4-Cyano-2-methylpyrimidine (IIId): By the general procedure, IId (1.0 g, 0.0073 mol) was treated with $POCl_3$ to give IIId, 0.58 g.

4-Cyano-2,6-dimethylpyrimidine (IIIe): By the general procedure, IIe (0.65 g, 0.0043 mol) was treated with $POCl_3$ (2 ml) to give IIIe, as colorless needles (from petr. ether), 0.32 g.

4-Cyano-2-methylquinazoline (IIIf)——A mixture of IIf (0.5 g, 0.0027 mol) and P_4O_{10} (0.38 g, 0.0027 mol) was heated at 170° under reduced pressure to sublimated pale yellow crystals. The crystals were dissolved in C_6H_6 and passed through an alumina column for decoloration and recrystallized from petr. ether to give colorless needles, 0.197 g.

Acid Hydrolysis of 4-Cyano-2-methylquinoline (IIIc)——A solution of IIIc (2.0 g) in 75% H_2SO_4 (20 ml) was refluxed for 1 hr. The solution was neutralized with 3 N-NaOH to give colorless precipitates. The precipitates were collected by filtration and recrystallization from EtOH to yield colorless needles (IVc), mp 240—243° (dec.), 1.25 g (56%).

Decarboxylation of 2-Methylquinoline-4-carboxylic Acid (IVc)——A solution of IVc (1.2 g) in nitrobenzene (40 ml) was refluxed for 24 hr. After cooling, the solution was shaken with 3 N HCl and the HCl layer was made alkaline with 3 N NaOH followed by extraction with ether. The ether extract was concentrated to afford a pale yellow liquid, bp 120—125° (20 mmHg), 0.23 g (25%) which was identical with 2-methylquinoline by comparison of spectral data and by the mixed melting point test with its picrate (mp 192—194°).

Alkaline Hydrolysis of 4-Cyano-2-methylquinazoline (IIIf)——A suspension of IIIf (0.2 g) in 10% KOH (2.5 ml) was stirred at room temperature. After IIIf dissolved, AcOH (1.0 g) was added to the solution to give the precipitates which were collected by filtration. Recrystallization of the precipitates from EtOH gave 2-methyl-4-quinazolone (VI), mp 234—236°, 0.15 g (80%). VI was identical with the authentic sample by comparison of IR spectrum.

One-step Preparation of IIIa—e from Ia—e——The same method with the general procedure of nitrosation was used. The crude aldoximes (IIa—e) obtained from acetone extracts of the reaction mixture were treated with phosphoryl chloride. The treatment for dehydration of IIa—e with phosphoryl chloride was the same as the general procedure. The yields were summarized in parentheses in Table III.

Acknowledgement The authors are greatful to all the staffs of the Central Analysis Room of this Institute for elemental analysis and NMR spectra measurement.

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A New Phytochemical Survey of Malaysia. IV. Chemical Screening

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Presented here are the results of further screening of Malaysian plants consisting of 148 species from 61 families, for the presence of alkaloids, saponins, steroids and triterpenes.

Keywords——phytochemical screening; alkaloids; saponins; steroids; triterpenes

In the three previous papers of this series[2-4] we have reported the results of a preliminary chemical investigation of 743 plant samples representing 540 species, distributed over 112 families and 333 genera. In this communication, we wish to present the results of chemical examination of further 273 samples, from 148 plant species belonging to 61 families. Of these 41 samples have given positive tests for alkaloids, 64 samples for saponins and 38 samples

1) Location: *Kuala Lumpur, Malaysia.*
2) Part II: J. Carrick, K.C. Chan, and H.T. Cheung, *Chem. Pharm. Bull.* (Tokyo), **16**, 2433 (1968).
3) K.C. Chan and L.E. Teo, *Chem. Pharm. Bull.* (Tokyo), **17**, 1284 (1969).
4) K.C. Chan and L.E. Teo, *Chem. Pharm. Bull.* (Tokyo), **20**, 1582 (1972).

