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ISOLATION OF A BIOACTIVE STEROL FROM A SEA PEN, *PTEROEIDES ESPERI*

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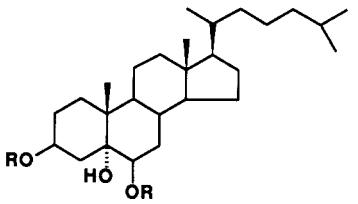
ABSTRACT.—A cytotoxic sterol, cholesta-3β,5α,6β-triol [**1**] was isolated from the sea pen *Pteroeides esperi*. This is the first report of its isolation from a natural source.

In connection with our search for marine toxins, we investigated *Pteroeides esperi* Herklots (Pennatulidae) for the first time and report here the isolation of a cytotoxic sterol, cholesta-3β,5α,6β-triol [**1**]. This is the first report of its isolation from a natural source, although it has been prepared by synthesis (1). The synthetic material has shown steatotic and cytotoxic activity (2) and was found to be the most active of the oxidized sterols in its cytopathic effect on cells in culture, producing necrosis (3). It has also an angiotoxic effect on the aorta, involving medial necrosis in rats (4). The 3β,5α,6β-trihydroxylation pattern has been found in several polyhydroxy steroids of marine origin (5–7).

Positive Liebermann-Burchard color reaction, negative tetranitromethane color test, and its ir, ^{1}H-nmr, and mass spectra indicated the compound to be a trihydroxy steroid. It was characterized as cholesta-3β,5α,6β-triol [**1**] by comparison of its ^{13}C-nmr spectrum with that reported for the corresponding synthetic sterol (8).

The triol formed a diacetate, 3β,6β-diacetoxy-cholest-5α-ol [**2**], the ^{13}C-nmr data of which were compared with those reported earlier (9).

Cholesterol was also isolated and characterized by comparison of its mp and superimposable ir spectrum with those of an authentic sample. The previously unreported data are summarized in the experimental section.



1 R=H
2 R=Ac

EXPERIMENTAL

COLLECTION OF SEA PEN.—*P. esperi* was collected from the Bay of Bengal at Digha, latitude 21°37′N, longitude 87°31′30″E, which is about 180 km west of Calcutta, in September 1986. A voucher specimen has been deposited in the Zoological Survey of India, Calcutta.

ISOLATION OF STEROLS.—The sea pen (10 kg) was macerated and extracted with C_6H_{14}, MeOH-$CHCl_3$ (1:2), and MeOH (95%) successively at room temperature. After removal of the solvents by a rotavapor (40°), the extracts were mixed, and the combined extract (100 g) was chromatographed on Si gel (60–120 mesh; Glaxo, India). C_6H_6-$CHCl_3$ (1:1) eluate yielded cholesterol, mp (uncorrected) 146–148°, yield 450 mg (0.45% of the crude extract), and MeOH-$CHCl_3$ (4%) eluate furnished a fraction (1.1 g) which after further chromatography gave cholesta-3β,5α,6β-triol [**1**], mp (uncorrected) 226–228° [lit. (1) mp 223–225°], yield 90 mg (0.09% of the crude extract): ir ν max (KBr) cm^{-1} 3400 (br); ^{1}H nmr (100 MHz, DMSO-d_6) δ 3.36 (s, OH), 4.13 (d, J = 5 Hz, OH), 4.36 (d, J = 4 Hz, OH) (these disappeared on D_2O exchange), 3.58 (1H, br s, H-6α), 3.78 (1H, $W_{1/2}$ 24 Hz, H-3α); cims (CH_4) *m/z* (rel. int.) $[MH-H_2O]^+$ 403 (25), $[MH-2H_2O]^+$ 385 (100), $[MH-3H_2O]^+$ 367 (39).

The triol furnished the diacetate on acetylation (Ac_2O/pyridine), recrystallized from aqueous

MeOH: mp 157–160°, resolidified and melted at 163°; ir ν max (KBr) cm^{-1} 3470, 1730, 1710; ^1H nmr (100 MHz, $CDCl_3$) δ 0.69 (3H, s, H_3-18), 0.87 (6H, d, $J = 6$ Hz, H_3-26 and H_3-27), 0.96 (3H, d, $J = 6$ Hz, H_3-21), 1.16 (3H, s, H_3-19), 1.68 (br s, exchangeable with D_2O, 5α-OH), 2.00 (s, Ac), 2.06 (s, Ac), 5.24 (1H, m, $W_{1/2}$ 25 Hz, H-3α), 4.72 (1H, br s, H-6α); eims *m/z* (rel. int.) $[M]^+$ 504 (4), $[M-H_2O]^+$ 486 (5), $[M-HOAc]^+$ 444 (7), $[M-H_2O-HOAc]^+$ 426 (10), $[M-2HOAc]^+$ 384 (36), $[M-H_2O-2HOAc]^+$ 366 (44), $[M-H_2O-2HOAc-C_8H_{17}]^+$ 253 (18), 210 (17), 123 (24).

Further details of our methods and spectra are available on request from the senior author.

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