

Medicinal plants from Riau Province, Sumatra, Indonesia. Part 1: Uses

Paul W. Grosvenor^{*a}, Philip K. Gothard^b, Nicholas C. McWilliam^c, Agus Supriono^d,
David O. Gray^a

^a*School of Biological Sciences, Queen Mary & Westfield College, Mile End Road, London E1 4NS, UK*

^b*6, Siggot Street, Huddersfield, HD3 4XA, UK*

^c*Royal Geographical Society, 1, Kensington Gore, London SW7 2AR, UK*

^d*Biological Sciences Club, Jalan H. Noor No. 10, Pejaten Barat-Pasar-Minggu, Jakarta 12510, Indonesia*

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Abstract

One hundred and fourteen species of flowering plants, claimed to have medicinal uses, were recorded from a previously uninvestigated area of Sumatra. Of the specimens, which belonged to 51 families, 50% were used to combat fever, 33% for diarrhoea and 31% for other gastrointestinal problems. External applications were often used to treat internal conditions, particularly fever. Species new to the ethnomedical literature are *Garcinia parvifolia*, *Scleria purpurescens*, *Galearia filiformis*, *Litsea elliptica*, *Litsea robusta*, *Barringtonia lanceolata*, *Sesbania aculeata*, *Mimosa pigra*, *Abelmoschus ficulneus*, *Hedyotis leucocarpa*, *Pavetta multiflora*, *Symplocos cochinchinensis* and *Trema tomentosa*. *Hanguana* (as *H. malayana*) represents a new genus of medicinal plants.

Keywords: Traditional herbal medications; Indonesia; Sumatra

1. Introduction

The flora of Sumatra is representative of the Sunda region (MacKinnon, 1982a) and exhibits a very rich and diverse range of vegetation types (Meijer, 1981). The use of medicinal plants in Sumatra has been documented by Heyne (1927), by Van Steenis-Kruseman (1953) and more incidentally in other publications (Burkhill, 1966;

Perry and Metzger, 1980). The more recent Sumatran pharmacopoeias, those of the Alas and Gayo (Elliott and Brimacombe, 1987) and Seberida peoples (Mahyar et al., 1991) list plants which are used in the same way in widely separated cultures throughout Southeastern Asia and the Far East.

This paper reports the uses of medicinal plants by the Talang Mamak and Orang Melayu peoples settled around the northern end of the Tigapuluh mountains in the Riau province, as determined by

^{*} Corresponding author.

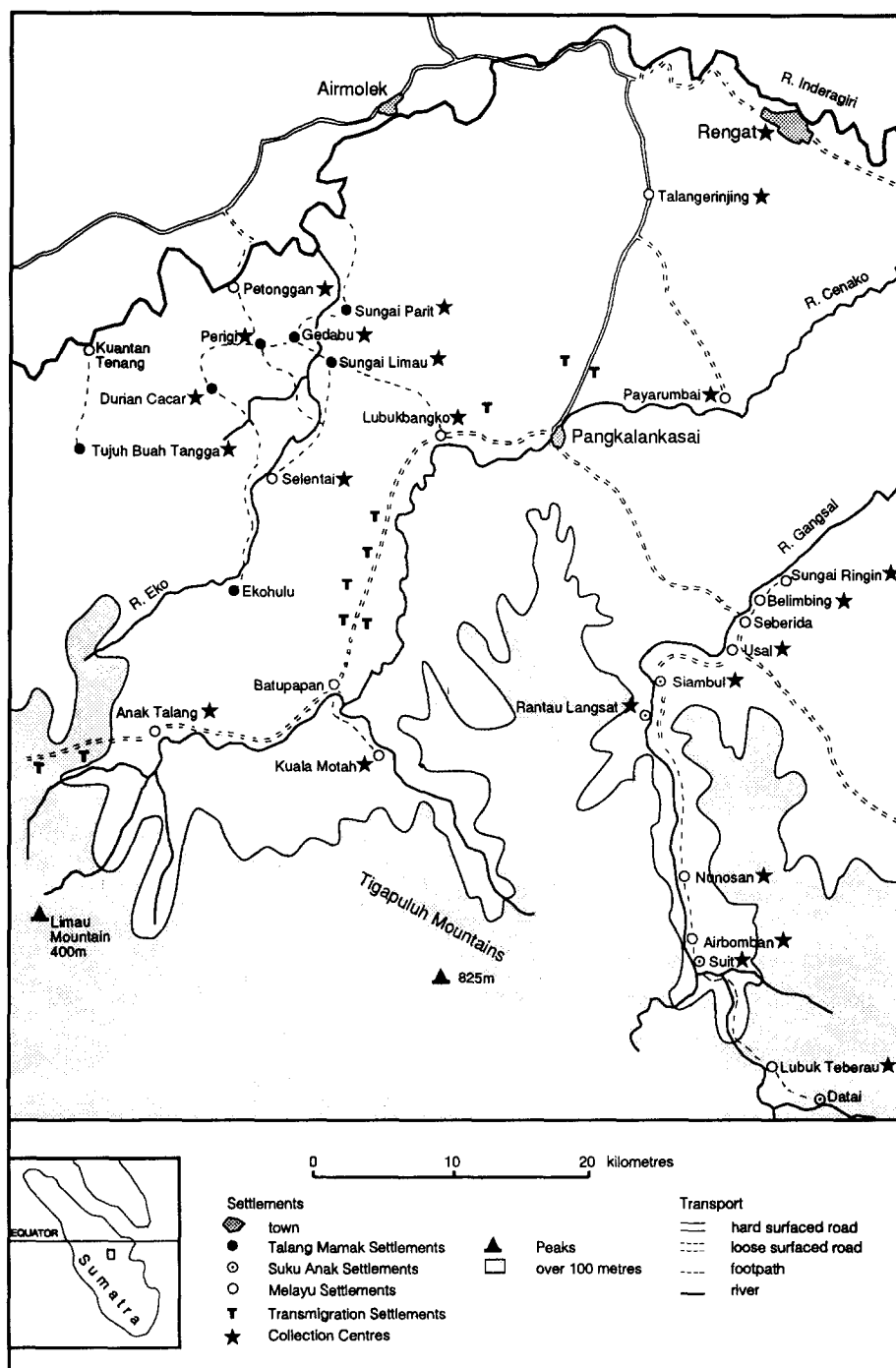


Fig. 1. Map of study area, the Northwestern end of the Tigapuluh mountains, Riau, Sumatra.

an ethnomedical study. In a separate paper (Part 2), results of antimicrobial assays of these plants will be presented.

