

CHAPTER II

Strychnos minor Dennst.

Historical nomenclature

Strychnos minor Dennst. is one of the species of great taxonomic confusion and at one time supplied the drug known as "*lignum colubrinum*" or snake-wood (Bisset, 1972b).

S. minor Dennst. once treated and called *Scherukatu-valli-caniram* by Van Rheedee tot Draakestein was recognised among *Strychnnos* species as an ingredient of *lignum colubrinum*. The first valid name available for use, *S. minor* Dennst., is that given by Dennstedt in 1818. But at the first time the name *S. minor* Bl. called by Blume in 1836, which now considered to be either *S. minor* Dennst. or *S. axillaris* Colebr., was accepted over that of Dennstedt. Not only *S. minor* of these two authors but the plant described by Bentham also made confusion. *S. minor* sensu Benth. was not the true *S. minor*, now it is considered to represent *S. benthamii* C.B. Clarke and *S. trichocalyx* A.W. Hill.

Moreover, there were great confusion among botanists about the identity as well as nomenclature of *S. minor* and *S. colubrina*. The name *S. minor* and *S. colubrina* were given by many authors, eventhough later some of

them were proved to be the same species. For instance, Bentham used the name *S. colubrina* for calling the plant which is now considered to be *S. minor* Dennst. and *S. bicirrhosa* Lesch. et Wall. Hill called a plant as *S. colubrina* too. His *S. colubrina* was accepted in the Bentham sense, except for the removal of *S. bicirrhosa* Lesch. et Wall. Many years latter, Leenhouts (1962) used the name *S. colubrina* L. for the plants which is now considered as *S. minor* Dennst. Finally, Bisset and Philcox re-established the Linnaeus description of *S. colubrina* L., which is clearly different from *S. minor* Dennst. but holding the same name at one time, as the first valid name, *S. wallichiana* Steud. ex DC. They also pointed out that the correct name for *S. colubrina* in the sense of Bentham and Hill was actually *S. minor* Dennst. The historical confusion of *S. minor* Dennst. nomenclature is concluded in table 4.

Table 4 : Nomenclature concerning of *S. minor* Dennst.

authors	name	correct name
Rheede (1678-1703)	<i>Scheru-Katu-valli- caniram</i>	<i>S. minor</i> Dennst.
Dennstedt (1818)	<i>S. minor</i> Dennst.	<i>S. minor</i> Dennst.
Blume (1836)	<i>S. minor</i> Bl.	<i>S. minor</i> Dennst. <i>S. axillaris</i> Colebr.
Bentham (1856)	<i>S. minor</i> sensu Benth.	<i>S. benthamii</i> C.B. Clarke <i>S. trichocalyx</i> A.W. Hill
	<i>S. colubrina</i> sensu Benth.	<i>S. minor</i> Dennst. <i>S. bicirrhosa</i> Lesch. et Wall.
Hill (1917)	<i>S. colubrina</i> sensu A,W. Hill	<i>S. minor</i> Dennst.
Leenhouts (1962)	<i>S. colubrina</i> L.	<i>S. minor</i> Dennst.
Bisset & Philcox (1971)	<i>S. minor</i> Dennst.	<i>S. minor</i> Dennst.

