

Rapid Communication

$\Delta^{7(15)}$ -Dehydrosarcophytin, a new diterpenoid from the soft coral *Sarcophyton elegans* of the Indian Ocean

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Received 25 September 1998; accepted 16 October 1998

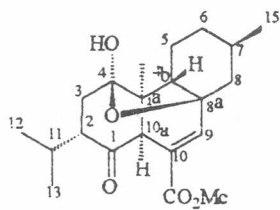
$\Delta^{7(15)}$ -Dehydrosarcophytin **4**, a new member of this novel class of diterpenoids has been isolated from the Indian ocean soft coral *Sarcophyton elegans* besides sarcophytin **1** and 7-dehydrosarcophytin **2**.

Sarcophyton elegans occurring in different regions of the Pacific Ocean has been reported to yield polyhydroxy steroids¹⁻³ and cembranoid diterpenoids⁴. From the same species, collected from Havelock (12°19'N, 93°48'E) Island of the Andaman and Nicobar group of islands of the Indian Ocean, we have reported the isolation of a novel tetracyclic diterpenoid, named sarcophytin **1** and its structure elucidation by spectral data and X-ray analysis⁵, and more recently 7-dehydrosarcophytin **2** from the same extract⁶. These two differ from chatancin⁷ **3** of this new class of diterpenoids bearing perhydrophenanthrene skeleton having a five-membered cyclic hemiketal ring instead of a six-membered one in the latter. Further examination of the same extract yield $\Delta^{7(15)}$ -dehydrosarcophytin **4** to become a fourth member of this series of novel diterpenoids.

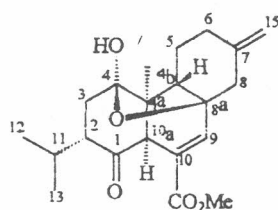
The ethyl acetate extract (20g) of the organism was subjected to vacuum liquid chromatography⁸ over a

column of silica gel. Elution of the column with hexane-ethyl acetate (8:2) gave a close running mixture of compounds. The mixture was rechromatographed over silver nitrate impregnated silica gel using hexane-acetone (8.8:1.2) as eluant to yield sarcophytin **1** (60mg, mp 162-63 °C), 7-dehydrosarcophytin **2** (80 mg, mp 160-62 °C) and $\Delta^{7(15)}$ -dehydrosarcophytin **4**.

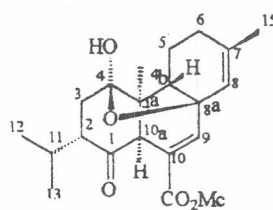
$\Delta^{7(15)}$ -Dehydrosarcophytin **4** came as colourless feathery needles from hexane-acetone, mp 160-62 °C, 20 mg, $[\alpha]_D^{25} + 0.32^\circ$ (c 1.0, CHCl₃). It analysed for C₁₂H₂₈O₅ which was supported by its M⁺ at m/z 360 in its EIMS. Its spectral characteristics (UV, IR and ¹H NMR) closely resembled with those of sarcophytin **1** and 7-dehydrosarcophytin **2** and in particular with those of the latter, being isomeric with it. For example, the presence of hydroxylic group (3434 cm⁻¹), two carbonyls, a six-membered saturated ketone ((1705 cm⁻¹) and an α , β -unsaturated ester function (1720 cm⁻¹) and UV absorption at 254 nm indicative of conjugation supported the above contention. Like **1** and **2**, it exhibited ¹H NMR signals for a tertiary methyl (δ 1.10, s, 14-H₃), an isopropyl group (δ 0.80, 0.85, each d, J = 6 Hz), a carbomethoxyl (δ 3.70, s) and a β -proton of an α ,



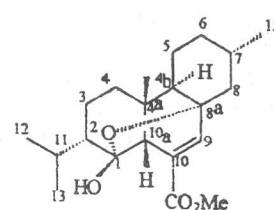
1



4



2



3

Table I — ^1H and ^{13}C NMR spectral data of compounds **1**, **2** and **4** (chemical shifts in δ , ppm)

