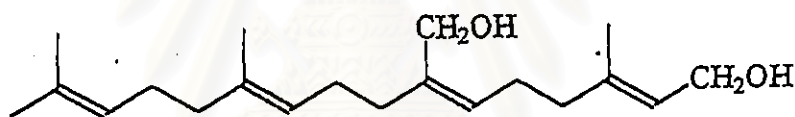


CHAPTER I



INTRODUCTION

Medicinal plants can be used as therapeutic agents. It is believed that they have less harmful side effects than synthetic drugs. Moreover, they are often cheap and easily available. Thus, the research studies in medicinal plants are interesting and important. An example of active component found in Thai medicinal plants is Plaunotol which can be isolated from Plao noi (*Croton sublyratus* Kurz.) and used as an anti-ulcer agent. [1]



Plaunotol

From the Thai pharmacopoeia, many plants in the 'Plao' (*Croton*) genus are useful as folk medicine. For example, the barks and roots of Plao Nam Ngoen (*C. cascarilloides* Raeusch.) can be used as an antifebrile, the woods of Plao Lueat (*C. robustus* Kurz.) can be used as an antianemic agent, the barks and leaves of Plao Noi can be used as a antidysuric agent, Plao Yai (*C. oblongifolius* Roxb.) is often used with Plao Noi, etc. [2]

Croton oblongifolius Roxb. is an interesting Thai medicinal plant because of it is believed that all parts can be used as drugs such as the leaves can be used as a tonic, the flowers are used as a teniacide, the fruits are used to treat dysmenorrhea, the seeds are used as a purgative, the barks are used to treat dyspepsia, and the roots are used to treat dysentery.[3]

Botanical Aspects of *Croton Oblongifolius* Roxb.

Croton oblongifolius Roxb. is a medium-sized deciduous tree in the Euphorbiaceae family. There are about 800 genera and 5,000 species in this family. In Thailand, it is commonly called as Plao Yai (Central), Plao Luang (Northern), Poh (Kamphaeng Phet), Khwa-wuu (Karen-Kanchanaburi), Saa-kuu-wa (Karen-Mae hong Son), Haa-yoeng (Shan-Mae Hong Son). It is distributed throughout forests or shrubs below 700 meters above sea level. [4,5]

General characterization of *Croton oblongifolius* Roxb. can be summarized as follows. The trunk is straight. The bark is ash-coloured and pretty smooth. The leaves are petioled, alternate and thickly set about the ends of the branchlets, spreading or drooping, oblong, serrate, obtusepointed, very smooth on both sides, from six to twelve inches long. The petioles are round and smooth, with a lateral gland on each side of their apices. The stipules are small and caducous. The racemes are terminal, generally solitary, erect; shorter than the leaves. The flowers are solitary, a few female ones mixed with many male ones, small, of a pale yellowish green. The bractes are three-fold and one-flowered. The glands are on the inside of each of the small, lateral bractes is a round permanent one. The male calyx is deeply five-cleft. The six petals are very woolly and smaller than the calyx. The twelve filaments, nine in the circumference and three in the centre, are distinct, woolly toward the base. The female calyx and corol is as in the male. The stamens are none. The germ is globular. The three styles, each divided into two very long, are variously bent segments. The capsules are globular, fleshy, six-furrowed and tricocous. [6]

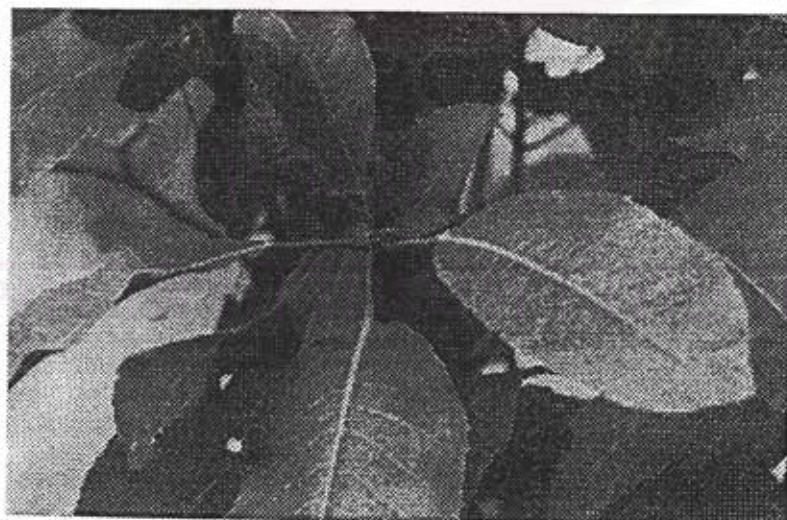


Figure.1 *Croton oblongifolius* Roxb.