2. Materials and methods

2.1. Collection of plant material

This was the responsibility of Project Soma, a joint British-Indonesian ethnomedical expedition led by Dr. Philip Gothard and Drs. Agus Supriono (Gothard and McWilliam, 1989). The normal approach was to ask the local herbal doctor (dukun) or village elder to name all the possible plants used to treat a particular symptom or collection of symptoms (e.g., diarrhoea with or without blood), covering the body systematically. All interviews were carried out in the Indonesian language by trained biologists using the local names of the relevant plants throughout. These were then collected under the guidance of whosoever gave the information about use. At the time of collection, standard herbarium record sheets were completed with the name of the collector (Project Soma), collection number, date, locality and local name.

2.2. Plant material

Taxonomic samples initially pressed between absorbent paper saturated with denatured ethanol and packed in heavy plastic bags, were subsequently dried, identified and deposited at the following herbaria: Herbarium Bogoriense, Java (Indonesia) and Royal Botanic Garden, Edinburgh (UK).

3. Results

All the 24 villages and settlements visited (Fig. 1) still relied primarily on plant-based medicines. Observations in the field suggest that this appears now to be true only of isolated areas in Sumatra.

Table 1 lists data from 114 species, belonging to 51 families, arranged alphabetically according to family, giving voucher numbers, local names, parts used, and uses. The most common remedy was to combat fever (57 in total), followed by those for diarrhoea (38) and other gastrointestinal problems (35). Diarrhoea and gastrointestinal problems are the most prevalent in the area.

Replicate samples of 21 species were collected. These replicates provided confirmation of use in 12 cases but otherwise suggested multiple uses. The local names recorded for the replicates allow some interesting comparisons; these confirm the view of the expedition members that, 'local names could only safely be used within a village or locality' (Gothard and McWilliam, 1989) and illustrate that such names are even more prone to transcriptional error than taxonomic ones.

4. Discussion and conclusions

The Riau Province still has Sumatra's largest area of primary rainforest (MacKinnon, 1982b) even though the area has been subjected to over a century of commercial plantations and oil explorations. The Talang Mamak, a subsistence agricultural society of probable Veddoid origin (Loeb, 1972), with a population estimated to be ca. 6000 in 1985 (Singleton, 1989), together with the Orang Melayu, the most numerous group in the area, still carry on traditional ways and customs. The Talang Mamak centred around Perigi are more isolated, due in part to less developed lines of communication, than those living together with the Melayu in Suku Anak Dalam settlements (Fig. 1). However, in all cases, development is increasingly dependent on alternative western drugs (as seen by the availability of analgesics and antimalarials in some village stores), thus precipitating the loss of traditional herbal knowledge.

Of the 23 villages visited, 2 were mentioned in a previous study of a mainly Melayu populated area (Mahyar et al., 1991). In the present study a high incidence of external applications to treat internal conditions, particularly fever, was noted. The data in Table 1 confirms this observation: 25 uses out of 105 are external (excluding eye, cuts, ulcers and skin treatments). This feature appears to be characteristic of herbal medicine in the Southern Pacific region. The effectiveness of such treatments can be partially attributed to the cooling effects of moist applications acting as a febrifuge. Undoubtedly there is also absorption of active principles across the keratin and dermal layers, dependent on the degree of rubefaction, the lipophilicity and molecular size of the active prin-

Table 1
Uses of medicinal plants from the Riau Province, Sumatra, Indonesia

Botanical name (Voucher No.) ^a	Local name	Parts used ^b	Uses ^{c,d}
ACANTHACEAE			
<i>Gendarussa vulgaris</i> Nees (PS.BM25)	Tajam	LF/RT	Leaves ground together with those of <i>Mallotus paniculatus</i> (Euph) ^c , rubbed on the affected parts in case of smallpox. Decoction of roots drunk as a fever medication (TM)
(PS.BM116)	Gandarus	LF	Leaves kneaded in water applied to forehead for headache (MX)
(PS.CM17)	Sitajam	LF	Leaves crushed in salted water and drunk for stomachache/diarrhoea. See <i>Flemingia strobilifera</i> (Legu). (TM)
<i>Staurogyne</i> sp. (PS.DM9)	Karak karak	WH	Macerates of 7 plants crushed in water is rubbed over the body as a post-medication treatment for chronic fever (TM)
AMARANTHACEAE			
<i>Celosia argentea</i> L. fma. <i>plumosa</i> (Voss) Back. (PS.EM29)	Bunga merah	WH/LF	Decoction of whole plant without roots drunk as a cough medication; decoction of leaves with those of <i>Arcangelisia flava</i> (Meni) rubbed on the body for yellow eyes and skin (OM)
(PS.EM30)	Bunga kuning	WH/LF	As for EM29 (OM)
AMARYLLIDACEAE			
<i>Crinum asiaticum</i> L. (PS.BM132)	Telipuk telipuk	LF	Leaves smeared with coconut oil, heated and rubbed on affected parts for kidney pains (MX)
<i>Crinum lineare</i> L. (PS.CM85)	Telipuk	LF	Leaves heated with vegetable oil and poulticed to treat back pains by applying it to the affected area, changing 3 × daily (MX)
<i>Curculigo</i> sp. (PS.XM3)	Gedemba	RT	Decoction of roots together with those of <i>Acorus calamus</i> (Arac) drunk to assist parturition (OM)
ANACARDIACEAE			
<i>Mangifera foetida</i> Lour. (PS.CM93)	Pucuk ambacang	LF	Leaves with those of <i>Celosia argentea</i> (Amar) and <i>Tamarindus indica</i> (Legu) eaten with rice as a post-partum medication (OM)
<i>Mangifera indica</i> L. (PS.BM111)	Pauh	BK	Bark pounded with a little water together with that of <i>Hibiscus tiliaceus</i> (Malv) and preparation applied to stomach as a treatment for intestinal worms (MX)
APOCYNACEAE			
<i>Alstonia scholaris</i> (L.) R. Br. (PS.XM9)	Pulai	LF	Leaves crushed in water and the filtrate drunk as a fever medication (OM)

Table 1 (continued)