H/C	^1H NMR (90 MHz, CDCl_3)			^{13}C NMR (22.5 MHz, CDCl_3)		
	1	4	2	1	4*	2
1				209.9(s)	209.8(s)	210.1(s)
2	2.10(m)	2.05(m)	2.05(m)	56.0(d)	56.2(d)	55.5(d)
3	2.35 & 1.85(m)	2.35 & 1.85 (m)	2.45 & 1.85 (m)	40.9(t)	40.8(t)	40.4(t)
4				105.6(s)	105.8(s)	105.6((s)
4a				51.9(s)	51.9(s)	50.9(s)
4b	2.45(m)	2.45(m)	2.45(m)	48.7(d)	48.9(d)	44.7(d)
5	1.45(m)	1.58(m)	1.64(m)	21.3(t)	21.2(t)	23.1(t)
6	1.66(m)	1.70(m)	2.4(1H, m)&	33.8(t)	33.5(t)	41.1(t)
7	0.98(m)		1.8(1H, m)	29.9(d)	143.1(s)	131.1(s)
8	2.10(m)	2.05(m)		43.7(t)	45.0(t)	121.4(d)
8a			5.36(hrs)	79.3(s)	78.9(s)	77.6(s)
9	7.10(s)	7.0(s)	6.98(s)	145.9(d)	145.2(d)	145.9(d)
10				130.9(s)	130.8(s)	131.7(s)
10a	2.98(d, $J = 2\text{Hz}$)	2.98(d, $J = 2\text{Hz}$)	3.11(s)	49.8(d)	49.8(s)	48.5(d)
11		2.0(m)	1.90(m)	25.9(d)	25.9(d)	25.6(d)
12	0.84(d, $J = 6\text{Hz}$)	0.80(d, $J = 6\text{Hz}$)	0.81(d, $J = 6.3\text{Hz}$)	19.0(q)	18.9(q)	18.8(q)
13	0.84(D, $J = 6\text{Hz}$)	0.85(d, $J = 6\text{Hz}$)	0.83(d, $J = 6.3\text{Hz}$)	21.3(q)	21.9(q)	21.0(q)
14	1.10(s)	1.10(s)	1.11(s)	16.8(q)	16.8(q)	16.8(q)
15	1.06(d, $J = 5.5\text{Hz}$)	4.9(d, $J = 3\text{Hz}$)	1.75(s)	22.2(q)	114.2(t)	23.8((q)
16				165.9(s)	165.9(s)	165.6(s)
17	3.73(s)	3.70(s)	3.71(s)	51.3(q)	51.3(q)	51.7(q)
			3.4 (s, OH)			

* Multiplicities are assigned from DEPT spectrum

β -unsaturated ester function (δ 7.0, s). But unlike in sarcophytin **1** with a secondary methyl 15- H_3 and in 7-dehydrosarcophytin **2** with the same methyl on a double bond (δ 1.75, s), it exhibited an exocyclic methylene functionality. The presence of exocyclic methylene was supported by its IR absorptions (1629, 899 cm^{-1}), ^1H NMR data (Table I) (exocyclic methylene protons at δ 4.9, 2H, d, $J = 3\text{Hz}$) as well as by its ^{13}C NMR spectral data (Table I) which showed the exocyclic methylene carbons at δ 143.1 (s) and 114.2 (t) in addition to the olefinic carbon of a trisubstituted double bond at δ 145.2 (d) and 130.8 (s). Similarly, the appearance of hemiketal carbon at δ 165.9 (s) as in **1** and **2** was in full agreement with its structure as $\Delta^{7(15)}$ -dehydrosarcophytin **4**. In view of the very close and comparable chemical shifts of the remaining carbons and in particular those of chiral carbons C-2, C-4, C-4a, C-10a, C-4b and C-8a with those of **1** and **2** the same relative stereochemistry was assumed for **4** as well.

Acknowledgement

We are grateful to the Department of Ocean Development, New Delhi for financial support and to

the CSIR, New Delhi for Emeritus Scientist Scheme to the senior author (A S R A).

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