

IR-PERPUSTAKAAN UNIVERSITAS AIRLANGGA

**DISSERTATION**

**SECONDARY METABOLITES FROM MYANMAR MEDICINAL PLANT  
(*Clausena excavata*) AND THEIR ANTIOXIDANT, ANTIDIABETIC, AND  
ANTICANCER ACTIVITITES**



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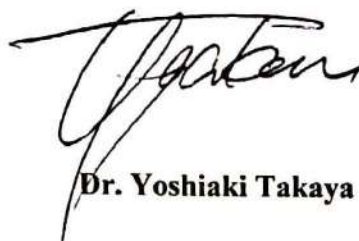
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**LIST OF ABBREVIATIONS**

WHO	=	World Health Organization
<sup>1</sup> H NMR	=	Proton Nuclear Magnetic Resonance
<sup>13</sup> C NMR	=	Carbon Nuclear Magnetic Resonance
HSQC	=	Heteronuclear Single Quantum Coherence
HMBC	=	Heteronuclear Multiple Bond Coherence
DQF-COSY	=	Double Quantum Filtered Correlation Spectroscopy
NOESY	=	Nuclear Over Hauser Effect Spectroscopy
Hz	=	Hertz
MHz	=	Mega Hertz
δ	=	Chemical shift value
ppm	=	Parts per million
s	=	Singlet
d	=	Doublet
dd	=	Double doublet
t	=	Triplet
m	=	Multiplet
<i>J</i>	=	Coupling constant
CDCl <sub>3</sub>	=	Deuterated chloroform
methanol-d <sub>4</sub>	=	Deuterated methanol
DMSO-d <sub>6</sub>	=	Deuterated dimethylsulfoxide
FT-IR	=	Fourier Transform Infrared
UV	=	Ultraviolet
Vis	=	Visible
cm <sup>-1</sup>	=	Reciprocal centimeter
NaCl	=	Sodium Chloride
DART-MS	=	Direct analysis real time Mass Spectroscopy
<i>m/z</i>	=	mass by charge
HPLC	=	High Performance Liquid chromatography
DCM	=	Dichloromethane

EtOAc	=	Ethyl Acetate
MeOH	=	Methanol
H <sub>2</sub> O	=	Water
R <sub>f</sub>	=	Retardation factor
v/v	=	volume by volume
°C	=	degree Celsius
%	=	Percentage
g	=	gram
mg	=	milligram
kg	=	kilogram
mp	=	Melting point
$[\alpha]_D^{20}$	=	Specific rotation in degrees
TLC	=	Thin-Layer Chromatography
VLC	=	Vacuum liquid chromatography
GCC	=	Gravitational column chromatography
CC	=	column chromatography
Fig.	=	Figure

## LIST OF PUBLICATION AND CONFERENCE

### List of Publications :

1. T. M. Thant, N. S. Aminah, A. N. Kristanti, R. Ramadhan, P. Phuwapraisirisan, Y. Takaya, 2019, A new pyrano coumarin from *Clausena excavata* roots displaying dual inhibition against  $\alpha$ -glucosidase and free radical, Nat. Product research. (Online Published)
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## ABSTRACT

SECONDARY METABOLITES FROM MYANMAR MEDICINAL PLANT  
(*Clausena excavata*) AND THEIR ANTIOXIDANT, ANTIDIABETIC, AND  
ANTICANCER ACTIVITIES

Tin Myo T., Nanik Siti A., Alfinda Novi K. and Yoshiaki Takaya

In the course of searching bioactive constituents from Myanmar medicinal plant (*Clausena excavata*), a total of 17 isolated and modified compounds were reported from this species. Among them one new compound, TMT-4, (excavatin-A) was isolated together with six known compounds; TMT-1 (nordentatin), TMT-2 (dentatin), TMT-3 (heptaphylline), TMT-5 (mukonine), TMT-6 (xanthoxyletin), and TMT-7 (7-hydroxyheptaphylline) were naturally isolated from *C. excavata*. Moreover, 10 new pyranocoumarin benzoate derivatives (TMT-1a to TMT-1j), were semi-synthesized from TMT-1 (nordentatin). All structures were elucidated by using spectroscopy methods. All the isolated and modified compounds were tested on their antioxidant activity by DPPH assay, antidiabetic activity by using  $\alpha$ -glucosidase inhibition assay and cytotoxicity by MTT assay. Among isolated compounds, TMT-1 showed the highest antioxidant activity with  $IC_{50}$  values 0.02 mM. Moreover, TMT-1 exhibited strong inhibition activity against maltase ( $IC_{50}$  5.45  $\mu$ M) and sucrase ( $IC_{50}$  43.57  $\mu$ M), whereas TMT-2 showed high inhibition against maltase and yeast enzymes. Moreover, inhibition activity modified compounds against on yeast  $\alpha$ -glucosidase were performed and compared with the parent compound (TMT-1). Of modified compounds, TMT-1b exhibited highest inhibition against yeast  $\alpha$ -glucosidase with  $IC_{50}$  values 1.54 mM (where, acarbose  $IC_{50}$  values 7.57 mM was used as standard) more inhibit than parent compound TMT-1 (nordentatin, 37.62 mM) on yeast  $\alpha$ -glucosidase enzymes. In addition, the evaluation of cell viability of *Hela* (cervical cancer) and T47D (breast cancer) of isolates and semi-synthesized compounds were performed. Among tested compounds, new compound TMT-4 (excavatin-A) showed the highest cell cytotoxic activity on hela ( $IC_{50}$ , 44.5  $\mu$ M) and on the other hand, TMT-1 (nordentatin) showed the highest values on T47D ( $IC_{50}$  41.3  $\mu$ M).

*Keywords:* *Clausena excavata*, *excavatin-A*, *nordentatin*, *dentatin*, *heptaphylline*, *7-hydroxyheptaphylline*, *xanthoxyletin*, *mukonine*, *pyranocoumarin benzoates*, *antioxidant*,  *$\alpha$ -glucosidase inhibitor*, *Hela*, *T47D*