Botanical name (Voucher No.) ^a	Local name	Parts used ^b	Uses ^{c,d}
<i>Voacanga grandifolia</i> (Miq.) Rolfe (PS.BM27)	Puding hitam	BK	Scrapings from inner bark layer rubbed on to the skin as a medication for dermatitis (TM)
ARACEAE			
<i>Acorus calamus</i> L. (PS.XM4)	Siak siak	RT	See <i>Curculigo</i> sp. (Amar) (OM)
ARALIACEAE			
<i>Aralidium pinnatifidum</i> Miq. (PS.EM58)	Kuhang	NI	NI (TM)
BALSAMINACEAE			
<i>Impatiens balsamina</i> L. (PS.EM60)	Inai ayam	LF	Leaf ground with black pepper and ginger, the filtrate drunk to treat Beri-Beri (TM)
BEGONIACEAE			
<i>Begonia isoptera</i> Bl. (PS.CM84)	Septampis	NI	NI (MX)
BOMBACACEAE			
<i>Ceiba pentandra</i> (L.) Gaertn. (PS.BM85)	Kapuk	LF	Leaves pounded in water together with those of <i>Ananas comosus</i> (Brom) and macerate rubbed on the body as a fever medication (MX)
BROMELIACEAE			
<i>Ananas comosus</i> (L.) Merr. (PS.BM80)	Nanas	LF	Ground with water and preparation applied to forehead as a fever medication. See <i>Ceiba pentandra</i> above and <i>Garcinia atroviridis</i> (Clus) (MX)
CAPPARACEAE			
<i>Crateva religiosa</i> Forst. f. (PS.BM3)	Laban	LF	Water added to three ground leaves, filtrate drunk for headache (TM)
CLUSIACEAE			
<i>Cratoxylon formosum</i> (Jack) Dyer (PS.CM4)	Manpat	BK	Infusion of bark scrapings together with that of <i>Horsfieldia wallichii</i> (Myri) is used to treat flatulence and diarrhoea (TM)
<i>Garcinia atroviridis</i> Griff. (PS.CM76)	Gelugur	LF	Infusion of leaves together with those of <i>Ananas comosus</i> (Brom), drunk to treat stomach pains associated with pregnancy (MX)

Table 1 (continued)

Botanical name (Voucher No.) ^a	Local name	Parts used ^b	Uses ^{c,d}
<i>Garcinia mangostana</i> L. (PS.BM86) (PS.XM18)	Manggis Manggis	LX BK	Latex applied topically to treat oral ulcers (MX) Decoction of inner bark scrapings drunk twice daily to treat dysentery (OM)
<i>Garcinia parvifolia</i> Miq. (PS.CM75)	Kandis	LF	Infusion is drunk as a post-partum medication (MX)
COMPOSITAE			
<i>Blumea balsamifera</i> DC. (PS.CM1) (PS.BM33)	Capa Capa	SH/RT SH	Infusion of young shoot or root crushed in cold water is topically applied in case of snakebite (TM) Ground in cold water and drunk or applied to stomach for stomachache (TM)
<i>Pluchea indica</i> (L.) Less. (PS.XM30)	Beluntas	LF	Juice from a handful of crushed leaves drunk twice daily as a tonic for depression (OM)
CONNARACEAE			
<i>Rourea mimosoides</i> (Vahl) Planch. fma. <i>obtusifolia</i> Leenh. (PS.BM10)	Sembelit merah darah	LF	Decoction drunk to treat bloody diarrhoea or used as a diuretic (TM)
CONVOLVULACEAE			
<i>Ipomoea batatas</i> (L.) Lamk. (PS.BM140)	Ubi jalak	LF	Ground leaves applied as a dressing to swellings (MX)
<i>Merremia umbellata</i> (L.) Hall. f. var. <i>orientalis</i> Hall. f. (PS.BM125)	Akar ritang	LF	Leaves and flowers ground, water added and drunk to alleviate constipation (MX)
CYPERACEAE			
<i>Scleria purpurascens</i> Steud. (PS.BM5) (PS.BM6)	Sialit tajam Sialit tumpul	RT RT	Sap from three roots drunk as a cough medication (TM) As for BM5 (TM)
DILLENIACEAE			
<i>Dillenia meliosmifolia</i> Hook. f. (PS.AM7)	Simpur	RT	Decoction drunk as a medication for food poisoning (TM)
<i>Tetracera asiatica</i> (Lour.) Hoogl. (PS.BM23)	Sengkerit akar	LF	Water added to pounded young leaves and drunk as a medication for diarrhoea (TM)

Table 1 (continued)

Botanical name (Voucher No.) ^a	Local name	Parts used ^b	Uses ^{c,d}
<i>Tetracera</i> sp. (PS.BM12)	Sengerit merah pucuk	LF	Three to five leaves ground with water and drunk as a medication for diarrhoea (TM)
EBENACEAE			
<i>Diospyros</i> sp. (PS.XM53)	Ribu ribu	LF	Infusion of half-a-handful of macerated leaves used to wash the body of children with oncoming colds (OM)
EUPHORBIACEAE			
<i>Breynia racemosa</i> M.-A. (PS.BM38)	Silarak mata punai	NI	NI (TM)
<i>Croton</i> cf. <i>caudatus</i> Geisel (PS.BM94)	Bauh keras	NI	NI (MX)
<i>Galearia filiformis</i> Boerl. (PS.CM79)	Kayu tulang	NI	NI (MX)
<i>Galearia</i> sp. (PS.XM15)	Lese	LF	Two to three leaves eaten 3 × daily as a fever medication for cases with a history of recurrent fevers (OM)
<i>Glochidion wallichianum</i> M.-A. (PS.EM51)	Samak pulut	BK	One hand length of scrapings mixed with water and drunk for dysentery (TM)
<i>Jatropha curcas</i> L. (PS.CM83)	Jarak pagar	LF	Crushed; water added; compress applied to the head to treat fever (MX)
<i>Macaranga gigantea</i> M.-A. (PS.EM26)	Kulit melabai	LF/BK	Decoction of 3–4 leaves or finger-length of bark in half a glass of water together with the same respective parts of <i>Macaranga triloba</i> and <i>Mallotus ricinoides</i> , drunk to treat stomachache (OM)
<i>Macaranga triloba</i> M.-A. (PS.EM28)	Mahang abu	LF/BK	See <i>Macaranga gigantea</i> (TM)
<i>Mallotus ricinoides</i> M.-A. (PS.EM21)	Balik angin	LF/BK	See <i>Macaranga gigantea</i> (OM)
<i>Phyllanthus emblica</i> L. (PS.CM18)	Raja kayu	LF/ST	Crushed, water added and drunk in case of stomachache and liver trouble (TM)
<i>Pimeleodendron papaveroides</i> J.J.S. (PS.AM8)	Panai panai	ST	Stem sap applied topically to treat oral abscesses (TM)
GNETACEAE			
<i>Gnetum latifolium</i> Bl. (PS.BM9)	Akar singkil	RT/ST	Decoction of root or stem used to treat urinary stasis (TM)

Table 1 (continued)

