CHAPTER 1

INTRODUCTION

1.1 General

Studies on chemical constituents of tropical plants are of interest to many organic chemists in order to discover new compounds and to study the relationship between the chemical constituents. The flora in Malaysia is regarded as one of the richest and oldest in the world, hence it reveals an interesting site to search for medicinal plants. Hsuen Keng[1] reported that, the richness may be attributed to two reasons, firstly, the climate in Malaysia is constantly warm and nearly uniform, suitable for the growth of tropical rainforests, secondly, the region has been a stable one, which has made possible the persistance of vegetation, at least from the early tertiary (over 50 million years ago).

The Malaysian forest consists of many variaties of plants. Published reports[2,3] have indicated that, over the last fourty years, at least 500 genera and more than 5000 species were found in the flora of Malaysia with ca. 900 species being used by practitioners of traditional medicines[4]. Interestingly, some of the species have valuable drugs and have been used for many generations in various traditional

medicinal systems, for examples, *Eurycoma longifolia* (Tongkat Ali), *Striga asiatica* (Jarum Mas), *Zingiber officinale* (Halia) and *Labisia pothoina* (Kachip Fatimah) [5].

In this research, two species from the family of Annonaceae and Lauraceae were studied. The study mainly deals with isolation and structural elucidation of natural products from the bark and the leaves of *Phoebe grandis* (Nees) Merr.(Lauraceae) and the bark and the leaves of *Ganiothalamus tortilipetalus* Hend. (Annonaceae).

1.2 Lauraceae : General Appearance And Morphology[6]

Lauraceae in Malay known as "Medang", consists of ca. 35 genera and 2500 species throughout the warmer parts of the world whilst in Malaysia, it comprises about 16 genera and 213 species.

Ecology of Lauraceae is dependent on the types of lands whether lowlands or highlands. In the lowlands, the Lauraceae are typically small trees of the lower canopy except for a few species which may reach 30 metres tall whereas in the highlands , the Lauraceae becomes more abundant reaching the top layer of the forest canopy.

In Malaysia, timbers from this family are of no great commercial importance although trees of commercial size are fell. They are suitable for decorative work such as interior, finishing, panelling, furniture and cabinet making. The timber is also

suitable for plywood manufacture and the heavier species could be utilitized for medium construction under cover.

The trees of Lauraceae are usually evergreen, shrubs and without buttresses. They are often aromatic or leafless twining parasites as in *Cassytha*. The bark is usually smooth, rarely fissured, scaly or dippled and often covered with large lenticels with the colour of grey-brown to reddish brown while for inner bark, they are usually very thick, granular, mottled or laminated with strong aromatic smell. Terminal bud is naked or covered with bud scales which sometimes appear like small leaves as in *Actinodaphne*.

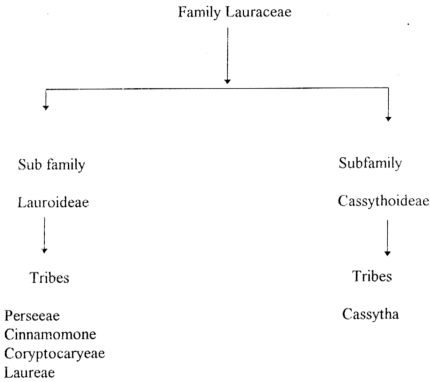
The leaves of this family appear in a simple way. They are spiral, alternate, opposite, subopposite, whorled, entire and leathery. Occasionally the secondary veins pinnate has only one pair of veins (trinerved) as in *Cinnamomum*.When more than one present, the basal pair is enhanced and the leaf base appears trinerved as in *Lindera*. The colour of the new leaves vary from nearly white to pink, purple, red or brown.

The flowers are surrounded by an involucre of decussate persistent large bracts as in *Litsea, Lindera* and *Neolitsea*. The flowers are small, regular, greenish white or yellow, fragrant or with rancid smell, bisexual or unisexual,trimerous (trimerous in *Neolitsea*) and perianth free or united with six tepals in two rows (four tepals in two rows in *Neolitsea*). The flowers are pollinated chiefly by flies and beetles which are attracted by the smell emitted from the flowers.