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Table I. Screening Tests

Family and species	Parts	Chemical tests for: Alkaloids	Saponins	Steroids–triterpenes
Acanthaceae				
Acanthus ilicifolius L.	W	–	–	–
Pseuderanthemum graciflorum Nees	W	1+	2+	–
Alangiaceae				
Alangium javanicum (Bl.) Wang	L, S	–	–	–
Ampelidaceae				
Pterisanthes cissoides Korth.	W	–	–	–
Anacardiaceae				
Buchanania lucida Bl.	S	1+	1+	–
	L	–	–	+
Annonaceae				
Anaxagorea javanica Bl.	S	1+	–	–
	L	–	–	–
Artabotrys blumei Hk f. & Thoms.	S	2+	–	–
	L	1+	–	–
Drepananthus pahangensis (*cf.* Corner)	L, S	–	–	–
Goniothalamus subevenius King	S	1+	2+	–
	L	–	–	–
Polyalthia affinis T. & B.	S	1+	–	–
	L	–	–	–
Polyalthia sumatrana King	L, S	–	–	–
Apocynaceae				
Alstonia spathulata Bl.	S	–	–	–
	L	1+	–	–
Cerbera odollam Gaertn.	L, S	–	–	–
Chilocarpus suaveolens Bl.	L, S	–	–	–
Holarrhena antidysenterica Wall.	S	–	–	–
	L	–	1+	–
Aquifoliaceae				
Ilex cymosa Bl.	S	–	6+	+
	L	–	4+	+
Ilex triflora Bl.	L, S	–	2+	+
Araliaceae				
Polyscias cf. javanica K. & V.	S	1+	–	–
	L	–	–	–
Schefflera farinosa (Bl.) Merr.	L, S	–	2+	+
Aristolochiaceae				
Apama corymbosa Soler	S	–	–	–
	L	1+	–	+
Burseraceae				
Santiria rubignosa Bl. var. nanal ((H.J. Lam) Kalman	L, S	–	1+	+
Caesalpiniaceae				
Afzelia retusa Kurz	L, S	–	–	–
Bauhinia glauca Wall.	W	–	–	–
Bauhinia pottsii G. Donn var. *elongata* (Korth.) De Wit	S	–	3+	–
	L	–	2+	–
Bauhinia purpurea L.	L, S	1+	1+	–
Bauhinia rosea (*cf.* Corner)	L, S	–	1+	–
Cynometra ramiflora L.	L, S	–	–	–
Campanulaceae				
Pentaphragma begoniaefolium Wall.	W	–	–	–
Cannaceae				
Canna orientalis Rosc.	L, S	–	–	–
Clusiaceae				
Calophyllum canum Hk. f.	L, S	–	–	–
Garcinia griffithii T. Anders.	L, S	–	–	–
Garcinia parviflolia (Miq.) Miq.	L, S	–	1+	–
Combretaceae				
Combretum nigrescens King	S	–	–	–
	L	–	–	–
Terminalia subspathulata King	S	–	1+	–
	L	–	–	–
Commelinaceae				
Forrestia griffithii Clarke	W	–	–	–
Connaraceae				
Rourea mimosoides (Vahl) Planch.	L, S	–	–	–
Convolvulaceae				