Botanical name (Voucher No.) ^a	Local name	Parts used ^b	Uses ^{c,d}
HANGUANACEAE			
<i>Hanguana malayana</i> (Jack) Merr. (PS.BM151)	Bakung	LF	Cooked with rice and eaten as an appetite stimulant (MX)
(PS.CM57)	Bakung	LF	Leaves ground, water added, mixture rubbed over body to reduce temperature during fever (OM)
LABIATAE			
<i>Coleus scutellarioides</i> (L.) Bth. (PS.AM11)	Ati ati paladang	LF	Juice of crushed leaves applied as ear drops to treat infections (TM)
(PS.BM26)	Hati hati paladang	LF	Leaves ground with water, drunk 3 × daily as a medication for gastritis (TM)
<i>Ocimum basilicum</i> L. (PS.CM19)	Selasi	SD	Seeds macerated and the mixture drunk as a remedy of 'hot inside' (TM)
(PS.EM9)	Selasi	FL/SD	Mature inflorescences containing ca. 100 seeds soaked in cold water for 15 min and the whole drunk for fever and chest pain (OM)
<i>Ocimum tenuiflorum</i> L. (PS.CM90)	Ruku ruku	NI	NI (OM)
<i>Orthosiphon aristatus</i> (Bl.) Miq. (PS.BM129)	Sungut kucing	LF/ST	Decoction used as a diuretic (MX)
LAURACEAE			
<i>Litsea elliptica</i> Bl. (PS.CM5)	Madang perawas	LF	Crushed leaves applied around the forehead for headaches (TM)
<i>Litsea robusta</i> Bl. (PS.EM40)	Madang kalimas	LF	Infusion of ground leaves drunk as a medication 3 × daily for haematuria (OM)
LECYTHIDACEAE			
<i>Barringtonia lanceolata</i> (Bl.) Miq. (PS.XM13)	Putat	LF	Three to four young leaves eaten as a remedy for insomnia (OM)
<i>Barringtonia</i> sp. (PS.EM16)	Tarang tan	BK	NI (OM)
LEGUMINOSAE			
<i>Bauhinia</i> sp. (PS.CM50)	Katuk katuk	LF	Leaves crushed, dried, rolled into a cigarette and smoked to make inhalations to treat polyps in the nasal tract (OM)

Table 1 (continued)

Botanical name (Voucher No.) ^a	Local name	Parts used ^b	Uses ^{c,d}
<i>Cassia alata</i> L. (PS.BM7) (PS.CM31)	Galinggang hutan	RT	Decoction of 3–4 finger lengths of root drunk for constipation (TM)
	Ketapeng/ Gelenngang	LF	Juice of crushed leaves applied on the skin affected by rashes (e.g. ringworm), or young leaves eaten with rice as a laxative. See <i>Citrus aurantifolia</i> (Ruta) (TM)
(PS.EM1)	Ketapeng	LF	For skin diseases (see CM31) (OM)
<i>Cassia</i> cf. <i>nodosa</i> Buch.- Ham. ex Roxb. (PS.EM8)	Sibusut	BK/SD	Infusion of ground small seeds (1–3) or 1/3 finger length of inner layer of bark mixed with water, drunk for lung problems or for headaches (OM)
<i>Flemingia strobilifera</i> (R.Br.) Ait. (PS.CM112) (PS.DM11)	Siringan	LF	Decoction used as a health tonic by rubbing it on the body (OM)
	Rengan rengan	LF/FL	Mixed with leaves of <i>Gendarussa vulgaris</i> (Acan), boiled until water discoloured, body washed with preparation 3 × daily for lethargy and to induce sweating (TM)
<i>Mimosa pigra</i> L. (PS.CM21) (PS.CM43)	Sikejut	LF	Leaves roasted, then ground; infusion made and drunk to treat a weak heart (weak pulse) (TM)
	Mimosa	WH	A decoction of dried, ground mixture of male and female plants is used like CM21 (TM)
<i>Sesbania aculeata</i> Poir. (PS.BM21)	Kayu ambun	LF/RT	Leaf and root decoction drunk for kidney pains (TM)
<i>Tamarindus indica</i> L. (PS.CM109)	Asam jawa	LF	See <i>Mangifera foetida</i> (Anac) (OM)
LOGANIACEAE			
<i>Fagraea</i> cf. <i>auriculata</i> Jack (PS.EM15)	Bako bako	LF	One glassful decoction made with 3–4 leaves, drunk as a fever medication or used as a rinse for mouth ulcers (OM)
LYTHRACEAE			
<i>Lagerstroemia speciosa</i> (L.) Pers. (PS.CM100)	Bungur	LF/FR/FL	Decoction used as a mouth rinse for toothache (OM)
MALVACEAE			
<i>Abelmoschus ficulneus</i> W. et H. (PS.GM7)	Polud polud	LF	Crushed with salted water the liquid drunk 2 × daily for diarrhoea (OM)
<i>Abelmoschus moschatus</i> Medik. (PS.BM128)	Kapas hantu	LF	Ground with water and the filtrate drunk to treat nausea (MX)

Table 1 (continued)

Botanical name (Voucher No.) ^a	Local name	Parts used ^b	Uses ^{c,d}
<i>Gossypium barbadense</i> L. var. <i>acuminatum</i> (Roxb.) Mast. (PS.BM143)	Kapas tanam	LF	Ground with water together with those of <i>Hibiscus tiliaceus</i> (Malv) and <i>Costus</i> sp. (Zing); resultant solution drunk for headaches (MX)
<i>Hibiscus x archeri</i> Wats. (PS.BM78)	Bunga raya	LF	Ground with water and pulp applied over the body as a fever medication (MX)
<i>Hibiscus sabdariffa</i> L. (PS.XM17)	Susur	LF	Two leaves wrapped in banana leaf, warmed over a fire and used to treat swelling by poulticing on affected area (OM)
<i>Hibiscus tiliaceus</i> L. (PS.BM106)	Kulit baru	BK	See <i>Mangifera indica</i> (Anac).
(PS.BM139)	Radang	LF	Ground with water, solution drunk and residue applied to the forehead in case of headache and fever (MX)
MELASTOMATACEAE			
<i>Dissochaeta gracilis</i> (Jack) Bl. (PS.BM11)	Kedudu akar	LF/ST	Decoction of 16 leaves or 1 finger length of stem drunk as a medication for diarrhoea (TM)
<i>Melastoma affine</i> D. Don (PS.EM5)	Keduduk	LF	A handful of leaves, ground and applied as a compress for skin swelling (such as snake bite), changing once daily (OM)
<i>Melastoma malabathricum</i> L. (PS.BM42)	Kedudu	LF	Ground and applied as a compress to cuts and wounds (TM)
(PS.CM34)	Pucuk keduduk	LF/ST	As for BM42 (TM)
<i>Phyllagathis rotundifolia</i> (Jack) Bl. (PS.CM80)	Selupa	LF	Decoction drunk in case of intestinal pain or discomfort (MX)
MELIACEAE			
<i>Aglaia eximia</i> Miq. (PS.EM19)	Piota	BK/RT	Decoction of finger-length scrapings of bark or root drunk in case of stomachache, shivering and colds (malaria?) (OM)
MENISPERMACEAE			
<i>Arcangelisia flava</i> (L.) Merr. (PS.BM28)	Akar kunyit	RT	Decoction used as a wash to treat eye infections (TM)
(PS.EM24)	Akar kunyit	RT	As for BM28. Also, water added to powdered roots is drunk to treat yellow skin and eyes (OM)