The fruits are small to large one-seeded berry. Sometimes they are enveloped by the accrescent perianth tube (*Cryptocarya*) or the perianth persisting and clasping the base of fruit as in *Phoebe*. In some genera the perianth lobes are droping but the tube is developing into a shallow or deep cup at base of fruit (*Litsea*). The fruit stalks are enlarging and becoming highly coloured in some species of *Dehaasia* and *Alseodaphne*. The fruits are eaten by monkeys, squirrels, bats, musangs and birds. However, some species are not eaten by these animals.

1.3 Classification of tribes

Classification of Lauraceae proposed by Hsuan Keng[7] can be illustrated in Scheme 1 and Table 1 below. He classified that over thirty genera , mainly grow in tropical and sub tropical Asia and America and about sixteen are found in Malaysia. This classification is according to Malayan seed plants.



Scheme 1: Classification of Lauraceae

Table 1: Genera of Lauraceae in the Malayan flora

Tribe 1 Perseeae	Tribe 2 Cinnamomone	Tribe 3 Cryptocaryeae	Tribe 4 Laureae
Perseae Phoebe Beilschmeidinea Perseineae	Cinnamomineae Anibineae Actinodaphne	Eusideroxylineae Cryptocaryineae Eusideroxylon Cryptocarya	Litseineae Lauriineae Litsea linera Neolitsea Laurus

1.4 The Genus *Phoebe*

Phoebe is a genus belongs to the family of Lauraceae, of the tribe of Perseeae[8] and found in Asia and America. In Malaysia the species are largely montane. Kochummem[6] reported that there are 50 species found in Pantropic and ca. 6 species in Malaysia.

Phoebe is found most abundant in Borneo and the Malaysian Peninsula, from central Perak to Malacca. Nothing economic value is recorded of the following Malaya species ; *P.cuneata, P. multiflora, P. declinata,* Nees and *P. tavayana*. Several species including *P.declinata, P.excelsa, P.macrophylla, P. multiflora, P. opaca* are mainly used for house- building, sculpture, panelling, carriages, ceiling and pyrography.

These evergreen trees or shrubs have leaves alternate and often fascicled at ends of twigs.The flowers appear in bisexual and panicles from upper leaf axils. They also have a short perianth tube with six lobes, subequal and the outer 3 is slighly shorter, persistent, enlarged and erect in fruit. Whereas the fruits are ovoid or ellipsoid seated on a cup formed by the enlarged and thickened erect persistent perianth lobes.

Description of *Phoebe grandis* (Nees) Merr.[9]

The tree is normally medium in size. It can achieve more than 21 metres tall and 150 cm girth. The bark is grey-fawn, lenticelate and scaling off in thin paperly flakes. It smells strongly aromatic. The inner bark is dark brown.

The leaves are frequently clustered at the end of the twigs. The stalk may have 1.2- 5 cm long with blade leathery, obovate or oblanceolate. It is also very variable and sometimes glaucous below 12.5- 30 x 3.5-12.5 cm. Moreover the colour of the flowers are normally yellowish brown. For more specific, the fruits of this species may be blue in colour, ellipsoid 1.5 x 0.75 cm seated on slightly enlarged lobed perianth.

The species can be found in the lowland to the mountain forests throughout Malaysia, Java, Sumatera and Borneo.

1.5 Annonaceae: General Appearance and Morphology

The trees of Annonaceae are shrubs, erect or climbing. They may reach more than 40 metres high and the shrub may go to about 30 cm high. The bark is usually smooth and entire, pale grey or buff to brown. The twigs are pubescent or tomentose, but rarely glabrous. Young twigs become glabrous sooner or later.

The leaves are always simple, alternate and entire without stipules and membranous or corioceous. The base maybe acute, rounded, emaginate, ordate or unequal sided. The apex is acute, accuminate or less often obtuse.

The flowers are usually solitary and scented. The scented flowers are very famous and the most popular species with fragrant flowers is *Cananga odorata* (Ylang-ylang). When the flower is not solitary, the influorescence is often a few flower cyme, usually condensed. The petals have a wonderful diversity and are of the greatest diagnostic value in Annonaceae.

