



CHAPTER I

INTRODUCTION

1.1 Botanical Aspects of *Harrisonia perforata* Merr.

Harrisonia perforata Merr. belong to the family of "Simaroubaceae", [1] a mainly tropical family centered in the New World. Plants in this family usually contain very bitter substances.[2] Their spirally arranged and stipules leaves are present in few genera. They usually have compound, axillary, but rarely terminal inflorescence and uni- or bisexual flowers. Sepals, 3 to 5 number, are almost connate, varied from valvate to slightly imbricate. Their petals, also 3 to 5 in number, are free and imbricate or valvate. Stamens inserted at the base of an intrastaminal and hypogynous disks are either isomerous or dimerous, but mostly obdiplostemonous (not rarely with a scale at the inner base). Plants in this family have separate carpels, 4 to 5 celled ovaries, and indehiscent (often drupaceous or a samara) fruits.

Plants in this *Harrisonia* genus are both perennial and shrubbery trees with thorns, erect or sprawling shrubs with height up to 12 m. and pithy branches. The older branches are glabrous and lenticellate. The stipular thorns are accrescent, conical, slightly recurved up to 7 mm. and finally caducous. Annual shoots have small persistent bud scales and sometimes spines at the base.

Harrisonia perforata Merr. is a shrubbery tree with thorns and 1 to 15 jugates (up to ca. 20 cm. in length) of odd-pinnate leaves. Rhachis is narrowly winged, usually with a rib above, and pubescent, especially on top. Leaflets are 10 to 20 by 5 to 15 mm., with petiole length of 0.5 to 3 cm. Branches of cymes and thyrses, for some

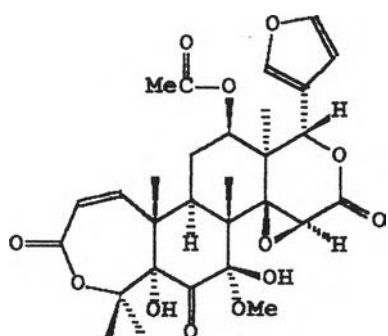
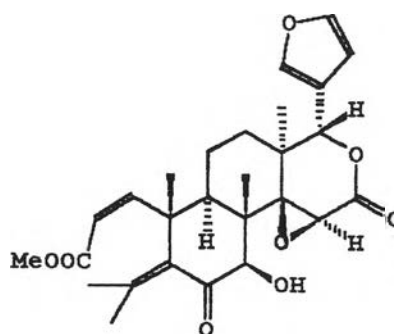
length, adnate to the peduncle that has pedicels of up to 2 mm. in length. Calyx is ca. 1.5 cm. high, having 0.75 cm. lobes. Petals are lanceolate, rarely oblong, and 6 to 9 by 11 to 15 mm. in dimension. Stamens have the following aspects : anthers (ca. 1.5 to 4.5 mm.); filaments (7 to 10 mm.); and densely woolly ligule at the margin (ca. 2 mm.). Cup-shaped disk is 1 to 2 mm. high and the ovary is slightly lobed with height of 0.5 to 1 mm. Style is pubescent with length of 5 to 8 mm. The fruit of this plant has the dimension of 4 to 9 by 11 to 15 mm. with at least 1 mm. thick coriaceous exocarp and hard endocarp without a suture. This plant has been found in all parts of Thailand, Hainan, Cambodia, Cochinchina, Malaysia and some other countries in Asia. It often grows on limestone, in deciduous forest, in thickets and along roadside, mostly in open or exposed places. (3,4,5)

1.2 Chemical Constituents of the Genera *Harrisonia*

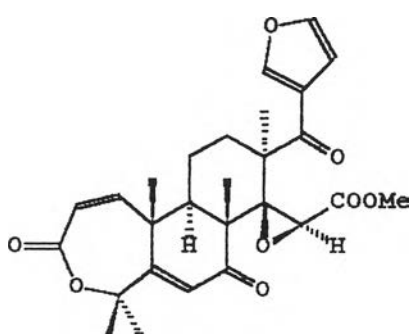
Many plants in *Harrisonia* genera have already been studied and many compounds were identified as shown in Table 1.

organic compound	Genera Species	Harrisonia					
		abyssinica		brownii	perforata		
		root-bark	root	bark	leaf	root-bark	root
12 -acetoxyharrisonin	1	7	11				
alloptaeroxylin	8		10				
atalantolide	2		10				
brownin A	18			12			
brownin B	19			12			
coumarin	20						18
5-dehydrooriciopsin	3	9					
harrisonin	4	6,7	11				
heteropeucenin	9						15
heteropeucenin-7-methyl ether	10						17,18
5-hydroxy-6,7-dimethoxycoumarin	21						18
2-hydroxymethyl-3-methylalloptaeroxylin	11						18
2-hydroxymethylalloptaeroxylin	12	8					
long chain aliphatic alcohol							18
lupeol	22						18
5-methoxyheteropeucenin	13						15
mixture of steroidal glycosides							17,18
mixture of steroids						14	17,18
obacunone	5	6,7,9	10,11			14	
pedonin	6		11				
perforatic acid	14						16,17,18
perforatin	7				13		
perforatin A	15	8	10				15
perforatin B	16						15
peucenin	17		10				
		[6,7,8,9]	[10,11]	[12]	[13]	[14]	[15,16,17,18]