Table 1 (continued)

Botanical name (Voucher No.) ^a	Local name	Parts used ^b	Uses ^{c,d}
<i>Pericampylus glaucus</i> (Lamk.) Merr. (PS.CM101)	Lempenang	LF	Crushed and applied to the forehead to treat headaches (OM)
<i>Tinomiscium petiolare</i> Hook. f. et Thoms. (PS.AM9) (PS.BM29)	Sikudung	LF	Whole leaves used as a dressing for severe cuts (TM)
	Asam tukul	LF	Ground leaves used to treat inflamed or swollen skin by rubbing them on to the affected part (TM)
<i>Stephania japonica</i> (Thunb.) Miers (PS.CM115)	Terong kamau	NI	NI (OM)
MORACEAE			
<i>Artocarpus elasticus</i> Reinw. ex Bl. (PS.BM95)	Terap	BK	Decoction drunk to treat dysentery (MX)
<i>Artocarpus integer</i> (Thunb.) Merr. (PS.AM15)	Tebadak	BK	Decoction drunk to treat dysentery (TM)
<i>Artocarpus nitidus</i> Trec. (PS.BM17)	Tampang	BK	Decoction of 3–4 fingers long drunk for constipation (TM)
<i>Ficus grossularioides</i> Burm. f. (PS.DM14)	Simantung rahu	LF/BK	Infusion from soaked leaves or bark used to treat skin problems, eczema or scabies by washing the affected parts (TM)
<i>Ficus microcarpa</i> Kurz (PS.CM88)	Ara beringin	NI	NI (MX)
<i>Ficus padana</i> Burm. f. (PS.AM26)	Simantung	LF	Crushed leaves applied around stomach in case of stomachache or colic (TM)
MYRISTICACEAE			
<i>Horsfieldia glabra</i> (Bl.) Warb. (PS.AM6)	Mandarahan	BK	Decoction drunk for dysentery (MX)
<i>Horsfieldia wallichii</i> (Hook. f. et Thunb.) Warb. (PS.CM3)	Kulit kayu pendahan	BK	See <i>Cratoxylon formosum</i> (Clus) (TM)
MYRTACEAE			
<i>Eugenia polyantha</i> Wight (PS.XM10)	Salam	LF	Leaves used as a vegetable in soups to treat hypertension (OM)

Table 1 (continued)

Botanical name (Voucher No.) ^a	Local name	Parts used ^b	Uses ^{c,d}
<i>Psidium guajava</i> L. (PS.AM4) (PS.CM10)	Jambu biji Jambu	LF LF	Infusion of young leaves drunk for diarrhoea (MX) As for AM4 (TM)
<i>Rhodamnia cinerea</i> Jack (PS.BM2) (PS.CM22)	Marapuyan Marapuyan	LF LF	Three leaves ground, cold water added; mixture drunk for aching joints (especially neck and shoulder) and repeated 3 × more (TM) Infusion drunk for diarrhoea (TM)
PANDANACEAE			
<i>Pandanus</i> sp. (PS.CM111)	Pandan duri	LF	Infusion of young leaves drunk 3 × daily for stomachache (OM)
PASSIFLORACEAE			
<i>Adenia cordifolia</i> Engl. (PS.CM94)	Sayap layang	NI	NI (OM)
RHAMNACEAE			
<i>Gouania leptostachya</i> DC. (PS.EM17)	Akar jangut baun	LF/ST	Ground with water and drunk to treat stomachache and diarrhoea (OM)
RHIZOPHORACEAE			
<i>Auisophyllea disticha</i> (Jack) Baill. (PS.CM25)	Ribu ribu	LF/ST	Decoction drunk to treat shivers and headache (TM)
RUBIACEAE			
<i>Hedyotis capitellata</i> Wall. (PS.BM35)	Kalang purut	NI	NI (TM)
<i>Hedyotis leucocarpa</i> Elm. (PS.BM13)	Siguntur	LF	Ground with water and drunk; the residue is also rubbed on the body to further reduce fever (TM)
<i>Mussaenda frondosa</i> L. (PS.CM108)	Balik adat	FL/LF	Infusion of flowers (preferable) or leaves, together with the leaves of <i>Celosia argentea</i> (Amar), <i>Costus</i> sp. (Zing) and <i>Ocimum basilicum</i> (Labi) drunk to treat jaundice or headaches (OM)
<i>Pavetta multiflora</i> Bl. (PS.BM93)	Bunga susun kelapa	BK	Bark shavings mixed with a little water and used as nose drops to treat colds (MX)
<i>Uncaria gambir</i> (Hunt.) Roxb. (PS.BM152)	Getah gambir	LF/ST	Infusion used to treat diarrhoea (MX)

Table 1 (continued)

