Sterols and Terpenes of the Marine Green Algal Species *Caulerpa racemosa* and *Codium decorticatum*

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WE have recently reported the presence of some new aromatic compounds[1] from the chloroform extract and a new sesquiterpene in addition to two new red caulerpin analogues[2] from the ethyl acetate extract of the green algal species, *Caulerpa racemosa* collected off Visakhapatnam coast. We, now report the isolation of β-sitosterol, caulerpin, the red pigment, *trans*- and *cis*-phytols from its hexane extract. This is the first report of the presence of *cis*- and *trans*-phytols from any caulerpa species.

We also report here in the chemical examination of another green algal species, *Codium decorticatum* collected from Mandapam coast. Two sterols have been separated from its ethyl acetate extract and they were identified as aplysterol and 24,28-didehydroaplysterol. The compounds were characterised by chemical and spectroscopic data and by comparison with authentic samples whereever possible.

C. racemosa : The residue (5 g) obtained by the evaporation of the hexane extract of the dry powder of *C. racemosa* (3 kg) was chromatographed over a column of silica gel (100−200 mesh) to yield four compounds : β-sitosterol (hexane-benzene, 4 : 6; 25 mg), colourless needles, m.p. 136−38°, $[\alpha]_D^{25}$ −36°; caulerpin (benzene ; 100 mg), orange red prisms, m.p. 316−18°, $C_{24}H_{18}O_4N_2$ (lit.[3,4] m.p. 317°); *trans*-phytol (benzene-ethyl acetate, 19 : 1), colourless oil, $C_{20}H_{40}O$; λ_{max} (MeOH) no absorption above 210 nm ; ν_{max} (neat) 3 400br, 2 950, 1 650, 1 450 and 1 010 cm^{-1} ; δ ($CDCl_3$) 0.90 (12H, d, *J* 6 Hz), 1.2−1.6 (20H, m), 1.65 (3H, s), 1.95 (2H, m), 4.05 (2H, d, *J* 6.4 Hz) and 5.3 (1H, t, *J* 6.4 Hz) ; *m/z* M^+ (296) and it was identified as *trans*-phytol[5] ; *cis*-phytol (benzene : ethyl acetate 19 : 1), colourless oil, $C_{20}H_{40}O$; λ_{max} (MeOH) no absorption above 210 nm ; ν_{max} (neat) 3 400br, 2 950, 1 650, 1 450 and 1 010 cm^{-1} ; δ ($CDCl_3$) ; 0.90 (12H, d, *J* 6 Hz), 1.2−1.6 (20H, m), 1.7 (3H, s), 2.0 (2H, m), 4.4 (2H, d, *J* 6.4 Hz) and 5.33 (1H, t, *J* 6.4 Hz) ; *m/z* M^+ (269) and it was identified as *cis*-phytol[5].

C. decorticatum : The dry powder (500 g) of *C. decorticatum* was extracted with ethyl acetate. The residue (1.5 g) obtained by the evaporation of the ethyl acetate extract on chromatography over a column of silica gel (100−200 mesh) yielded two crystalline compounds : aplysterol (24,26-dimethyl-cholest-5-ene-3β-ol[6] ; 10 mg), colourless prisms, m.p. 132−34° (lit.[6] 135−36°), $C_{29}H_{50}O$; $[\alpha]_D^{25}$ −25 ; λ_{max} ($CHCl_3$) no absorption above 210 nm ; ν_{max} ($CHCl_3$) 3 400br, 2 950, 1 450 and 1 040 cm^{-1} ; δ ($CDCl_3$) 0.70 (3H, s, 18-CH_3), 1.00 (3H, s, 19-CH_3), 3.40 (1H, m, C*H*OH) and 5.30 (1H, m, CH=C) ; *m/z* M^+(414) ; 24,28-didehydroaplysterol (26-methyl-24-methylenecholest-5-ene-3β-ol[6] ; 10 mg), colourless prisms, m.p. 126−28° (lit.[6] 128−30°), $C_{29}H_{50}O$; $[\alpha]_D^{25}$ −37 ; λ_{max} ($CHCl_3$) no absorption above 210 nm ; ν_{max} ($CHCl_3$) 3 400br, 2 950, 1 450, 1 040 and 885 cm^{-1} ; δ ($CDCl_3$) 0.70 (3H, s, 18-CH_3), 1.0(3H, s, 19-CH_3), 3.4 (1H, m, −C*H*OH), 4.68 (2H, s, $=CH_2$) and 5.3 (1H, m, CH=C) ; *m/z* M^+(412).

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