Strychnos minor dennst. is a very variable species comprising a large number of local races which are distributed from India and Sri Lanka to New Guinea and tropical Australia. In Thailand, *S. minor* Dennst. was first collected at Ko Tao, Surat Thani province, by Kerr as Kerr 11238 in the form of *S. silvicola* A.W. Hill (Bisset et al., 1973). Many different forms of *S. minor* Dennst. distribute in their localities with different names such as *S. acuminata* Wall. ex DC. (India), *S. bancroftiana* F.M. Bail. (Queensland, Australia), *S. barbata* A.W. Hill (New Guinea and Amboina), *S. beddomei* C.B. Clarke (South India), *S. celebica* Koord. (North Celebes), *S. cinnamophylla* Glig et. Bened. (New Guinea), *S. dubia* A.W. Hill (Mindanao, Philippines), *S. forbesii* A.W. Hill (Papua, New Guinea), *S. kerstingii* Gilg et K. Schum. (North-East New Guinea), *S. laurina* Wall. ex DC. (Burma), *S. lenticellata* A.W. Hill (South India and Sri Lanka), *S. leuconeura* Gilg et Bened (North-East New Guinea), *S. merrillii* A.W. Hill (Luzon, Philippines), *S. minor* Dennst. var. *thorelii* (A.W. Hill) Tirel or *S. laurina* Wall. ex DC. var. *thorelii* A.W. Hill or *S. colubrina* L. var. *thorelii* (A.W. Hill) Tirel (South Vietnam), *S. multiflora* Benth. (Luzon, Philippines), *S. myriantha* Gilg et Bened (North-East New Guinea), *S. pycnoneura* Glig et Bened (North-East New Guinea), *S. septemnervis* C.B. Clarke (Malacca, Malaysia), *S. septemnervis* C.B. Clarke var. *imberbis* A.W. Hill (Penang, Malaysia), *S. similis* A.W. Hill (Mindanao, Philippines), and *S. stylosa* Pierre ex Sauvan (South Vietnam)

(Bisset et al., 1973; Bisset, 1974).

The differences among these forms of local races are mostly very small and mainly concern the following characters : larger or smaller flowers, corolla more or less pubescent, anther barbate or glabrous, style either glabrous or partly or entirely hairy, and differences in the shape, size; nervation of the leaves; and the size of the inflorescences. In going from east to west, there is a tendency for the leaves, flowers and inflorescences to become smaller, and the leaves of the continental Asiatic forms are usually narrow and long-acuminate. Only very few races can clearly be characterized : *S. bancroftiana* F.M.Bail. and *S. forbesii* A.W.Hill have oblique, oblong to lanceolate leaves, the inner nerves of which diverge at a different height, and *S. multiflora* Benth. has large and many-flowered inflorescences, large flowers, and large, ovate, coarsely reticulate leaves (Leenhouts, 1962).

S. minor Dennst. is growing in Northern and Southern Thailand in the form earlier named as *S. silvicola* A.W.Hill. Their vernacular names are Tum Kaa Khaao (ตุมกาขาว), Lampang; Tum Kaa Daeng (ตุมกาแดง), Lampang (Tem Smitinand, 1980); Tao Plawng (เตाप็ล้อง), Ranong; Tao Kwang Du Tuk (เตากวางตุ๊ก), Surat (Craib and Kerr, 1951); and Phaya Plawng Tong (พญาปล้องทอง), Krabi.

Hill (1951) described the characteristic feature of *S. silvicola* A.W.Hill as a scandent with glabrous branches and bifid terete circinate spines 2-6 cm long. The leaf is lanceolate-ovate or elliptic-lanceolate in shape, 8-14 cm long, 4.5-7 cm wide, rotunda or a little angular base, acute apex, glabrous, varnished at the dorsal, and having three nerves starting from the base. The petiole is glabrous, 6-7 mm long. The inflorescence is panicle, 4-8 cm long and borne in the axils. The peduncle and pedicel are minute and tomentose. The calyx is separate, ovate with subacute in shape, 1 mm long and wide, and having ciliate margin. The corolla is 5 mm long, white colour. Corolla lobe is 2-2.25 mm long, ovate-lanceolate with acute in shape, and bending abruptly backwards at more than 90°. Inside about the mouth and corolla tube are woolly with long soft hair. The anther is 1 mm long and barbate. The style is 3.5-4 mm long and having long soft hair. The fruit is globose, woody, 1.5-1.8 cm diameter with 3-4 seeds. The seed is discoid in shape, 1.5 cm diameter and about 2.5 mm thick.

