

TABLE OF CONTENT

TITLE PAGE.....	ii
PAGE OF APPROVAL.....	iii
STATEMENT OF AUTHENTICITY.....	iv
ACKNOWLEDGEMENT.....	v
TABLE OF CONTENT.....	vii
LIST OF TABLES.....	ix
LIST OF FIGURES.....	x
LIST OF APPENDIX.....	xi
INTISARI.....	xii
ABSTRACT.....	xiii
I. INTRODUCTION.....	1
A. BACKGROUND.....	1
B. RESEARCH PROBLEMS.....	2
C. AIMS OF THE RESEARCH.....	2
D. BENEFITS OF THE RESEARCH.....	2
II. LITERATURE REVIEW.....	3
A. LITERATURE REVIEW.....	3
2.1. Skin layers.....	3
2.1.1. Stratum corneum.....	3
2.1.2. Epidermis.....	4
2.1.3. Dermis.....	5
2.1.4. Hypodermis.....	5
2.2. Photoaging.....	6
2.3 <i>Centella asiatica</i> (L.) Urb.....	8
2.3.1. Classification of <i>Centella asiatica</i> (L.) Urb.....	9
2.3.2. Morphology of <i>Centella asiatica</i> (L.) Urb	9
2.3.3. Biological Content and Benefits of <i>Centella asiatica</i> (L.) Urb.....	10
2.4 Antioxidants.....	11
2.4.1. Antioxidants Compounds in <i>Centella asiatica</i> (L.) Urb.....	11
B. HYPOTHESIS.....	12
III. RESEARCH METHODS.....	13
A. RESEARCH DESIGN.....	13
B. MATERIALS AND EQUIPMENT.....	13
C. METHODS.....	14
3.1. Sample Preparation.....	14
3.2. Extraction of <i>Centella asiatica</i> (L.) Urb.....	14
3.3. CAE (<i>Centella asiatica</i> Extract) Gel Preparation.....	14
3.4. UV-B Light Irradiation.....	15
3.4.1. Animal Treatment Preparation	15
3.4.2. Animal Treatment with CAE Gel and UV-B Light Irradiation	16
3.5. Histological Preparation.....	18
3.6. Data Analysis.....	18
IV. RESULTS AND DISCUSSIONS.....	20
A. EPIDERMIS THICKNESS.....	21

B. STRATUM CORNEUM THICKNESS.....	23
C. DERMIS THICKNESS.....	25
D. COLLAGEN DIAMETER.....	27
E. GENERAL DISCUSSION.....	30
V. CONCLUSION AND RECOMMENDATION.....	32
A. CONCLUSION.....	32
B. RECOMMENDATION.....	32
REFERENCES.....	34
APPENDIX.....	38

LIST OF TABLES

	Page
Table 1. Topical Treatment Groups Applied to the Dorsal Integument of of <i>Rattus norvegicus</i> (Berkenhout, 1769)	15
Table 2. Measurement of Epidermis and Stratum Corneum Thickness in <i>Rattus norvegicus</i> (Berkenhout, 1769) in each group after UV- B irradiation treatment.....	21
Table 3. Measurement of Dermis Thickness in <i>Rattus norvegicus</i> (Berkenhout, 1769) in each group after UV-B irradiation treatment.....	25
Table 4. Measurement of Collagen Diameter in <i>Rattus norvegicus</i> (Berkenhout, 1769) in each group after UV-B irradiation treatment.....	28

LIST OF FIGURES

	Page
Figure 1. Histological section of human skin.....	5
Figure 2. A histological section of three layers of human skin.....	6
Figure 3. Diagram of UV radiation.....	7
Figure 4. Mechanism of reactive oxygen species (ROS) in photoaging...	8
Figure 5. <i>Centella asiatica</i> (L.) Urb. Leaves.....	9
Figure 6. Design of the customized irradiation box for UV-B irradiation.	16
Figure 7. Microscopic representation of the histological structure of the epidermis and stratum corneum layer of <i>R. norvegicus</i> (Berkenhout 1769) after 7 days of UV-B irradiation, with HE staining and 10x10 magnification. (a) S; (b) C-; (c) C+; (d) F1 (1%); (e) F2 (10%); (f) F3 (20%).....	24
Figure 8. Microscopic representation of the histological structure of the dermis layer of <i>R. norvegicus</i> (Berkenhout 1769) after 7 days of UV-B irradiation, with MAF staining and 4x10 magnification. (a) S; (b) C-; (c) C+; (d) F1 (1%); (e) F2 (10%); (f) F3 (20%).....	27
Figure 9. Microscopic representation of the histological structure of the collagen fibers of <i>Rattus norvegicus</i> (Berkenhout 1769) after 7 days of UV-B irradiation, with MAF staining and 10x10 magnification. (a) S; (b) C-; (c) C+; (d) F1 (1%); (e) F2 (10%); (f) F3 (20%).....	29

LIST OF APPENDIX

	Page
Appendix 1. Measurements of epidermis thickness from ImageJ.....	36
Appendix 2. Measurements of stratum corneum thickness from ImageJ.	36
Appendix 3. Measurements of dermis thickness from ImageJ.....	36
Appendix 4. Measurements of collagen diameter from ImageJ.....	37
Appendix 5. Tests of Normality (Kolmogorov-Smirnov and Shapiro-Wilk Tests) with SPSS Statistics.....	37
Appendix 6. Descriptive Statistics with Confidence Intervals (SPSS Statistics)	38
Appendix 7. Levene's Test for Homogeneity of Variances with SPSS Statistics.....	38
Appendix 8. Post Hoc Test (Tukey HSD) for Epidermis Thickness and Stratum Corneum with SPSS Statistics.....	39
Appendix 9. Post Hoc Test (Tukey HSD) for Dermis Thickness and Collagen Diameter with SPSS Statistics.....	40
Appendix 10. Post Hoc Test (Tukey HSD) for Epidermis Thickness Subsets.....	41
Appendix 11. Post Hoc Test (Tukey HSD) for Stratum Corneum Thickness Subsets.....	41
Appendix 12. Post Hoc Test (Tukey HSD) for Dermis Thickness Subsets.	42
Appendix 13. Post Hoc Test (Tukey HSD) for Collagen Diameter Subsets	42
Appendix 14. Documentation of <i>Centella asiatica</i> Leaf Extract Process..	43
Appendix 15. Documentation of Animal Treatment.....	43
Appendix 16. Ethical Clearance.....	44