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THE ANTIMICROBIAL ACTIVITIES OF RUBRAXANTHONE ISOLATED FROM *GARCINIA PARVIFOLIA* (MIQ.) MIQ.

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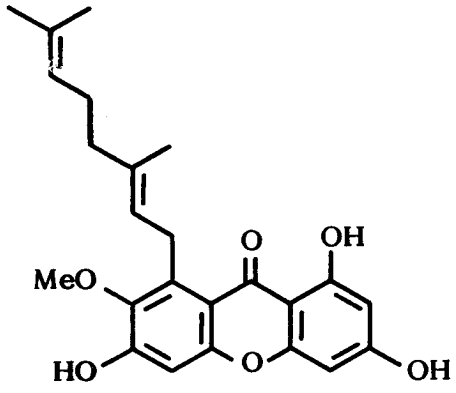
Abstract

Rubraxanthone (1) was isolated as the major constituent from the latex of Garcinia parvifolia *(Miq.) Miq. The compound was found to exhibit strong activities* against Staphylococcus aureus *of both normal and penicillin-resistant strains, and showed moderate activities against* Trichophyton mentagrophytes *and* Microsporum gypseum.

Garcinia parvifolia (Miq.) Miq. is a small, evergreen tree which grows in primary evergreen forests. It belongs to the family Guttiferae. Although there is no reputed medicinal use of this tree in Thai folklore, related species in the genus contain compounds which are antimicrobial.[1,2] There has been no report on the chemical constituents nor the biological activity of this plant, therefore this work was undertaken in order to isolate its chemical constituent(s) for antimicrobial activity testing.

Examination of the latex obtained from the tree indicated that it consisted of a mixture with a major component. Chromatography of the methanol soluble material from the latex gave a xanthone which was identified by spectroscopic methods as rubraxanthone (1). Compound (1) has previously been isolated from other *garcinia* species, viz: *G. rubra*[3], *G. cowa*[4], *G. pyrifera* and *nervosa*[5].



(1)

The activity of rubraxanthone against *Staphylococcus aureus* ATCC 25923 and a penicillin-resistant strain were found to be similar. Further tests established the minimal inhibitory concentration (MIC) of rubraxanthone on the penicillin-resistant strain to be the same as that of methicillin.

Rubraxanthone also showed moderate activities against *Trichophyton mentagrophytes* and *Microsporum gypseum*.

Experimental

Plant Material

The latex was collected from a *Garcinia parvifolia* tree during fruiting at Kao Chong National Park, Trang, on 14 July 1985. A voucher specimen of the plant material (Maxwell, 85-721) has been deposited in the Herbarium of the Biology Department at the Prince of Songkla University, Hat Yai, Thailand.

Extraction and Isolation

The latex (6.10 g) was dissolved in methanol (200 ml). The solution was filtered and evaporated to a reddish brown gum. The total material was separated by quick column chromatography using silica gel (Merck GF_{254}) as the adsorbent and eluting with hexane, benzene, benzene-dichloromethane, dichloromethane and finally methanol. The eluants were examined on silica gel thin layer chromatography and the fractions with similar constituents were combined. The fractions eluted with benzene-dichloromethane contained a yellow solid. Recrystallization from benzene gave yellow microcrystals (2.60 g, 43%) of mp. 209.5-210.5°C, identical in all respects with rubraxanthone.[3-5]

Antimicrobial Activities

A penicillin-resistant strain of *S. aureus* was obtained from Songkhlanagarind Hospital, Hat Yai, Thailand.

Preliminary antibacterial testings were performed by the agar diffusion method[6] with ethanolic solutions of rubraxanthone. The results are shown in Table I.

TABLE I. ACTIVITIES OF RUBRAXANTHONE AGAINST *S. AUREUS* TESTED BY THE AGAR DIFFUSION METHOD.

Concentration (μg/ml)	Diameter of clear zone (mm)	
	S. aureus ATCC 25923	Penicillin-resistant *S. aureus*
1,000	21.0	20.0
100	18.5	18.5
10	13.0	6.0
1	0.0	0.0

The MICs for rubraxanthone and methicillin on the penicillin-resistant strain of *S. aureus* were obtained by the broth dilution method.[7] The value for both substances was found to be 3.9 μg/ml.

The activities against two species of fungi, *Trichophyton mentagrophytes* and *Microsporum gypseum* were tested by the agar dilution method.[8] The results are shown in Table II.

TABLE II. % GROWTH INHIBITION OF *TRICHOPHYTON MENTAGROPHYTES* AND *MICROSPORUM GYPSEUM* BY RUBRAXANTHONE.

Fungus \ Concentration (μg/ml)	500	250	125	62.5	Control
T. mentagrophytes					
the diameter of colony (mm)	16	18	22	27	35
% inhibition	54.28	48.57	37.14	22.86	-
M. gypseum					
the diameter of colony (mm)	14	15	22	27	40
% inhibition	65.00	62.50	45.00	32.50	-

The MIC for rubraxanthone on *T. mentagrophytes* and *M. gypseum* were found to be 500 μg/ml and 125 μg/ml respectively.

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บทคัดย่อ

การสกัดสารจากยางของต้นชะมวง *(Garcinia parvifolia (Miq.) Miq.)** ให้ rubraxanthone เป็นสารหลัก สารนี้แสดงฤทธิ์ต้านเชื้อ*สแตฟฟัยโลคอคคัส ออเรียส* ได้ดีมากทั้งสายพันธุ์ปกติและสายพันธุ์ที่ดื้อต่อเพนิซิลลิน และแสดงฤทธิ์ต้านเชื้อ*ไทรโคฟัยทัน เมนทาโกรฟัยท์* และ *ไมโครสพอรัม จิพเซียม* ได้ในระดับปานกลาง

* *Garcinia cowa* ซึ่งคนไทยเรียกว่าต้นชะมวงเหมือนกัน เป็นต้นไม้คนละต้นกันกับ *Garcinia parvifolia.*