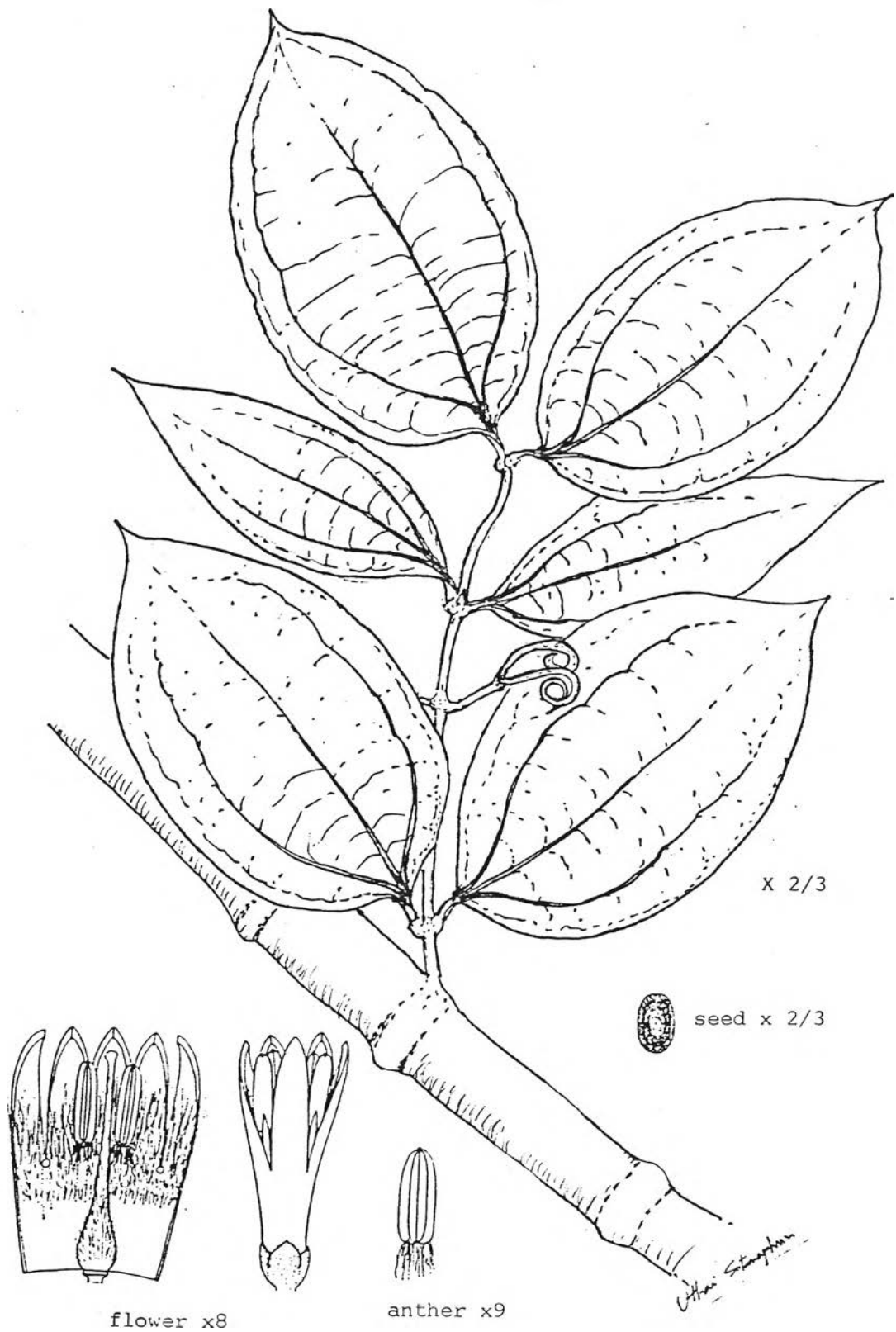


Figure 10 : *Strychnos minor* Dennst. (*Strychnos silvicola* A.W.Hill) branch, flower, and seed

Medicinal use of *Strychnos minor* Dennst.

