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U. L.B. Jayasinghe [a] , Y. Fujimoto [b] & K. Hostettmann [c]
[a] Institute of Fundamental Studies , Hantana Road, Kandy, Sri Lanka
[b] Department of Chemistry , Tokyo Institute of Technology , O-okayama, Meguro-ku, Tokyo, 152, Japan
[c] Institut de Pharmacognosie et Phytochimie, Universite de Lausanne , CH-1015, Lausanne, Dorigny, Switzerland
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MOLLUSCICIDAL SAPONINS FROM *POMETIA EXIMIA*

U.L.B. JAYASINGHE[a], Y. FUJIMOTO[b] AND K. HOSTETTMANN[c]

[a]Institute of Fundamental Studies, Hantana Road, Kandy, Sri Lanka.
[b]Department of Chemistry, Tokyo Institute of Technology, O-okayama, Meguro-ku, Tokyo-152, Japan.
[c]Institut de Pharmacognosie et Phytochimie, Universite de Lausanne, CH-1015, Lausanne-Dorigny, Switzerland.

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Abstract: Nine hederagenin saponins including seven new, isolated from *Pometia eximia* Hook. f. of the family Sapindaceae have been tested for molluscicidal activity against *Biomphalaria glabrata*, one of the snail vectors of schistosomiasis (bilharziasis).

Key words: *Pometia eximia*, Sapindaceae, molluscicidal activity, *Biomphalaria glabrata*

INTRODUCTION

The disease, schistosomiasis is endemic to about 75 countries throughout South America, Africa and the far East. About 250 million people are annually infected. It is caused by parasitic flatworms of the genus *Schistosoma*.[1] Chemotherapy is one way of controlling this disease. A disadvantage of the method is the high cost of the drugs and the possibility of re-infection. Hence it is very important to introduce new, simple and inexpensive methods to destroy the vector of these parasitic diseases. Plants with molluscicidal properties play an important role in this regard. In continuation of our search for biologically active compounds from Sri Lankan plants, the present investigation was carried out on *Pometia eximia* of the family Sapindaceae. *P. eximia* is a tree of moderate size growing in Sri Lanka.[2]

RESULTS AND DISCUSSION

The dry ground mature stem of *P. eximia* was defatted with light petrol and then extracted with methanol. Preliminary investigations on the MeOH extract

showed strong molluscicidal activity.[3] At a minimum concentration of 15 ppm, the MeOH extract caused 100% mortality of *Biomphalaria glabrata* snails, one of the intermediate hosts of the *Schistosoma* parasite. The MeOH extract also showed larvicidal activity.[4] At 300 ppm, the MeOH extract caused 84% mortality of *Aedes albopictus* larvae within 24 hours. No antileukaemic activity was observed against L-1210 cells *in vitro*.[5]

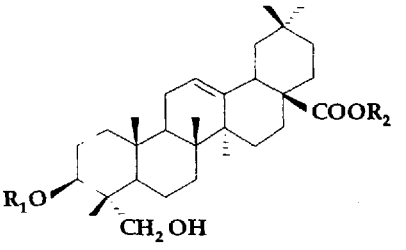
Chromatographic separation of the methanol extract over silica gel column, reversed phase HPLC and Sephadex LH-20 afforded compounds **1** - **10**. Among these compounds, **4** - **10** were found to be new natural products. Structural investigations on the saponins of the plant have already been reported.[6] In this paper we wish to report some noteworthy observation regarding structure and molluscicidal activity.

All the saponins (**2-10**) were subjected to molluscicidal activity test.[3] Results are given in Table 1. The saponins **2**, **3**, **5**, **7** and **8** all of which contain arabinose moieties showed strong molluscicidal activity, whereas the saponins **4**, **6**, **9** and **10** all of which contain glucose did not show any molluscicidal activity. However the presence of arabinose moieties and the absence of the glucose moieties does not seem to be prerequisite for molluscicidal activity, since certain saponins of *Diploclisia glaucescens* (Menispermaceae) containing glucose showed activity against the same snails.[7] These results suggest that a combination of aglycone and sugar structures could be important in eliciting molluscicidal activity.

EXPERIMENTAL

Molluscicidal activity test was made with snails of the species *Biomphalaria glabrata* reared in aquaria with a continuous circulation of water through an EHEIM Filter system; water temperature 24°C. Snails of uniform size were used (average diameter of the shell 9 mm). The tests were carried out by placing two snails in a

Table 1: Molluscicidal activity of saponins



Api = β-D-apiofuranosyl
Ara = α-L-arabinopyranosyl
Ara* = β-L-arabinopyranosyl
Ara(*f*) = α-L-arabinofuranosyl
Gal = β-D-galactopyranosyl
Glu = β-D-glucopyranosyl
Rha = α-L-rhamnopyranosyl
Xyl = β-D-xylopyranosyl

Cpd	R_1	R_2	Activity
1	H	H	not checked
2	Ara-	H	40 ppm
3	Xyl ^{3}Ara-	H	40 ppm
4	H	Api ^{2}Glu-	No
5	Rha ^{2}Xyl- (3 Ara(*f*))	H	10 ppm
6	Rha ^{2}Glu- (3 Api)	H	No
7	Rha ^{2}Ara*- (3 Ara(*f*))	H	2.5 ppm
8	Rha ^{2}Ara- (3 Xyl)	H	5 ppm
9	Rha ^{2}Glu- (3 Xyl)	H	No
10	Rha ^{2}Glu- (3 Gal)	H	No

Activity: minimum concentration for 100% mortality of *B. glabrata* snails

distilled water solution of known concentration. At several time intervals, the snails were placed on PETRI dish, light was shone from the bottom, and the heart-beat was checked by a microscope.[3] In order to dissolve completely the weakly water-soluble saponins, solutions were placed in an ultra-sonic bath for 1hr at room temperature prior to the experiment.

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