

CHAPTER I

INTRODUCTION

Free radicals or reactive oxygen species include superoxide ($O_2^{\cdot-}$), peroxy (ROO^{\cdot}), alkoxy (RO^{\cdot}), hydroxyl ($^{\cdot}OH$) and nitric oxide (NO^{\cdot}) (Halliwell, 1995). These chemical species are involved in the cellular energy producing system, synthesis of biological compounds and phagocytosis. However, if they are produced in excess, they could reactively attack lipid in the cell membranes, proteins, enzymes and DNA. These oxidative damages are considered to play causative roles in aging and several degenerative diseases such as cardiovascular diseases, cancers and cataract (Ames *et al.*, 1993). Exogenous antioxidants are needed for diminishing the undesired effects. Many antioxidants from plant-derived compounds have been reported (Larson, 1988). Due to the good free radical scavenging ability, flavonoids have been extensively studied (Pietta, 2000).

Results from many chemical investigations of plants in the genus *Ochna* have shown that this genus is a rich source of flavonoids (Messanga, *et al.*, 2001). The genus *Ochna*, belonging to the family Ochnaceae in the order Guttiferales, have been described (Smithinand and Larsen, 1970), as follows:

Shrubs or trees, sometimes undershrubs. Stipules small, intrapetiolarly united, caducous, Leaves shortly petioled, chartaceous or subcoriaceous; nerved curved upward, especially near the margin, not joining; veinlets \pm at right angles to the nerves near the midribs and joining in irregular tertiary nerves, \pm transverse near the margin. Inflorescences lateral or terminal thyres with a terminal flower; bracts small caduceous, often many at base of peduncle; peticels articulate, accrescent. Flowers with \pm hemispherical torus, which is distinctly swollen and red in fruit. Sepals 5, enlarged and red in fruit. Petals 5-10 in 1-2 whorls, yellow. Stamens numerous in 2 or more whorls;

filaments distinct; anthers opening by 2 apical pores. Carpels 5-10(-15), 1-celled, obovoid; ovules 1 per cell, erect; style 1, gynobasic, persistent; stigmas as many as ovaries, on short branches or \pm united. Drupes 1-3(-5), greenish, turning black when ripe. This genus was a principally African genus with four species in south and south-east Asia.

According to Smitinand (2001), two species of this genus have been characterized in Thailand:

<i>Ochna integerrima</i> (Lour.) Merr.	กระแจะ Krachae (Ranong)
(<i>O.harmandii</i> (Tiegh.) Lecomte)	กำลังช้างสาร Kamlang chang san (Central)
(<i>O.wallichii</i> Planch)	ขมื่นพระตัน Khamin phra ton (Chanthaburi)
	ควุ Khwu (Karen-Nakhon Sawan)
	แง่ง Ngaeng (Buri Ram)
	ช้างน้ำว Changnao
	ตานนกรวด Tan nok krot (Nakhon Ratchasima)
	ช้างน้อม Chang nom (Trat)
	ช้างโหม Chang hom (Rayong)
	ตาชีบัง Ta-chi-bang (Karen-Chang Mai)
	ตาลเหลือง Tan lueang (Northern)
	ฝืน Fin (Ratchaburi)
	โวโร่ Wo-ro (Karen-Kanchanaburi)
<i>O. kirkii</i> Oliv.	มิกกี้เมาส์ Micky mouse

Ochna integerrima (Lour.) Merr. is a deciduous undershrub, shrub or tree, up to 12 m, 45 cm diam. Leaves obovate-oblong or (obovate-) lanceolate, rarely obovate or linear-lanceolate, 6-2-(25-) by 2-7 cm, acuminate, sometimes acute or obtuse at apex,

acute, sometimes obtuse at base, margin finely denticulate. Inflorescences many-flowered; rachis 0.5-1.5(-4) cm; branches 1-3 flowered, monochasial; pedicels 2-4 cm, up to 5 cm in fruit, the basal 2-8 mm persistent. Torus 0.5-1 mm high, 1.5-2.5 mm diam., in fruit up to 6 mm high, 10 mm diam. Sepals 5, ovate to ovate-oblong, 10-16 by 4-9 mm. Petals 5-6(-10), obovate, 15-25 by 8-15 mm, tapering at base or subunguiculate. Stamens (25-)30-60(-75); filaments 2.5-7 mm, unequal, the outermost longest; anthers 4-6 by 0.4-0.8 mm. Carpels 6-10 (-15), 0.7-1.1 by 0.5-0.7 mm; styles 10-15 by *c.* 0.5 mm, up to 20 mm in fruit; stigmas sometimes on up to 1 mm long branches. Drupes up to 11 by 8 mm. This species occurred in North-eastern India, East Pakistan, Burma, the Andaman and Nicobar Islands, the Malay-Peninsula (Perlis, Kedah), Laos, Cambodia, Vietnam and Hainan. This species could be found throughout Thailand, except in the Pattani, Yala and Narathiwat.

In Thailand and Indo-China, the bark has been used as a digestive tonic (Perry, 1980). A recent chemical investigation on the leaves of *O. integerrima* resulted in the isolation of three new biflavonoids (Likhitwitayawuid *et al.*, 2000). The present study is aim to further study the chemical components of this plant. Several parts of *O. integerrima*, including the leaves, the stem wood and bark, and the root wood and bark are to be chemically studied. In addition, free radical scavenging activity of the constituents are also examined. The purposes of this work are :

1. To isolate free radical scavenging compounds from the leaves, the stem wood and bark, and the root wood and bark of *O. integerrima*
2. To determine the structures and free radical scavenging activities of the compounds isolated from *O. integerrima*



Figure 1 *Ochna integerrima* (Lour.) Merr. (Ochnaceae)