Jacquemontia paniculata (Burm. f.) Hallier f.	W	–	–	–
Lettsomia penangiana Miq.	W	–	–	–
Merremia crispatula Prain	W	–	1+	–
Cyperaceae				
Rhynchospora malasica Clarke	W	–	–	–
Dilleniaceae				
Dillenia grandifolia Wall.	S	–	–	–
	L	–	2+	–
Dillenia meliosmaefolia Hk. f.	S	–	–	+
	L	–	–	–
Elaeocarpaceae				
Elaeocarpus floribundus Bl.	S	–	2+	–
	L	–	–	–
Elaeocarpus griffithii Mast.	L, S	–	–	–
Euphorbiaceae				
Acalypha fallax Mull.	W	–	–	–
Acalypha indica L.	W	1+	–	–
Agrostistachys sessilifolia Pax & K. Hoffm.	S	–	1+	–
	L	–	–	–
Antidesma cuspidatum Mull.	L, S	–	2+	–
Antidesma pachystachys Hk. f.	S	–	1+	–
	L	–	–	–
Antidesma salicinum Ridl.	S	1+	–	–
	L	–	–	–
Antidesma velutinosum Bl.	S	–	2+	–
	L	–	–	–
Aporosa arborea (Bl.) M.A.	S	–	–	–
	L	1+	–	+
Aporosa nigricans Hk. f.	L, S	–	–	–
Bridelia griffithii Hk. fil.	S	–	2+	+
	L	–	–	+
Claoxylon longifolium Mull.	S	–	2+	–
	L	–	–	–
Croton caudatus Geisel	W	–	–	–
Emblica officinalis Gaertn.	S	–	1+	+
	L	–	–	+
Euphorbia pulcerrima Willd. ex Klotzsch	L, S	–	–	–
Glochidion leiostylum Kurz	S	1+	–	–
	L	–	–	–
Glochidion carrickii Airy Shaw	S	–	–	–
	L	–	–	–
	F	–	–	–
Mallotus macrostachyus Mull.	S	–	–	–
	L	–	–	+
Mallotus tiliifolius Mull.	L, S	–	–	–
Mallotus oblongifolius (Miq.) M.A.	S	–	–	+
	L	–	–	–
Mallotus subpeltatus Mull.	L, S	–	–	–
Melanolepis multiglandulosa (Bl.) Rchb. f. & Zoll.	S	1+	–	–
	L	–	–	+
Ostodes macrophylla Benth.	L, S	1+	–	–
Phyllanthus pulcher (Baill.) M.A.	W	–	1+	–
Sapium discolor Mull.	F, L, S	–	–	–
Sebastiana chamaelea (L.) M.A.	W	–	–	–
Fagaceae				
Pasania spicata Oerst.	L, S	–	–	–
Flacourtiaceae				
Casearia tuberculata Bl.	S	–	1+	–
	L	–	–	–
Hydnocarpus nana King	L, S	–	1+	+
Hamamelidaceae				
Buklandia populnea Br.	S	–	–	–
	L	–	1+	–
Hippocrateaceae				
Salacia grandiflora Kurz	S	–	–	–
	L	1+	–	–
Icacinaceae				
Gomphandra quadrifida (Bl.) *Sleumer* var. *quadrifida*	S	–	2+	–
	L	1+	–	–
Iodes cirrhosa Turcz.	W	–	1+	–
Labiatae				
Ocimum basilicum L.	S	–	–	+
	L	1+	–	+
Lauraceae				
Litsea umbellata (Lour.) Merr.	S	1+	–	–
	L	1+	–	–