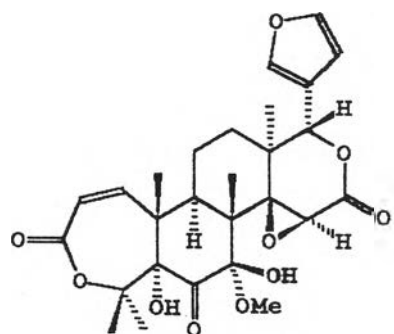
Table 1 The chemical constituents of some Harrisonia genera

(1) 12 β -acetoxyharrisonin

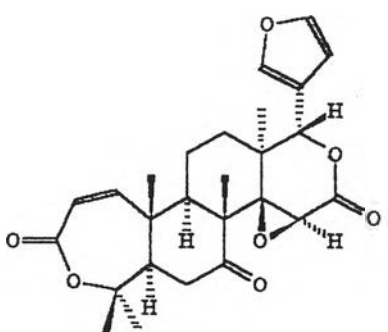
(2) atalantolide



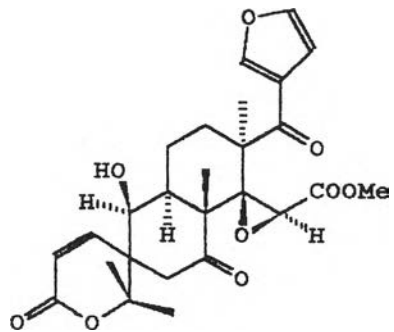
(3) 5-dehydrooriciopsin



(4) harrisonin

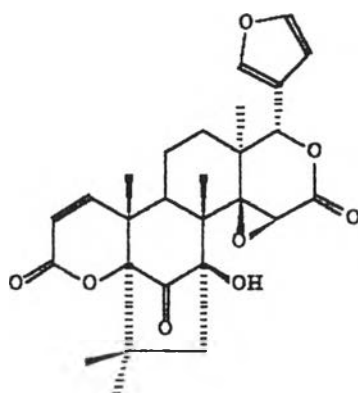


(5) obacunone

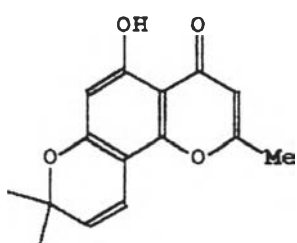


(6) pedonin

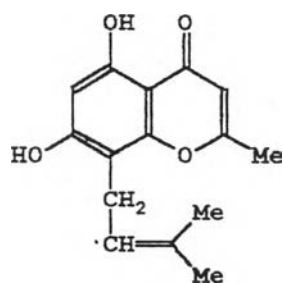
Figure 1 Chemical constituents of some *Harrisonia* genera



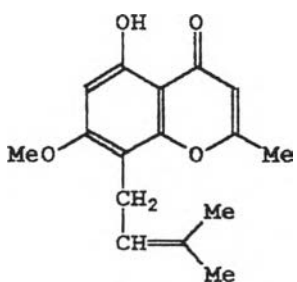
(7) perforatin



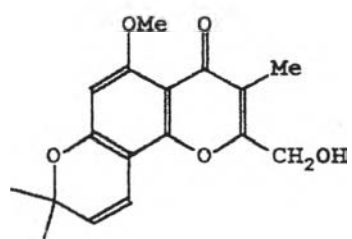
(8) alloptaeroxylin



(9) heteropeucenin

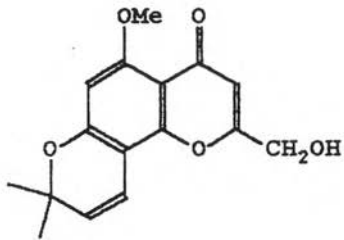


(10) heteropeucenin-7-methyl ether

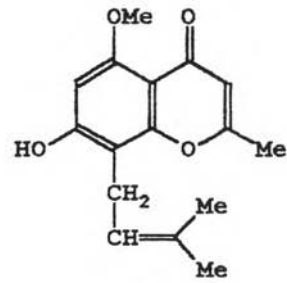


(11) 2-hydroxymethyl-3-methylalloptaeroxylin

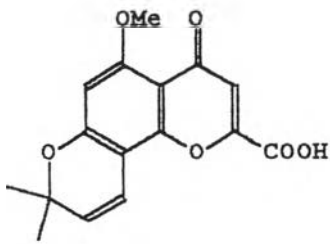
Figure 1 (continued)