Strychnos minor Dennst. was one of the *Strychnos* species believed to supply the drug known as *lignum colubrinum* or snake-wood. The use of *lignum colubrinum* was come into Europe during the 16th. 17th and 18th centuries as an alexipharmic, febrifuge, and anthelmintic. But when the identities and names of the *Strychnos* species were concerned in the *lignum colubrinum*, it was likely that *S. minor* Dennst. was only use locally and that little, if any, was exported (Bisset, 1972). Its locally uses as folk medicines were concluded by Bisset (1974) as follows.

In India, *S. minor* Dennst. as the previous name *scheru-katu-valli-caniram* was noted to be the indigenous uses. The fruits were used to apply to the head in the case of mania, while the root ground with pepper was used to check diarrhoea and colic and boiled in oil as a lini-ment to relieve pains in the joints. Furthermore, *nella watta chedde* as the other name of *S. minor* Dennst. that described by European physician in India, was observed to be fully as effective as medicine. The powder or decoc-tion of its roots, barks and leaves cured hecticks and other fevers, also consumption, cough and asthma. In the Flora of Assam, it was noted that the fruits of *S. lauri-na* Wall. ex DC. (*S. minor* Dennst.) are used against worms.

In Borneo, *S. minor* Dennst. was discussed under the name *ipoh akar* and *ipoh tanah* to use as a dart-poison

constituent (Bisset, 1966).

In Indonesia, *Sirioides* and *Sirioides alter* were the local name of *S. minor* Dennst. that used in 18th century. In serious illness, the root of *Sirioides* was rubbed down in water and vinegar and ginger, and the liquid was drunk; the root was used in the same way against pleurisy and against the effect of eating dangerous fishes and crabs. The root of *Sirioides alter* (tali sirih ketjil) was chewed with Areca nut (pinang) for stomach-ache; while the bruised root was bound on the painful and weak knees which effected from beri-beri. The flesh fruit was eaten to alleviate stomach pain due to flatulence.

In New Guinea, the bark of *S. minor* Dennst. was crushed with kawawal, a plant of Zingiberaceae, and the extracted juice fed to dogs to stimulate them to hunt.

In Philippines, *S. minor* Dennst. that described for its medicinal uses was in the form of *S. multiflora* Benth. A decoction of the bark was prescribed as an emmenagogue, the plant was also said to be the in throat troubles. The negritos sliced and shred the root bark and put it into a bottle containing coconut wine; after a day the infusion was taken morning and evening in small dose for cure dysmenorrhoea. The seeds was poisonous.

In Southern Thailand, *S. minor* Dennst. has been used together with other plants as a folk medicine to cure the tired joint, the pain of joint and paralysis.

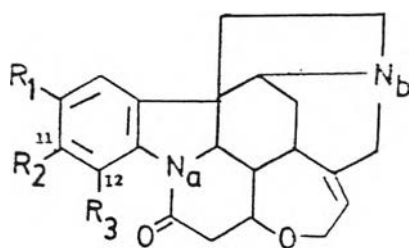
Previous phytochemical studies

Although *Strychnos minor* Dennst. has been greatly used as medicine, but only some phytochemical screenings have been taken. Previous alkaloid screenings have indicated that its alkaloidal composition is very variable for the plant growing in different areas. There is a tendency to have a slightly greater alkaloidal content for those coming from the eastern part of the distribution range (Bisset, and Phillipson, 1976).

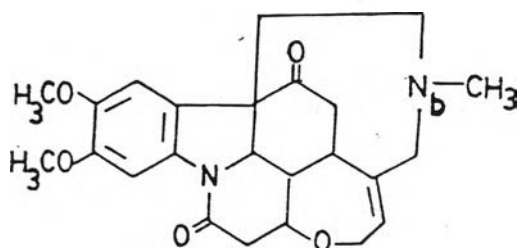
Bisset and Phillipson (1976) reported the presence of strychnine group alkaloids (1-2, 139-142) from the fruit samples. One leaf sample contained diaboline (117) as a major alkaloid with small amount of its derivatives (146-147), whereas some other leaf samples contained angustine (143) and related base (144-145). Probably *S. minor* Dennst. fruit is a source of strychnine group alkaloid, while its leaf is a source of diaboline group or angustine-base. Bisset and Phillipson (1976) suggested the leaf of *S. minor* Dennst. as a more appropriately placed with diaboline group. The list of alkaloids of *S. minor* Dennst. are set out in table 5.