The stamens are normally numerous, arranged in spirals on a convex or slightly flattened torus. The apex may be oblique, truncate, flat topped, two lobed with a little depression in the middle, convex, conical or produced into a long point.

The ovaries are usually oblong, cylindric, terete or angled and occasionally slightly falcate. They are usually covered with a pubescent or tomentose indumentum. The stigma may be present or absent. When present it is short as in *Monocarpia* and *Popowia* or elongated and slender as in *Xylopia* and *Goniothalamus*. In all genera,the stigma is split or slightly grooved on the top.

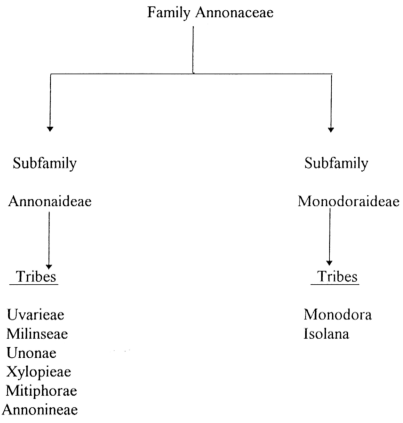
The fruits of Annonaceae are very important in determining the genera. In fact, the Annonaceae are subdivided into two subfamilies, Annonoideae and Monodoroideae on the basis of the fruit alone. In Annonoideae a great majority has apocarpous carpels. They are stalked or sessile whereas in a few genera the carpels are united into a many celled syncarp with erect stigmas. While in Monodoroideae, the carpels are united into a one celled ovary with placentation and radiating stigmas.

1.5.1 The Genus *Goniothalamus*

The genus *Goniothalamus* belongs to the family of Annonaceae. These come from subfamily of Annonaideae of tribes Mitiphorae. Other tribes of Annonaideae and Monodoroideae are shown in Scheme 2. There are 38 genera, 198 native and 5 cultivated species plus 17 varieties of Annonaceae in Penisular Malaysia as illustrated in Table 2 [10]. Determination of a genus is relied on a combination of characters, such as that of the petal and the fruit. Kochummen reported that, there are one hundred and fourteen species *Goniothalamus* grow in South and East of India, Sri Langka , Burma and Thailand, whilst in Malaysia, there are about twenty one species.

The trees of genus *Goniothalamus* are normally shrubs or small trees. The leaves are leathery or papery. The nerves are prominent with ladder-like reticulations or indistint with a lax network of reticulations. While for the flowers, they are usually axillary, sometimes terminal or cauliflorous.

For more specific, the petals reveal in the form of valvate, quite leathery and outer larger than inner. This genus also has many stamens with quite linear-oblong, connectives apiculate and flat topped or convex. The ovaries are numerous, cylindrical, pubescent or glabrous with the style of linear and grooved on the anterior side. Their stigmas are more or less funnel shaped with two lobed, rarely cylindrical and truncate. The fruits are stalked or sessile with 1-2 seeded.



Scheme 2: Classification of Annonaceae

1.5.2 *Goniothalamus tortilipetalus* Hend.

G.tortilipetalus are found most abundant in Kelantan, Perak, Pahang, Selangor, Malacca and Thailand.

The tree may achieve more than 6 metres tall with the diameter about 14 cm. The bark is blackish and fragrant. The leaves are leathery, oblong, shortly acuminate blunt. The base obtuse is about 5.5- 59 cm x 3.7- 12 cm with the colour of bright green above and glaucous below. The tree also has 25 pairs of nerves and it is inconspicuous at beneath. The petioles are of 1.2- 2.0 cm on old wood. The colour of

the flowers are normally orange. Furthermore, the fruits are ellipsoid, 1.5 cm long and glabrous. The lenght of the stalks are 5 mm long, with single and oblong seed.

