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STUDIES ON THE TOTAL SYNTHESIS OF OXETANOCIN; II[1].
TOTAL SYNTHESIS OF OXETANOCIN

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Abstract: The first total synthesis of a novel nucleoside oxetanocin 1 is described.

Oxetanocin 1, a novel nucleoside isolated from the culture filtrate of Bacillus megaterium NK84-0218, shows antiviral, antitumor and antibacterial activities[2]. Furthermore, 1 is the first natural product having an oxetanosyl -N-glycoside[3,4] and has a potential usefulness as an antiviral agent.

In the previous paper[1], we reported the first synthesis of 9-(2-oxetanyl)-adenine 2, a key intermediate for the synthesis of oxetanocin. We would like to disclose the final conversion from 2 to 1 in this communication.

The conversion was achieved in 5 steps from 2 as shown in Scheme I.

After protection of the hydroxy group of 2 with t-butylchlorodiphenylsilane in 77% yield, 3 was oxidized under the conditions of Lemieux-Johnson method[5] followed by reduction with $NaBH_4$ to give 5[6] in 56% overall yield. Removal of protecting O-t-butyldiphenylsilyl group with n-Bu_4NF and N-benzoyl group with NaOMe afforded 1 in 67% overall yield. The spectral data (IR, 400 MHz ^{1}H-NMR) of the synthetic oxetanocin were completely identical with those of the natural one.

Thus, the first total synthesis of oxetanocin 1 was accomplished in 19 steps from D-ribose.

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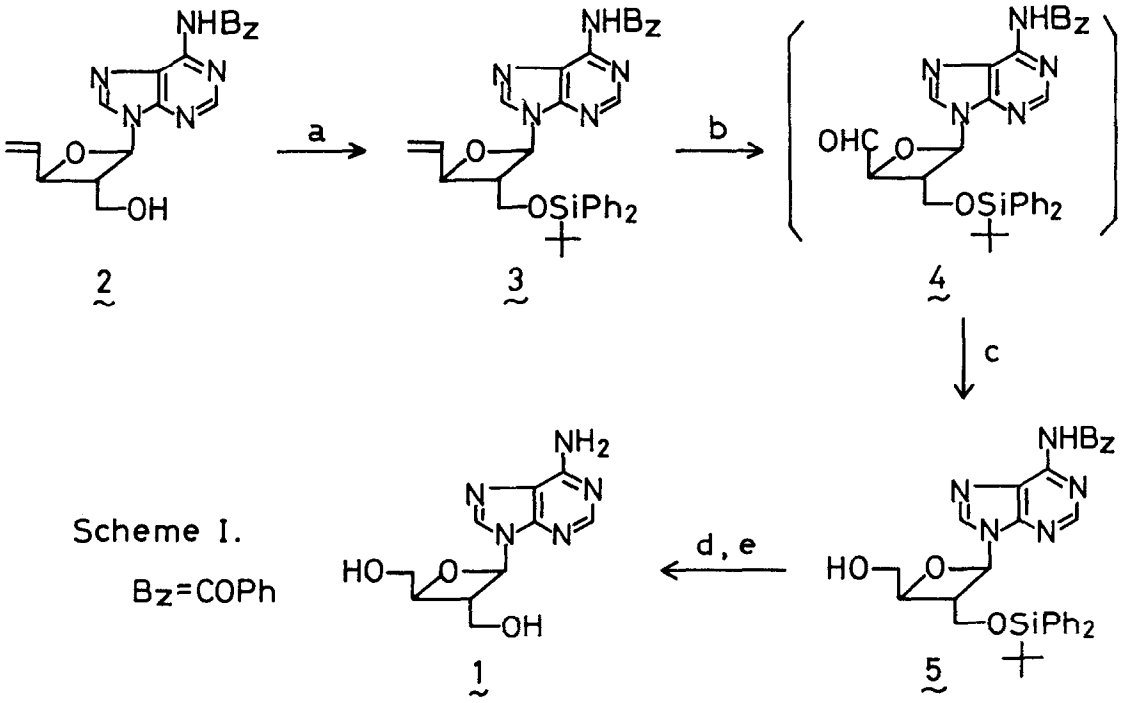

Scheme I.

Bz=COPh

a) t-BuSiPh$_2$Cl, pyridine, 16 h, r.t.; b) OsO_4(cat.), $NaIO_4$, MeOH-H_2O, 2 h, r.t.; c) $NaBH_4$, 10 min, 0°.; d) n-Bu_4NF, THF, 30 min, r.t.; e) NaOMe(cat.), MeOH, 15 h, r.t.

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6. Spectral data of 5,
IR ($CHCl_3$): 3410, 3300, 1717, 1618, 1585, 1460, 1118, 1000 cm^{-1}.
MS : m/z 536 (M-57), 432, 199.
^{1}H-NMR (400 MHz, $CDCl_3$): δ 3.70(1H, dd, J=2.0 and 13.4Hz); 3.89(1H, dd, J=4.1 and 12.0Hz); 3.92(1H, dd, J=4.1 and 12.0Hz); 4.08(1H, dd, J=1.5 and 13.4Hz); 4.14(1H, ddt, J=6.5, 6.9 and 4.1Hz); 4.88(1H, ddd, J=1.5, 2.0 and 6.9Hz); 6.42(1H, d, J=6.5Hz); 7.96(1H, s); 8.81(1H, S); 9.15(1H, br.s).

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