Table 5 : List of alkaloids of *Strychnos minor* Dennst.

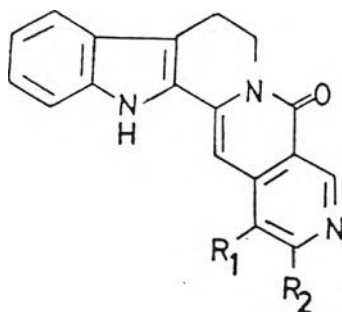
Plant part	Locallity	Alkaloid
Fruit	Philippines	Strychnine (<u>1</u>), 12-OH-11-OMe-Strychnine (<u>139</u>), Strychnine- <i>N</i> -Oxide (<u>140</u>), Brucine (<u>2</u>), Brucine- <i>N</i> -Oxide (<u>141</u>), Novacine (<u>142</u>)
	Solomon Island	Strychnine (<u>1</u>), 12-OH-11-OMe Strychnine (<u>139</u>), Brucine (<u>2</u>), Novacine (<u>142</u>)
Leaf	New Guinea	Angustine (<u>143</u>), Angustoline (<u>144</u>), Angustidine (<u>145</u>)
	Australia (collected 1943)	Angustine (<u>143</u>), Angustoline (<u>144</u>), Angustidine (<u>145</u>)
	Australia (collected 1948)	Diaboline (<u>117</u>), Acetyl-diaboline (<u>146</u>), Methoxyl-diaboline (<u>147</u>)



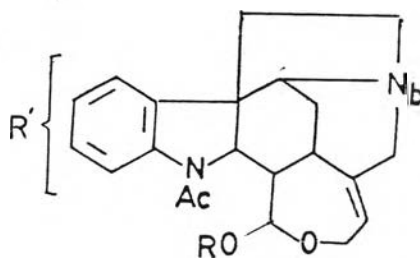
	R ₁	R ₂	R ₃	
<u>1</u> Strychnine	H	H	H	
<u>2</u> Brucine	OCH ₃	OCH ₃	H	
<u>139</u> 12-OH-11-OMe-strychnine	H	OCH ₃	OH	
<u>140</u> Strychnine <i>N</i> -oxide	H	H	H	<i>N_b</i> -oxide
<u>141</u> Brucine <i>N</i> -oxide	OCH ₃	OCH ₃	H	<i>N_b</i> -oxide



142 Novacine



	R ₁	R ₂
<u>143</u> Angustine	H	-CH=CH ₂
<u>144</u> Angustoline	H	-CHOH-CH ₃
<u>145</u> Angustidine	CH ₃	H



- 117 Diaboline ; R = H, R' = H
146 Acetyl-diaboline ; R = Ac, R' = H
147 Methoxy-diaboline ; R = H, R' = OCH₃

Purpose of the present investigation

Previous investigations of *Strychnos minor* Dennst. suggested that the forms of which growing in different areas have a variable alkaloidal composition. However, the investigations were carried out only on a screening scale and unable to give the overall information about the phytochemistry of this plant, especially in the part of root and stem.

The present investigation has been carried out in order to isolate the alkaloid bases from the stem of *S. minor* Dennst. to gain more informations about the plant's alkaloidal composition and to provide some informations concerning the alkaloidal distribution and the chemotaxonomy. Moreover, some isolated alkaloids would be provide informations to clarify their structure and pharmacological or toxicological activities relationships, which possibly lead to the beginning use of this native plant of Thailand as a source of medicinal substance.