibacterial strategies of BSFL, which could be mediated by the symbiotic microflora, the symbiotic bacteriophages or the chemical compounds that they produce. The panel of bacterial species tested for each of these hypothesized strategy include [CONFIDENTIAL]. The larval microflora were isolated and identified via both the API tests and the 16S rDNA sequencing. Six isolates were successfully identified as [CONFIDENTIAL]. Three isolates were identified as [CONFIDENTIAL] via the 16S rDNA sequencing and based on their colony morphology. The identities of the other four isolates need further confirmation as multiple identities were given by both identification methods. The bacterial isolates were assessed for their antimicrobial potentials via the cross streak test.

No inhibition zones were observed but several isolates might have promoted or suppressed the growth of certain test bacterial species. However, further validation is required due to the qualitative nature of this assessment. In addition, the larvae (freeze dried and oven dried larvae) were subjected to sequential solvent extraction and the resulting crude extracts were assessed for their antimicrobial potentials via the resazurin microplate assay. The [CONFIDENTIAL] of the freeze dried larvae and the [CONFIDENTIAL] of the oven dried larvae were active against [CONFIDENTIAL]. Besides, the [CONFIDENTIAL] of the oven dried larvae were active against [CONFIDENTIAL]; the latter was also active against [CONFIDENTIAL]. However, only partial inhibition was observed, all at [CONFIDENTIAL]. Finally, bacteriophage isolation was attempted via the double-layer plaque assay. Only the phage against [CONFIDENTIAL] was successfully isolated from the larvae. The findings from this study suggest that BSFL exhibit antibacterial potentials and more tests should be performed to validate this.

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DECLARATION

I hereby declare that the project report is based on my original work except for quotation and citation which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UTAR or other institution.

(YANG SHUN KAI)

APPROVAL SHEET

This project entitled **“INVESTIGATION OF THE ANTIBACTERIAL POTENTIALS OF BLACK SOLDIER FLY (*HERMETIA ILLUCENS*) LARVAE”** was prepared by YANG SHUN KAI and submitted as partial fulfillment of the requirements for the degree of Bachelor of Science (Hons) Microbiology at Universiti Tunku Abdul Rahman.

Approved by:

(DR. EDDY CHEAH SEONG GUAN)

(MS. LEONG SIEW YOONG)

Date:

Date:

Supervisor

Co-supervisor

Department of Biological Science

Department of Petrochemical
Engineering

Faculty of Science

Faculty of Engineering and Green
Technology

Universiti Tunku Abdul Rahman

Universiti Tunku Abdul Rahman

FACULTY OF SCIENCE

UNIVERSITI TUNKU ABDUL RAHMAN

Date:

PERMISSION SHEET

It is hereby certified that **YANG SHUN KAI** (ID No: **12ADB06146**) has completed this final year project entitled “INVESTIGATION OF THE ANTIBACTERIAL POTENTIALS OF BLACK SOLDIER FLY (*HERMETIA ILLUCENS*) LARVAE” under the supervision of Dr. Eddy Cheah Seong Guan (supervisor) from the Department of Biological Science, Faculty of Science and Ms. Leong Siew Yoong (co-supervisor) from the Department of Petrochemical Engineering, Faculty of Engineering and Green Technology.

I hereby give permission to the University to upload the softcopy of my final year project in pdf format into the UTAR Institutional Repository, which may be made accessible to the UTAR community and public.

Yours truly,

(YANG SHUN KAI)

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LIST OF ABBREVIATIONS

API	Analytical Profile Index
ATCC	American Type Culture Collection
BLAST	Basic Local Alignment Search Tool
BSA	bovine serum albumin
BSF/BSFL	black soldier fly/ black soldier fly larvae
CFU	colony forming unit
DMSO	dimethyl sulfoxide
DNA	deoxyribonucleic acid
dNTP	deoxyribonucleoside triphosphate
E-value	expect value
LB	Luria-Bertani
MH	Mueller-Hinton
MIC	minimum inhibitory concentration
MRSA	methicillin-resistant <i>Staphylococcus aureus</i>
NADP/NADPH	nicotinamide adenine dinucleotide phosphate
NCBI	National Center for Biotechnology Information
NTC	no-template control
OF	oxidative-fermentative
PBS	phosphate-buffered saline
PCR	polymerase chain reaction
REMA	resazurin microplate assay

sp. /spp.	species
<i>Taq</i>	<i>Thermus aquaticus</i>
UTAR	University Tunku Abdul Rahman
UV	ultraviolet
°C	degree Celcius
bp	base pair
rpm	revolution per minute
U	Unit
V	volt
g	gram
ng	nanogram
nm	nanometer
μg	microgram
μl	microliter
μm	micrometer
μM	micromolar
ml	milliliter
mm	millimeter
kg	kilogram
w/w	weight per weight
w/v	weight per volume