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ASSAY OF POTENTIAL ANTIMUTAGENICITY OF ETHNIC MEDICINAL PLANT EXTRACTS OF PAPUA NEW GUINEA BY USING SOS CHROMOTEST (*E. COLI* PQ 37)

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ABSTRACT: *Thirty six crude drug samples have been prepared from different parts of twenty five plants belonging to different families, and antimutangenic activities were studied by using SOS chromotest (E. coli PQ 37). The following crude extracts of PNG medicinal plants which had a appreciable antimutagenic activity against mitomycin C were: Artocarpus communis (stem bark), Cycas circinalis (leaves), Merremia peltata (leaves), Intsia palembanica (leaves), Annona muricata (stem bark), and Artocarpus altilis (root bark).*

INTRODUCTION

The people of third world countries have developed their own traditional medicines using different medicinal plants, which are as diverse as the people themselves. But the actual constitutents and antimutagenicity and mutagenecity of the most of the folk medicines have not been studied. The previous research reports revealed that a number of traditional medicinal plants showed genotoxicities in microorganisms as well as in mammalians (Wang and Hu, 1985; Chang and Chi, 1981; Chang and Chi, 1982; Chang *et al.*, 1982 (a), Chang *et al.*, 1982 (b), Kalantary *et al.*, 1986). Naturally occurring antimutagens in plant and animal sources have been studied by using different test techniques. A few research communications were available on antimutagens in crude drugs, which are frequently used as a traditional medicine, and studied the antimutagenicity of some of these plants (Kakinuma *et al.*, 1984 (a) Nakamura and Yamamoto, 1982; Kakinuma *et al.*, 1984 (b), Minakata *et al.*, 1983; Sakai *et al.*, 1986).

The present study aimed to investigate potential antimutagenic activities of ethnic medicinal plants collected in Papua New Ginea by using SOS chromotest.

MATERIALS AND METHODS

Plant Materials

The following Papua New Guinea native medicinal plants were identified and collected in Papua New Guinea based on ethno-medicinal information:

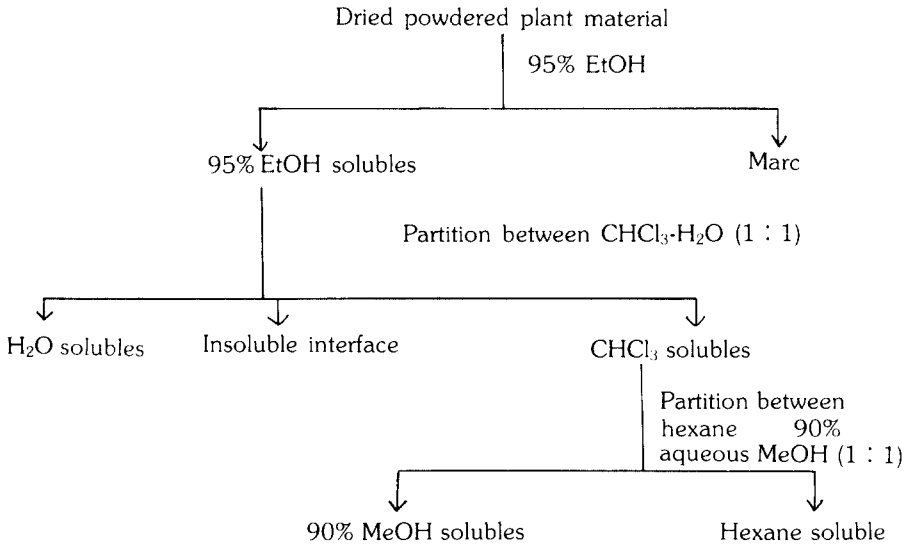
Table 1. Papua New Guinean plants used for experiment.