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TABLE I. (Continued)

Family and species	Parts	Chemical tests for: Alkaloids	Saponins	Steroids–triterpenes
Phoebe grandis (NEES) MERR.	L, S	–	–	–
Loranthaceae				
Elytranthe formosa DON	L, S	–	–	–
Loranthus pentapetalus ROXB.	L, S	–	–	–
Lythraceae				
Lawsonia inermis L.	L, S	–	–	–
Sonneratia acida L.	S	–	2+	–
	L	1+	–	–
Malpighiaceae				
Tristellateia australasiae A. RICH.	W	–	–	–
Melastomataceae				
Anerincleistus macranthus KING	S	–	–	–
	L	–	–	–
Memecylon amphexicaule ROXB.	S	–	1+	–
	L	–	–	–
Meliaceae				
Aglaia elaeagnoida (JUSS.) BTH.	L, S	–	–	–
Chisocheton sandoricocarpus K. & V.	L, S	–	–	–
Dysoxylon angustifolium KING	L, S	–	–	–
Payena obscura BURCK.	S	1+	–	–
	L	–	–	+
Turraea cf. breviflora RIDL.	W	1+	1+	–
Menispermaceae				
Arcangelisia loureiri (PIERRE) DIELS	S	4+	1+	–
	L	–	–	–
Mimosaceae				
Acacia podalyriaefolia A. CUNN. ex G. DON	S	–	1+	–
	L	–	–	–
Moraceae				
Ficus grossularioides BURM. f.	S	–	–	+
	L	1+	–	+
Myristicaceae				
Horsfieldia brachiata WARB.	L, S	–	–	+
Myrsinaceae				
Ardisia colorata ROXB.	S	–	–	+
	L	–	2+	–
Ardisia lurida BL.	L, S	–	–	–
Ardisia marginata BL.	L, S	–	–	–
Ardisia montana K. & G.	S	–	–	–
	L	–	+1	–
Embelia ribes BURM. f.	L, S	–	–	–
Maesa latifolia (BL.) DC.	L, S	–	–	–
Mytaceae				
Decaspermum fruticosum J.R. & G. *Forst.* var. *polymorphum* (BL.) BAKH. f.	S	1+	–	–
	L	–	3+	–
Ochnaceae				
Gomphia sumatrana JACK	S	–	2+	–
	L	–	–	–
Oleaceae				
Olea brachiata (*cf.* CORNER)	S	2+	1+	–
	L	2+	–	–
Oxaliaceae				
Connaropsis sericea RIDL.	L, S	–	–	–
Papilionaceae				
Derris scandens BENTH.	W	–	–	–
Desmodium triflorum (L.) DC.	W	–	–	–
Millettia sericea BENTH.	L, S	–	–	–
Piperaceae				
Piper magnibaccum C. DC.	S	2+	–	–
	L	2+	–	–
Polygalaceae				
Xanthophyllum excelsum (BL.) MIQ.	L, S	–	1+	–
Rhamnaceae				
Gouania javanica MIQ.	S	1+	3+	+
	L	–	–	–
Ventilago velutina RIDL.	W	–	–	–

Family and species	Parts	Chemical tests for: Alkaloids	Saponins	Steroids–triterpenes
Rubiaceae				
Aulacodiscus premnoides HK. f.	S	–	–	–
	L	1+	–	–
Gardenia carinata WALL.	S	1+	2+	–
	L	–	2+	–
Ixora pendula JACK	L, S	–	–	–
Neonauclea lanceolata (BL.) MERR.	L, S	–	–	–
Ophiorrhiza major RIDL.	W	–	–	–
Paederia verticillata BL.	W	–	–	–
Petunga floribunda RIDL.	L, S	1+	–	–
Randia densiflora BENTH.	S	1+	2+	–
	L	–	1+	–
Uncaria cordata (LOUR.) MERR. (white wood)	S	–	1+	+
	L	–	–	+
Uncaria sclerophylla (HUNT.) ROXB. *ssp. ferruginea*	S	–	1+	+
	L	–	3+	+
Urophyllum corymbosum KORTH.	L, S	–	–	–
Rutaceae				
Paramignya griffithii HK. f.	S	–	–	–
	L	–	2+	–
Sabiaceae				
Meliosma sumatrana (JACK) WALP.	S	–	4+	–
	L	–	4+	+
Sapindaceae				
Allophylus cobbe (L.) RAEUSCH. var. *velutinus*	L, S	–	–	–
Arytera litoralis BL.	L, S	–	–	–
Lepisanthes tetraphylla (VAHL) RADLK.	L, S	–	1+	–
Xerospermum intermedium RADLK.	S	–	1+	–
	L	–	–	–
Scrophulariaceae				
Curanga fel-terrae MERR.	W	–	–	–
Simaroubaceae				
Brucea javanica (L.) MERR.	L, S	–	–	–
Eurycoma longifolia JACK	L, S	–	–	–
	P	2+	–	–
Sterculiaceae				
Byttneria maingayi MAST.	S	2+	3+	–
	L	–	3+	–
Kleinhovia hospita L.	S	–	1+	+
	L	–	2+	+
Theaceae				
Adinandra dumosa JACK	S	–	1+	–
	L	–	–	–
Adinandra javanica CHOIS	L, S	–	2+	+
Tiliaceae				
Berrya cordifolia (WILLD.) BURRET	L, S	–	–	–
Grewia blattaefolia (*cf.* CORNER)	S	–	2+	–
	L	–	–	–
Grewia glabra BL.	L, S	–	–	–
Trichospermum cymbiforme SPRAGUE	S	–	–	–
	L	–	2+	–
Ulmaceae				
Gironniera parvifolia PLANCH.	L, S	–	–	+
Urticaceae				
Conocephalus subtrinervius MIQ.	L, S	–	–	–
Verbenaceae				
Avicennia alba BL.	S	–	–	–
	L	–	–	+
Callicarpa arborea ROXB.	S	–	1+	+
	L	–	–	–
Clerodendron indicum (L.) O.K.	W	2+	–	–
Clerodendron inerme (L.) GAERTN.	S	–	–	–
	L	1+	–	–
Premna corymosa (BURM. f.) ROTTL. & WILLD.	S	–	–	–
	L	–	–	+
Vitaceae				
Vitis cinnamonea WALL.	W	–	–	–