Table 2 : Genera Of Annonaceae in Malayan Flora

Tribe 1 Uvarieae	Tribe 2 Unoneae	Tribe 3 Xylopeae	Tribe 4 Miliuseae	Tribe 5 Mitiphoreae	Tribe 6 Annoneae
Sageraea	Cyathocalyx	Xylopia	Marsipopetalum	Pseduvaria	Annona
Stelechocarpus	Artabotrys	Anaxagorea	Phaeanthus	Neo- Uvaria	
Kingstonia	Desmos	Fissistigma	Miliusa	Goniothalamus	
Enicosanthum	Monocarpia	Pyramidanthe	Alphonsea	Oxymitra	
Trivalvaria	Oncodostigma	Mitrella	Platymitra	Mitrephora	
Uvaria	Polyalthia	Melodorum	Orophea	Popowia	
Cyathostemma	Cananga				
Rauwenhoffia	Mezzettia				
Ellipeia	Disepalum				
	Meiogyne				

1.6 Medicinal Value

The study of herbs and their medicinal uses in phytotherapy - has started since a long time ago and most common use is internally when the herbs are consumed as "tea" or infusian. The herb appears to manifest medicinal (healing) qualities.[11] Traditional medicine is widely practiced throughout the world and Malaysia is no exception. It has been with Malaysians of all ethnics for the last hundred of years. Ethnobotanical surveys carried out among various Malaysians communities revealed

that many plants species are extensively being used as remedies for various symptomatic diseases or illness[12].

Recognising the importance of traditional medicine in Malaysia, several considerations are vital for future research in it. They are as the following:

a) Ethnopharmacognosy: All the plant species that are claimed to have medicinal values should be recorded or published formally.

b) Natural products: The chemistry of these plants must be studied, including the isolation and characterisation of new compounds.

c) Bioactivity studies: The isolated and purified chemical compounds as well as crude extracts must be tested against organisms or cell-lines and

d) Commercialisation.

Several medicinal values of *Phoebe* species and *Goniothalamus* species are shown in Table 3 and Table.4 [13].

Table 3 : The medicinal values of *Goniothalamus* species

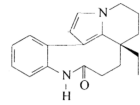
	Goniothalamus Species And Localities	Part of Plant	Treatment
1.	*G. macrophyllus* Peninsular Malaysia and Jawa, Indonesia	Leaves Roots	- To steam a fever patient. The leaves are applied as well - As a post partum protective medicine. This may cause abortion - In Indonesia, the mountain dwellers used an infusion of the very aromatic roots to treat typhoid fever
2.	*G. amuyon* Peninsular Malaysia, Taiwan and the Philippines	Seeds Fruit	- Fluid distilled from seeds is applied to treat scabies. - This seeds evoked with oil make an effective liniment to treat rheumatism, - A decoction of them is given to treat tymparites. - The fruit is considered to be stomachic.
3.	*G. scortechiini* Peninsular Malaysia		- A decoction of this species alone or in mixture is given as a post partum protective medicine.
4.	*G. tapis* Peninsular Malaysia and Borneo, Indonesia	Root Bark	- Only during the early months of pregnancy, the root of *G.tapis*, in combination with Plumbago, is used as an aborticnt. - In Indonesia , the bark is used a mosquito repellent.

Table 4 : The medicinal values of *Phoebe* species

	Phoebe Species	Part of Plant	Treatment
1.	*P. nanmu*	Twigs	- A decoction is used in treating cholera.
		Bark	- As a fomentation on sprains swellings.
2.	*P.henryi*	Fruit	- A decoction is a remedy for stomachache .
3.	*P. forbesii*	Bark	- Positive to treat Anti-tumour

Several species of *Phoebe* are used for treatment diseases in China, Indonesia, Indo- China, Japan , Philiphine and Peninsular Malaysia. The twigs, bark, inner bark, leaves and also seeds of the species are used in treating several diseases including anti-tumour as described in Table 4.

Some species for examples *Phoebe excelsa, Nothaphoebe caudatum, Nothaphoebe umbelliflora* contain a toxic alkaloid named laurotetanine(2) with action similar to strychnine(3) as violent tetanic poison employed commercially in vermin killer. However it is less active by comparison.



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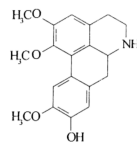

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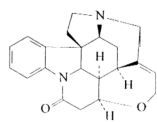

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