Botanical name (Voucher No.) ^a	Local name	Parts used ^b	Uses ^{c,d}
RUTACEAE			
<i>Citrus aurantifolia</i> Swingle (PS.CM91)	Limau tipis	LF/RT	Decoction of root and leaves together with those of <i>Cassia alata</i> (Legu) and <i>Dendrocnide stimulans</i> (Urti), 1/2 glass drunk 3 × daily for 3 days to treat coughing with blood (OM)
(PS.XM40)	Limau tipis	BK/RT	Used for fever mixed with BK/RT of other <i>Citrus</i> sp. (OM)
<i>Citrus medica</i> L. (PS.AM10)	Limau muntimum	LF	Whole leaves eaten as a vegetable to treat liver complaints (TM)
SIMAROUBACEAE			
<i>Brucea javanica</i> (L.) Merr. (PS.EM23)	Dahun belur	LF	A handful of leaves crushed, and rubbed against infected area, repeated 2 × daily. This alleviates, not cures, ringworm (OM)
STAPHYLEACEAE			
<i>Turpinia sphaerocarpa</i> Hassk. (PS.XM12)	Tulang katak	LF	Crushed leaves are applied to the belly to treat stomachache (OM)
SYMPLOCACEAE			
<i>Symplocos cochinchinensis</i> (Lour.) Moore (PS.XM6)	Kendung	LF	Young leaves soaked in water and chewed to treat madness (OM)
THEACEAE			
<i>Eurya acuminata</i> DC. (PS.BM8)	Jirak pandang	LF	Leaf infusion drunk for diarrhoea with blood (TM)
(PS.CM2)	Jirak pandang	LF/RT	Root infusion drunk for stomachache or diarrhoea; leaves ground, water added and applied as a compress for fever (TM)
THYMELAEACEAE			
<i>Aquilaria malaccensis</i> Lamk. (PS.EM10)	Garu	WD	Wood burned, affected area held over the smoke in case of joint pain (OM)
TILIACEAE			
<i>Elaeocarpus</i> cf. <i>mastersii</i> King (PS.CM78)	Ajin kayu	BK/LF	Infusion of bark scrapings drunk for fever or crushed young leaves applied around the forehead as a headache treatment (MX)

Table 1 (continued)

Botanical name (Voucher No.) ^a	Local name	Parts used ^b	Uses ^{c,d}
<i>Grewia acuminata</i> Juss. (PS.BM90) (PS.BM149)	Daun nilau nasi Hanilau	BK LF	Bark decoction drunk as a cold and fever medication (MX) Infusion of leaves drunk in a concoction to treat backache and pains (MX)
ULMACEAE			
<i>Trema tomentosa</i> (Roxb.) Hara (PS.BM15)	Mendarung/ windarung	WH/BK	Infusion from leaves and stem of 3 plants ground with water or decoction of finger length bark piece drunk for diarrhoea (TM)
URTICACEAE			
<i>Dendrocnide stimulans</i> (L. f.) Chew (PS.CM72)	Jelatang kayu	LF/RT	Decoction drunk as an anthelmintic in cases of hard swollen stomach, constipation and yellow eyes. See <i>Citrus aurantifolia</i> (Ruta) (MX)
VIOLACEAE			
<i>Rinorea anguifera</i> (Lour.) O. K. (PS.BM40)	Rambutan pacat	LF/RT	Young leaves ground and rubbed on stomach as a postpartum medication or root decoction drunk for diarrhoea (TM)
ZINGIBERACEAE			
<i>Boesenbergia rotunda</i> (L.) Mansf. (PS.CM96)	Temu kunci	NI	NI (OM)
<i>Costus</i> sp. (PS.CM29)	Setawar	WH	Leaves and stem crushed, water added and drunk for coughs. See <i>Gossypium barbadense</i> (Malv) (TM)
<i>Curcuma</i> cf. <i>heyneana</i> Val. et v. Zijp (PS.XM27)	Temu giring	RZ	Rhizome crushed with papaya leaves, strained and juice drunk as a tonic for depression (OM)
<i>Curcuma</i> sp. No. 1 (PS.XM26)	Temu hitam/Temu ireng	RZ	As for <i>Curcuma</i> cf. <i>heyneana</i> (OM)
<i>Curcuma</i> sp. No 2 (PS.CM12)	Kunyit temu	RT	Dried root powder mixed with water and drunk as a postpartum medication (TM)
<i>Zingiber purpureum</i> Roxb. (PS.CM86)	Bunglai hitam	RT	Roasted, ground, water added, filtered; applied daily for 3 days to treat swollen eyelids (MX)

^aVoucher No.: PS, Project Soma (collector), followed by collection code; ^bBK, bark; FL, flower; FR, fruit; LF, leaf; LX, latex; NI, no information; RT, root; RZ, rhizome; SD, seed; SH, shoot; ST, stem; WD, wood; WH, whole plant without root; ^cfor crossreference purposes, the first 4 letters of family name are indicated in parentheses; ^dTM, use from a Talang Mamak village; MX, use from a mixed Talang Mamak/Orang Melayu settlement; OM, use from an Orang Melayu village

ciples and temperature. Whether or not the process may be facilitated by other plant constituents acting as phase transfer catalysts is still conjecture (Mahyar et al., 1991). The advantages of external, as opposed to internal, administrations could be selectivity and dosage regulation of beneficial or detrimental active compounds. For example, the leaves of *Jatropha curcas* were administered externally by a dukun, who noted that they were poisonous if consumed, probably due to the presence of cyanide (Burkhill, 1966), a component absorbed much more readily through the gut than through the skin.

However, when our results are compared in more detail with those of Mahyar et al. (1991), there is little correspondence. The two studies have 13 species in common but only agree about the uses of 3 of them. Different peoples, living in the same geographical area, may clearly have quite different ethnomedical traditions.

This is further illustrated by the plants used in Talang Mamak villages compared with those in the mixed and Orang Melayu settlements. Table 1 shows that the latter use species of the families, Amaryllidaceae, Anacardiaceae, Clusiaceae, Convolvulaceae, Malvaceae and Tiliaceae: the former appear not to do so.

A brief review of relevant literature now follows which either gives corroborative evidence of the medical use(s) found in Riau, much of it taken from Perry and Metzger (1980), or information about the possible scientific basis of that use. No comprehensive ethnomedical review has been attempted for these species and comments relating use to antibacterial and antifungal activity will be presented in a separate paper.

ACANTHACEAE

Of the two species used in Riau, only *Gendarussa vulgaris* (syn.: *Justicia gendarussa* L.) has corroborative evidence of uses. Its root decoctions are also drunk for fever in China (Stuart, 1911); certainly such extracts lower artificially-induced fever in rats (Hutchins, 1936). Leaf preparations are taken for stomach troubles in the Malay peninsula. Here the high internal levels of potassium (Burkhill, 1966), together with the salt sometimes

added, are obviously beneficial in replacing electrolytes lost in diarrhoeal fluid.

AMARYLLIDACEAE

Crinum asiaticum and *Crinum lineare* have been used in Indonesia, Malaysia, India and Papua New Guinea for the relief of inflammation and pain caused by spasms, lumbago, fractured limbs, etc. (Burkhill, 1966; Holdsworth, 1980; Elliott and Brimacombe, 1987). The leaves, usually oiled and heated, are applied externally; their analgesic effects have been attributed to alkaloids structurally similar to morphine and codeine (Ghosal et al., 1985).