Research studies in Chemical Constituents of *Croton Oblongifolius* Roxb.

From the literature surveys, the chemical constituents of *Croton oblongifolius* Roxb. have been studied since 1968.

In 1968, P.S. Rao, G.P. Sachdev, T.R. Seshadri and H.B. Singh [7] studied on the bark of *Croton oblongifolius* Roxb.. They found a new diterpene alcohol, β -sitosterol and oblongifoliol.

In 1969, V.N. Aiyar, P.S. Rao, G.P. Sachdev and T.R. Seshadri [8] found deoxyoblongifoliol from the bark.

In 1970, V.N. Aiyar and T.R. Seshadri [9] studied on the structure of oblongifolic acid, the major diterpene acid component of the bark, it was formulated as isopimara-7(8), 15-diene-19-oic acid.

In 1971, V.N. Aiyar and T.R. Seshadri determined the structures of oblongifolius and deoxyoblongifolius again. Two components have been assigned their structures as *ent*-isopimara-7,15-diene-3 β ,19-diol and *ent*-isopimara-7,15-diene-3 β -ol respectively. [10] In the same year, they found three new minor components from the bark. One was *ent*-isopimara-7,15-diene, the second was 19-hydroxy-*ent*-isopimara-7,15-diene and the third was *ent*-isopimara-7,15-diene-19-aldehyde.[11] Moreover, Acetyl aleuritolic acid, 3 β -acetoxy-olean-14(15)-ene-28-oic acid, has been obtained from the bark.[12]

In 1972, V.N. Aiyar and T.R. Seshadri found two closely related furanoid diterpenes from the bark. One was *ent*-15,16-epoxy-3,11,13(16),14-clerodatetraen-19-oic acid or 11-dehydro(-)-hardwickiic acid and the second was (-)-hardwickiic acid. [13] They studied on the other parts of *Croton oblongifolius* Roxb., root-bark, wood and leaves. The almost compounds which were reported from the stem-bark but in poorer yields, while the leaves gave only waxy materials. [14]

The chemical constituents of *Croton oblongifolius* Roxb. can be summarized in Table 1 and Figure 2.

Table 1 The Chemical Constituents of *Croton oblongifolius* Roxb.

Plant parts	Organic Compounds	References
Bark	oblongifoliol (I)	[7,10]
	19-deoxyoblongifoliol (II)	[8,10]
	oblongifoliol acid (III)	[9]
	<i>ent</i> -isopimara-7,15-diene (IV)	[11]
	3-deoxyoblongifoliol (V)	[11]
	<i>ent</i> -isopimara-7,15-diene-19-al (VI)	[11]
	acetyl aleuritic acid (VII)	[12]
	11-dehydro(-)-hardwickiic acid (VIII)	[13]
	(-)-hardwickiic acid (IX)	[13]
Wood	oblongifoliol (I)	[14]
	19-deoxyoblongifoliol (II)	[14]
	oblongifoliol acid (III)	[14]
	<i>ent</i> -isopimara-7,15-diene (IV)	[14]
	3-deoxyoblongifoliol (V)	[14]
	<i>ent</i> -isopimara-7,15-diene-19-al (VI)	[14]
	11-dehydro(-)-hardwickiic acid (VIII)	[14]
	(-)-hardwickiic acid (IX)	[14]
Leaves	waxy materials	[14]

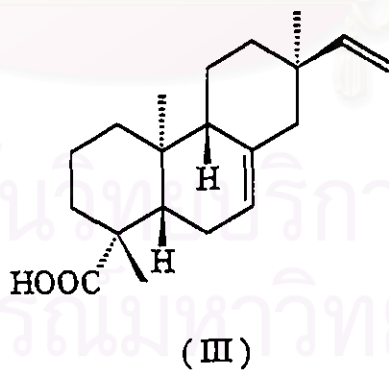
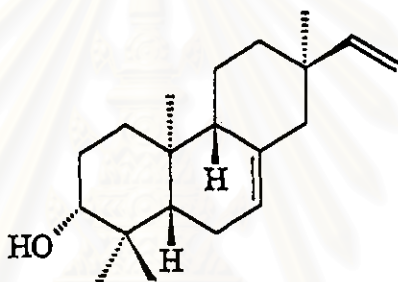
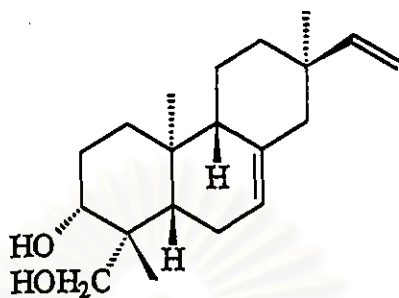
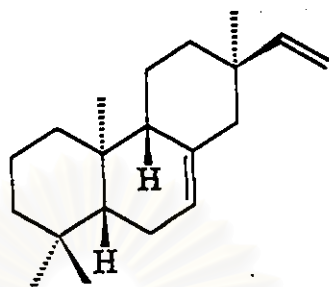
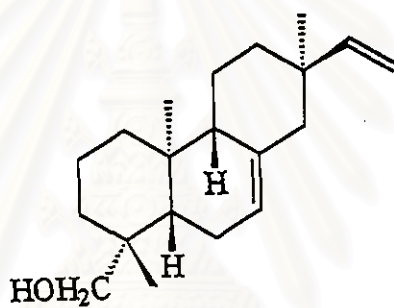