Abbreviations—plant parts: S=stem; L=leaf; F=fruit; P=petiole; W=whole plant.
The same visual assessment as stated in the previous publication[1] was adopted.

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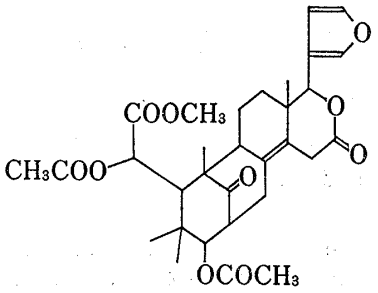
for steroids and triterpenes. These specimens were collected from various parts of west Malaysia. The plant extracts were prepared and chemical tests carried out according to the methods previously described.[2]

Detailed chemical studies of the seeds of *Swietenia macrophylla* grown locally has resulted in the isolation of a new compound, switenolide diacetate, which has not been previously reported in the seeds from this plant.[5]



switenolide diacetate

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5) K.C. Chan, T.S. Tang, and H.T. Toh, *Phytochemistry*, **15**, 429 (1976).

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L-Serine O-Sulphate Lyase, a New Enzyme in Extracts from Higher Plants[1]

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L-Serine O-sulphate (L-SOS) lyase, an enzyme capable of degrading L-SOS to pyruvate, ammonia and sulfuric acid, was newly found in extracts from higher plants. The optimum pH for the L-SOS lyase in higher plants differ from that for the enzyme(s) in animals and micro-organisms in the same buffer. The distribution and some properties of the L-SOS lyase in higher plants are described.

Keywords——amino acid; serine O-sulphate; O-acetyl-L-serine; enzyme; L-serine O-sulphate lyase; O-acetyl-L-serine lyase; O-acetyl-L-serine sulfhydrylase; Leguminosae; Liliaceae; Cruciferae

In recent years L-serine O-sulphate (I) has been implicated as an intermediate in the biosynthesis of cysteine derivatives such as S-methylcysteine and S-allylcysteine by extracts in *Leucaena*, *Albizzia*, *Citrullus* and *Allium* seedlings.[3] It is tentatively found in our laboratory that the enzyme which utilize O-acetyl-L serine and L-serine O-sulphate as a substrate for S-alkyl-cysteine formation in a number of higher plants are different.[4]

1) This work was presented at the 19th Kanto Branch Meeting of the Pharmaceutical Society of Japan at Chiba, November 15, 1975, Meeting Abstracts, p. 59.
2) Location: *1-33 Yayoi-cho, Chiba-shi, 280, Japan.*
3) I. Murakoshi, A. Yamazaki, and J. Haginiwa, presented at the 92th Annual Meeting of the Pharmaceutical Society of Japan, Osaka, April 7, 1972. Meeting Abstracts, II. p. 260.
4) I. Murakoshi, F. Kato, and J. Haginiwa, *Chem. Pharm. Bull.* (Tokyo), **21**, 919 (1973); *idem*, *ibid.*, **22**, 473 (1974).

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