APOCYNACEAE

This family is known as a rich source of biologically active compounds. One of our two listed species, *Alstonia scholaris*, is used as a fever treatment in India, Indonesia, the Philippines and Papua New Guinea (Pushpangadan and Atal, 1986; Mahyar et al., 1991). The roots contain the alkaloid echitamine, an effective anti-malarial as well as a hypotensive (Vasanth et al., 1990) while the bark may also be slightly active against a *Plasmodium* sp. (Gandhi and Vinayak, 1990). The effectiveness of *Alstonia scholaris* in treating patients with malarial fever has been recorded by Mukherjee (1991). However, generalisations must be tentative because plants from Thailand and Taiwan belong to a different chemical race than those from Indonesia, as judged by leaf alkaloid pattern (Yamauchi et al., 1990).

BOMBACEAE

The leaves of *Ceiba pentandra* are also used against fever elsewhere, externally in Cambodia as baths or lotions (Menaut, 1929) and internally in the Malay peninsula (Burkhill, 1966).

BROMELIACEAE

Ananas comosus leaves are used like those of *Ceiba pentandra* in the Malay peninsula. *Ananas comosus* contains the protease bromelain in the

fruit and stem (Rowan et al., 1990). Bromelain, administered intravenously, is said to increase tissue permeability (Taussig and Batkin, 1988) but, as yet, there is no evidence that it could increase absorption of bioactive substances through the skin.

CAPPARACEAE

A decoction of *Crateva religiosa* leaves is taken for headaches in Taiwan too, but here it is also used against dysentery.

DILLENACEAE

All species are used to alleviate gut disorders. Previous reports from the Malay peninsula (Burkhill, 1966) include treatment of diarrhoea internally with reportedly astringent preparations of either *Dillenia ovata* bark or *Tetracera indica* leaves.

EUPHORBIACEAE

Jatropha curcas leaves are also used externally for fever in the Caribbean and Latin America (Morton, 1980).

Decoctions of almost all parts of *Macaranga triloba* and *Macaranga gigantea* are employed to treat gut disorders in Java, Indonesia, the Malay peninsula and Papua New Guinea (Holdsworth, 1980), while *Mallotus ricinoides* and *Mallotus japonicus* are used similarly in Papua New Guinea and Japan, respectively, sometimes alone but often mixed with the *Macaranga* preparations. *Mallotus oppositifolius* is known to contain the anthelmintic rottlerin (Oliver-Bever, 1983) and *Mallotus japonicus* extracts are reported to be active against KB carcinoma cell lines (Arisawa et al., 1990).

LABIATAE

Three of the species listed in Table 1 appear in the literature. One is *Ocimum basilicum* whose flower and/or seed infusion is drunk in India for infant gastrointestinal problems and in Malaysia for colic, while in Riau it is used to alleviate gastrointestinal complaints, probably ulcers. The

seed mucilage is a demulcent (Burkhill, 1966) while extracts of the aerial parts decrease acid output and enhance hexosamine secretion by ulcers (Akhtar and Munir, 1989). The flavonoid fraction is anti-inflammatory (Anton, 1988).

The second species is *Orthosiphon aristatus* (syn.: *Orthosiphon stamineus* Benth.), which has been experimentally confirmed (Galyutera et al., 1990) and documented as an efficacious diuretic in Southern China, Taiwan, the Philippines and the Malay peninsula. Leaves and stems have a high potassium content (Van der Sleen, 1959) and this may explain why extracts do not cause kidney damage (diuretics often deplete body potassium).

The last species is *Coleus scutellarioides* (syn.: *Coleus atropurpureus* Benth., *Coleus blumei* Benth.), whose leaf juice is used to treat inflamed eyes and/or gastritis in the Malay peninsula (Burkhill, 1966) and Java (Heyne, 1927).

LEGUMINOSAE

The crushed leaves of *Bauhinia* species are used as a poultice for nose ulcers in the Malay Peninsula as an alternative to inhalation of the smoke (Table 1).

The leaves of *Cassia alata* are a transglobal treatment for skin infections, particularly ringworm; reports come from Australasia and South East Asia (Holdsworth, 1980) as well as from India (Watt, 1972), West Africa (Kerharo, 1969), and Central and South America (Morton, 1981; Hirschhorn, 1983). *Cassia alata* leaves are also widely used as a laxative. Here the activity is associated with the purgative action of the anthrones and anthraquinones (Smith and Sadaquat, 1979), which stimulate the synthesis of endogenous prostaglandin E₂, thereby enhancing fluid and electrolyte secretion by the colon (Beubler and Kollar, 1985). Bark and seeds of *Cassia nodosa* are used for headaches in Riau; certainly ethanolic extracts of the leaves, at 200 mg/kg, like acetylsalicylate, will inhibit the inflammation of carrageenin-induced oedema in rats (Abatan, 1990).

Lastly, *Flemingia strobilifera* (syn.: *Moghania strobilifera* (L.) St. Hil. ex Jacks.) is used externally also in the Malay Peninsula and the Philippines as

a general purpose tonic and a postpartum protective medicine.

MALVACEAE

The parent species of *Hibiscus x archeri* (*Hibiscus rosa-sinensis* L. x *Hibiscus schizopetalus* H.f.: Backer and Bakhuizen, 1963) together with *Hibiscus tiliaceus* are fever remedies in the Malay Peninsula, too. However, here leaf decoctions, or more often root decoctions of *Hibiscus tiliaceus*, are taken internally. The demonstrated antiviral activity of another species, *Hibiscus mutabilis*, against *Herpes simplex* type II (Zheng, 1989) may be relevant.

MELASTOMATACEAE

Melastoma dodecandrum leaf decoction is used to wash snake bites in Southern China, much as *Melastoma affine* (syn.: *Melastoma polyanthum* Bl.) is employed in Riau. *Melastoma malabathricum* is a treatment for cuts and wounds in Malaysia, too, although here dried powdered root as well as leaf is sprinkled on the affected area (Burkhill, 1966). An ellagitannin, lobotanin B, isolated from *Melastoma malabathricum* has in vitro antiviral activity against human immunodeficiency virus (Yoshida et al., 1992) and against mouse mammary tumor virus (Tsai et al., 1992).

A decoction of *Phyllagathis rotundifolia* roots (sometimes leaves) is used for stomachache in the Malay peninsula (Burkhill, 1966).

MENISPERMACEAE

The use of *Arcangelisia flava* (syn.: *Arcangelisia lemniscata* (Miers.) (Becc.) seems otherwise restricted to the Philippines, where bark decoctions are used as washes for wounds, ulcers and itching, rather than for eyes, and to Indonesia, as a treatment for jaundice. The plant may be effective because it contains the alkaloid, berberine (Valenzuela et al., 1949), which is known to be antibacterial, trypanocidal, anthelmintic (Oliver-Bever, 1983), amoebicidal (Keene et al., 1986) and anti-inflammatory (Zhang and Shen, 1989).