Scientific name	Family	Part Used
Artocarpus communis J.R. & G. Forster	Moraceae	Stem bark
Plumeria rubra L.	Apocyanaceae	Stem bark/leaves
Alstonia spectabilis R. Br	Apocyanaceae	Stem bark leaves
Kleinhovia hospita L.	Sterculiaceae	Stem bark/leaves
Cycas circinalis L.	Cycadaceae	Seeds/leaves
Dracaena angustifolia Roxb.	Agavaceae	Leaves
Desmodium umbellatum L.	Leguminosae	Leaves
Timonius timon (Spreng) Merr.	Rubiaceae	Leaves
Securinega melanthesoides (F. Muell) Airy Shaw	Euphorbiaceae	Leaves
Merremia peltata L.	Convolvulaceae	Leaves
Intsia palembanica Miq.	Lequminosae	Leaves
Vitex trifolia L.	Verbenaceae	Leaves
Melanolepsis multiglandulosa (Reinw. ex Bl.)	Euphorbiaceae	Leaves
Wedelia biflora L.	Compositae	Leaves
Cordia dichotoma Forst	Boraginaceae	Leaves
Pipturus argenteus (Forst.) Wedd	Urticaceae	Leaves
Pterocarpus indicus Willd	Leguminosae	Leaves
Annona cherimolia Mill	Annonaceae	Seeds/Root bark/ Stem bark
Annona muricata L.	Annonaceae	Seeds/Root bark/ Stem bark
Cananga odorata Hook	Annonaceae	Stem bark
Popowia polyandra Merr.	Annonaceae	Stem bark
Artocarpus altilis	Moraceae	Seeds/Root bark/ Stem bark
Morinda citrifolia L.	Rubiaceae	Leaves/Stem bark/ Root bark
Breynia cernua Muel. Arg.	Euphorbiaceae	Leaves

Extraction

The following extraction procedures was used (Rupprecht *et al.*, 1990). The dried plant materials were extracted with 95% ethyl alcohol. This was concentrated, then followed by solvent partitioning using chloroform-water (1:1, v/v). The chloroform solubles were concentrated and partitioned between hexane-90% aqueous methanol (1:1, v/v). The 90% methanol solubles were concentrated under vacuum by rota evaporator. The dried samples were dissolved in DMSO and used for antimutagenicity assay.

Scheme 1. Standard flow sheet of extraction and initial partitioning.



Source: Repprecht *et al.*, 1990.

Table 2. β-Galactosidase activities induced by plant extracts.

Species	Plant Part	β-Galactosidase activity (unit) (4 mg/ml)*
Mitomycin C (0.03 μg/ml		339
DMSO		54
Artocarpus communis	stem bark	135
Plumeria rubra	stem bark	214
Plumeria rubra	leaves	243
Alstonia spectabilis	stem bark	329
Alstonia spectabilis	leaves	242
Kleinhovia hospita	stem bark	150
Kleinhovia hospita	leaves	195
Cycas circinlis	seeds	105
Cycas circinalis	leaves	129
Dracaena augustifolia	leaves	202
Desmodium umbellatum	leaves	198
Securinega melanthesoides	leaves	270
Merremia peltata	leaves	125
Intsia palembanica	leaves	131
Vitex trifolia	leaves	270
Melanolepsis multiglandulosa	leaves	289
Wedelia bioflora	leaves	353
Cordia dichotoma	leaves	142
Pipturus argentens	leaves	219

Continued from Table 2.

Species	Plant Part	β-Galactosidase activity (unit) (4 mg/ml)*
Pterocarpus indicus	leaves	238
Annona cherimolia	seeds	198
Annona cherimolia	root bark	145
Annona cherimolia	stem bark	212
Annona muricata	seeds	184
Annona muricata	stem bark	96
Annona muricata	root bark	311
Cananga odorata	stem bark	326
Cananga odorata	root bark	151
Popwia polyandra	stem bark	195
Artocarpus altilis	seeds	189
Artocarpus altilis	root bark	111
Artocarpus altilis	stem bark	142
Morinda citrifolia	leaves	210
Morinda citrifolia	stem bark	286
Morinda citrifolia	root bark	233
Breynia cernua	leaves	350

*concentration of each extract

Assay of Antimutagenicity by Using SOS Chromotest (*E. coli* PQ3)

The SOS Chromotest (*E. coli* PQ37) was described by Chang *et al.* (1987) elsewhere.

RESULTS AND DISCUSSION

Antimutagenic activities by using SOS Chromotest (*E. Coli* PQ37) for PNG medicinal plants crude extracts against mitomycin C were presented in Table 1. The results indicate that *Cycas circinalis* (seeds), *Annona nuricata* (stem bark), and *Artocarpus altilis* (root bark) showed significant antimutagenic effect (96-111 units) against mitomycin C compared to postive control (339 units). The nine other crude extracts which had a appreciable antimutagenic effect (~150 units) were: *Artocarpus communis* (stem bark), *Kleinhovia hospita* (stem bark) *cycas circinalis* (leaves), *Merremia peltata* (leaves), *Intsia palembanica* (leaves), *Cordia dichotoma* (leaves), *Annona cherimolia* (root bark), *Cananga Odorata* (root bark) and *Artocarpus altilis* (stem bark). The other plants crude extracts had a lower antimutagenic activities.

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