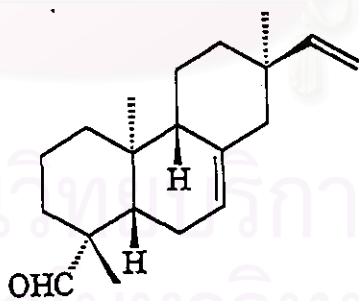
Figure 2 The Chemical Constituents of *Croton oblongifolius* Roxb.



(IV)

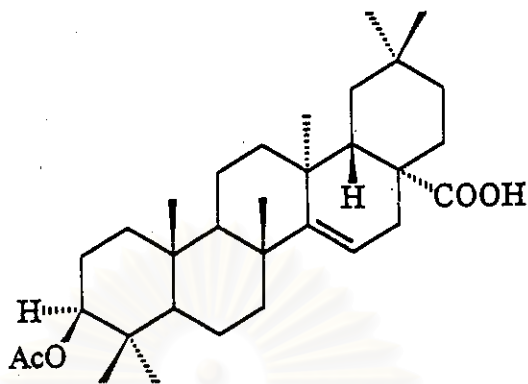


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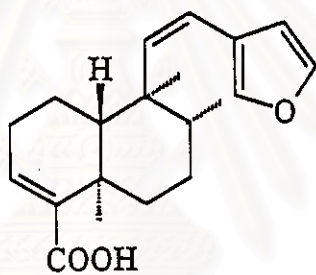


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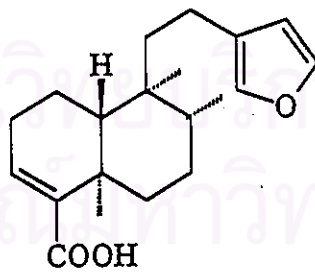
Figure 2 (continued)



(VII)



(VIII)



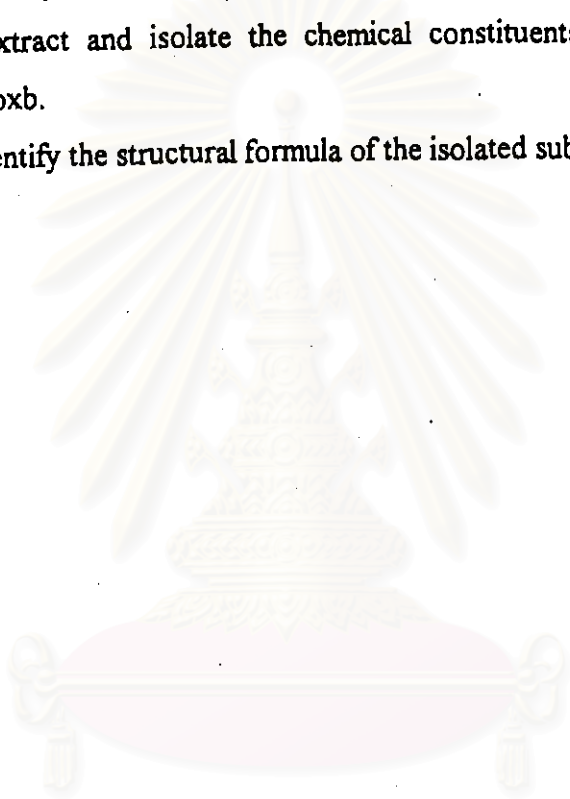
(IX)

Figure 2 (continued)

From the beginning information, the leaf of *Croton oblongifolius* Roxb. can be used as drug and the previous studies in chemical constituents of the leaf of *Croton oblongifolius* Roxb. have not yet been found any biologically active compounds. Therefore it was decided to re-investigate chemical constituent of the leaf of *Croton oblongifolius* Roxb.

Thus, the objective of this research will be summarized as follows:

1. To extract and isolate the chemical constituents of the leaf of *Croton oblongifolius* Roxb.
2. To identify the structural formula of the isolated substances.



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