Pericampylus glaucus (syn.: *Pericampylus in-*

canus Miers., *Cocculus glaucus* DC.) leaves are also applied externally for headaches in the Malay peninsula.

Stephania alkaloids are known to be anti-inflammatory, hypnotic and sedating (Rabinovich et al., 1965). For example, cepharanthine, isolated from *Stephania cepharantha* and *Stephania susaki*, stimulates production of antibodies and inhibits the secretion of histamine and serotonin by mast cells (Wagner, 1987).

MORACEAE

Decoctions of *Artocarpus integer*, *Artocarpus elastica*, *Artocarpus horridus* and *Artocarpus communis* are also drunk for dysentery in Burma, Northern Sumatra and other parts of Indonesia (Elliott and Brimacombe, 1987). The anti-ulcerogenic properties of *Artocarpus integer* bark extracts have been attributed to the presence of (+)-catechin (Yamazaki et al., 1987); this compound was also reported to stimulate absorption of water by rat colon (Verhaeren and Lemli, 1986).

Ficus grossularioides leaves are further used against eczema in Bali. There have been no chemical studies on these leaves but other *Ficus* species contain phototoxic furanocoumarins (Murray et al., 1982) and these photosensitizers have been used therapeutically for skin complaints (Hönigsmann et al., 1989).

MYRISTICACEAE

The bark and leaves of *Horsfieldia glabra* are used to treat intestinal disorders in other parts of Indonesia too.

MYRTACEAE

Treatment of diarrhoea with *Psidium guajava* leaves extends from Southeastern Asia to the Far East and is also established in India (Pushpangadan and Atal, 1986), West Africa (Oliver-Bever, 1983), the Caribbean and Central and South America (Morton, 1980); the remedy has been recommended as a part of primary health care (Le Grand 1989). One of the active compounds is probably quercetin which shows a mor-

phine like inhibition of acetylcholine release in electrically stimulated guinea pig ileum (Lutterodt, 1989), the in vivo effect being a reduction in intestinal motility.

RUBIACEAE

The use of *Hedyotis leucocarpa* as a febrifuge is corroborated by similar uses of *Hedyotis herbacea* in Indo-China as well as by Chinese pharmacies in Malaysia and of *Hedyotis corymbosa* in Vietnam, Taiwan and the Philippines. Experimental evidence in support of such use is circumstantial but fever is sometimes associated with viral hepatitis, in which elevated serum aminotransferase levels contribute to liver damage. *Hedyotis corymbosa* decreases the level of one of the serum aminotransferases in rats with livers damaged by carbon tetrachloride (Chiu et al., 1988).

The leaves of *Mussaenda frondosa* together with *Mussaenda glabra* Vahl (Heyne, 1927) are also used in the Malay peninsula against headaches but, here, singularly and as a poultice.

Uncaria gambir leaves are a remedy for diarrhoea in India and other parts of Indonesia as well (Van Steenis-Kruseman, 1953; Burkhill, 1966). The astringent and tanning properties of this plant are due to the high levels of catechin and catechin-tannins (loc. cit.). The beneficial effect of catechin on diarrhoea has already been discussed (Moraceae). Moreover, the tannin, gambinin A, may be effective in suppressing viral diarrhoea, prevalent in children, since the compound is antiviral at least against *Herpes simplex* type 1 (Takechi et al., 1985).

SIMAROUBACEAE

The leaves of *Brucea javanica* (syn.: *Brucea sumatrana* Roxb., *Brucea amarissima* (Lour.) Desv. ex Gomes) are a treatment for ringworm in the Malay peninsula and Java. However, the use of the plant against fever and dysentery is even more widespread (Burkhill, 1966). Certainly the quassinoids it contains (Cassady and Douros, 1980; Polonsky, 1985) are effective against *Plasmodium falciparum* and *Entamoeba histolytica* in vitro and have some activity against *Plasmodium berghei* in vivo (O'Neill et al., 1987;

Wright et al., 1988). These effects are specific, not due to general cytotoxicity (Anderson et al., 1991). One of *Brucea javanica*'s glycosides, kosamin, was reported to be emetocathartic, a cholagogue and an anthelmintic (Perry and Metzger, 1980).

STAPHYLEACEAE

Another *Turpinia* species (*Turpinia montana*) is an antidiarrhoeal agent in Thailand (Panthong et al., 1991) but is used internally.

TILIACEAE

In the Malay Peninsula the leaves of *Elaeocarpus mastersii* are similarly used for headache and instead of bark, as in Riau, a root infusion is drunk for fever (Burkhill, 1966).

ULMACEAE

In Java *Trema orientalis* is taken for diarrhoea (Burkhill, 1966) much as *Trema tomentosa* is used in Riau.

ZINGIBERACEAE

The Malays also use *Costus* species for the treatment of coughs, the rhizome of *Costus speciosus* being eaten with betel nut.

Curcuma domestica, in combination with *Acorus calamus*, and the tubers of *Curcuma zedaria* are both post partum medications in Java too (Heyne, 1927).

Zingiber species are also used as antiseptic washes elsewhere. *Zingiber mloga* is favoured in China (root decoction) and the Malay Peninsula (leaf extract) (Stuart, 1911; Burkhill, 1966).

Based on the literature review above, it seems worthwhile to suggest the following species be further studied: *Dillenia meliosmifolia* (Dilleniaceae), *Tetracera asiatica* (Dilleniaceae), *Artocarpus elastica* (Moraceae) and *Artocarpus nitidus* for the presence of (+)-catechin; *Ficus grossularioides* (Moraceae) for photosensitizing compounds; *Hibiscus x archeri* (Malvaceae) for antiviral activity.

Finally, to put our findings in perspective, Table

1 also includes a small number of species new to the ethnomedical literature. These include *Garcinia parvifolia* (Clusiaceae), *Scleria purpurascens* (Cyperaceae), *Galearia filiformis* (Euphorbiaceae), *Litsea elliptica* (Lauraceae), *Litsea robusta*, (Lauraceae), *Barringtonia lanceolata* (Lecythidaceae), *Sesbania aculeata*, *Mimosa pigra* (Leguminosae), *Abelmoschus ficulneus* (Malvaceae), *Hedyotis leucocarpa* (Rubiaceae), *Pavetta multiflora* (Rubiaceae), *Symplocos cochinchinensis* (Symplocaceae) and *Trema tomentosa* (Ulmaceae). Members of all these genera have been used before but not the species listed. However, *Hanguana* is a newcomer to medicinal plant genera.

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