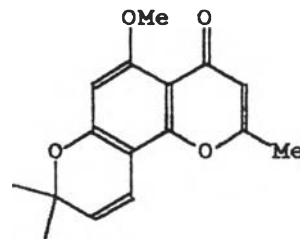
(12) 2-hydroxymethylalloptaeroxylin



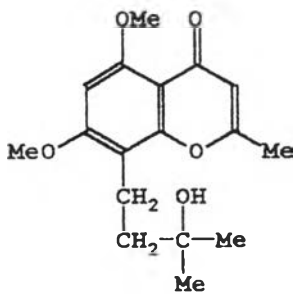
(13) 5-methoxyheteropeucenin



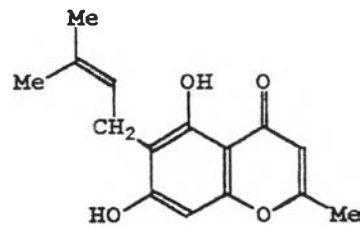
(14) perforatic acid



(15) perforatin A

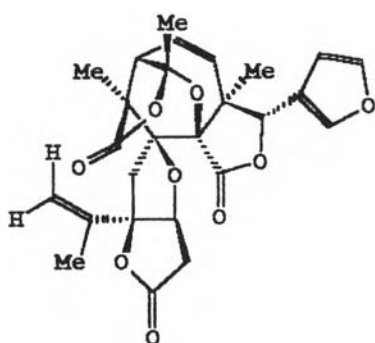


(16) perforatin B

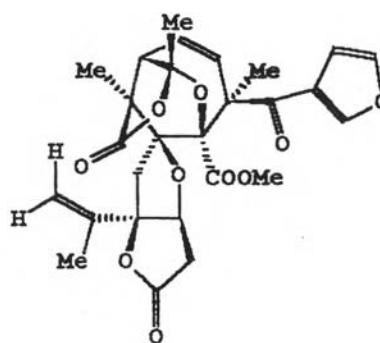


(17) peucenin

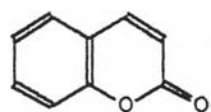
Figure 1 (continued)



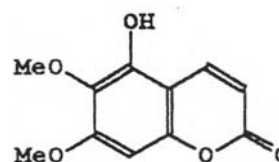
(18) brownin A



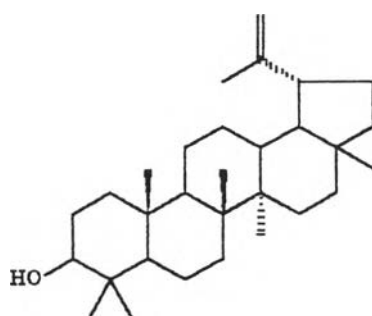
(19) brownin B



(20) coumarin



(21) 5-hydroxy-6,7-dimethoxycoumarin



(22) lupeol

Figure 1 (continued)

1.3 Pharmacological Activities

In the part, plants in Simaroubaceae family that have been used as local medicinal herbs, are tabulated in Table 2.

The works involving the pharmacological activities of *Harrisonia perforata* Merr. were done by Mongkhon Morkhasamit. [19] In his work, it was found that the ethanolic crude extract exhibited antihistamine property and had some effects on the smooth muscle of mice's small intestine. Other utilizable of *Harrisonia perforata* were summarized in Table 3.

Table 2 The Utilities as herbs from Simaroubaceae family

Scientific Names	Plant parts	Utilities
<i>Brucea javanica</i>	fruit	antidysentery antidiarrhoea febrifuge
<i>Eurycoma longifolia</i>	root	febrifuge
	root bark	febrifuge
<i>Harrisonia abyssinica</i>	root, root bark	antifeedant antimicrobial cytotoxic
<i>Harrisonia brownii</i>	root	antidysentery anticholera
<i>Harrisonia perforata</i>	wood	antidiarrhoea
	root bark	antidysentery
<i>Picrasma javanica</i>	bark	febrifuge

Table 3 The utilities of *Harrisonia perforata* Merr.

Plant parts	Utilities
root	febrifuge, antihistamine
bark	antiseptic
branch	toothbrush
wood	febrifuge
	antidysentery
root bark	antidiarrhoea

1.4 The Objective of this Research

The objective of this research can be summarized as follow :

1. To extract and isolate the organic constituents from the root bark of *Harrisonia perforata* Merr.
2. To elucidate the structural formulas of the isolated compounds obtained from the root bark of *Harrisonia perforata* Merr.
3. To add information on the data of the plant taxonomy of Simaroubaceae.