[Chem. Pharm. Bull. 20(7)1374—1379(1972)]

UDC 547.94.057 : 547.857.7.04

Hypocholesterolemic Alkaloids of *Lentinus edodes* (Berk.) Sing. IV.[1] Synthesis of Three Stereoisomers of Eritadenine[2]

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(Received November 15, 1971)

The synthesis of three stereoisomers of eritadenine (I); D-*threo*-(II), L-*threo*-(III) and L-eritadenine (IV), is described. D-*threo*-Eritadenine (II) was derived from eritadenine by utilizing a novel *erythro-threo* epimerization. L-*threo*-Eritadenine (III) was synthesized, starting from L-threonolactone dibenzoate (IX), through the route involving an imidazole ring closure. The synthesis of L-eritadenine (IV) was achieved conveniently by direct condensation of adenine and L-erythronolactone acetonide (XX).

In view of an excellent hypocholesterolemic activity of eritadenine (I), an alkaloidal substance isolated from *Lentinus edodes* (Berk.) Sing.,[4] we have undertaken a comprehensive program of the structural variation on this lead compound. In the previous papers,[1,5] we described the preparation of the analogous compounds bearing a variety of purine and pyrimidine bases in place of the adenine moiety. As pointed out in one of those papers,[1] stereochemistry of the side chain in this class of compounds may be considered to be also a factor of major importance for the biological activity. For an approach to the structural alteration from this stereochemical aspect, we attempted to prepare all of the three stereoisomers of eritadenine (I) possessing 2(R),3(R)-configuration: D-*threo*-(II),[2] L-*threo*-(III)[2] and L-ritadenine (IV) with 2(S),3(R)-, 2(R), 3(S)- and 2(S),3(S)-configurations, respectively. The present paper is concerned with the results of this attempt.

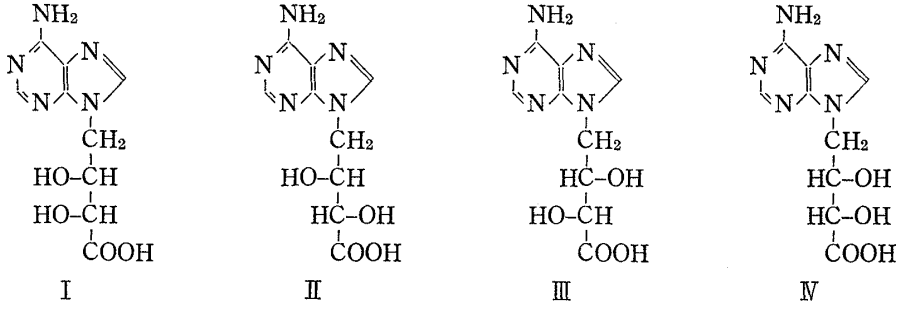

Chart 1

The preparation of D-*threo*-eritadenine (II) was achieved, starting from eritadenine, by utilizing a novel *erythro-threo* epimerization.[2] A clue for this conversion was provided by our following observation. During our investigation on the synthesis of eritadenine, it was found that, on treatment with barium methoxide in methanol, 2,3-O-isopropylidene-D-erythronolactone (V)[6] transformed with epimerization into methyl 2,3-O-isopropylidene-D-threonate (VII) with the recovery of some starting material unchanged. The structural

1) Part III: M. Hashimoto, Y. Saito, H. Seki, and T. Kamiya, *Chem. Pharm. Bull.* (Tokyo), **20**, 1186 (1972).
2) A preliminary account of a part of this work appeared in *Tetrahedron Letters*, **1970**, 1359.
3) Location: *Kashima-cho, Higashiyodogawa-ku, Osaka.*
4) T. Kamiya, Y. Saito, M. Hashimoto, and H. Seki, *Tetrahedron*, **28**, 899 (1972).
5) T. Kamiya, Y. Saito, M. Hashimoto, and H. Seki, *J. Heterocyclic Chem.*, submitted. **9**, 359 (1972).
6) D.L. Mitchell, *Can. J. Chem.*, **41**, 214 (1963).

assignment of VII was based on the fact that treatment of VII with 10% hydrochloric acid followed by benzoylation with benzoyl chloride in pyridine gave D-threonolactone dibenzoate (VIII), whose structure was confirmed by comparison with L-threonolactone dibenzoate (IX)[7] derived as a suitable precursor for the synthesis of L-*threo*-eritadenine (see below). The acetonide ester (VII) could be considered as the epimerized product of methyl 2,3-O-isopropylidene-D-erythronate (VI) which is expected to be initially produced from the lactone (V). The latter erythro isomer (VI) should be in an equilibrium with the former *threo* one (VII) in the reaction solution, since, under the same epimerizing condition, the *threo* acetonide (VII) converted partially into erythronolactone acetonide (V), whose formation is explained by easy lactonization of the erythro acetonide (VI). The ratio of the *threo* isomer (VII) to the presumed erythro one (VI) in this equilibration was 6:1 as judged by the ratio of the acetonide-methyl resonances of the former (VII) and the lactone (V) on the nuclear magnetic resonance (NMR) analysis of the reaction mixture. The predominance of the *threo* isomer (VII) can be easily rationalized in terms of the relative stabilities of 1,2-*trans* and -*cis* interactions of the methoxycarbonyl and hydroxymethyl groups.

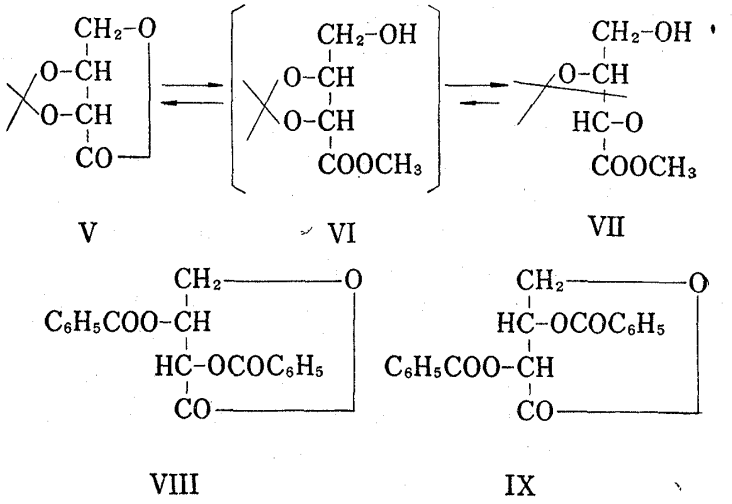

Chart 2

In view of the above stereochemical outcome, our attention was turned to the result expected on similar treatment of the acetonide methyl ester (X) which was readily derivable from eritadenine.[4] A route involving this kind of epimerization step was expected to provide a convenient preparative method for the desired D-*threo*-eritadenine (II). Thus, on treatment with sodium methoxide, X was found to transform smoothly to the epimerized product (XI) in an equilibrium.

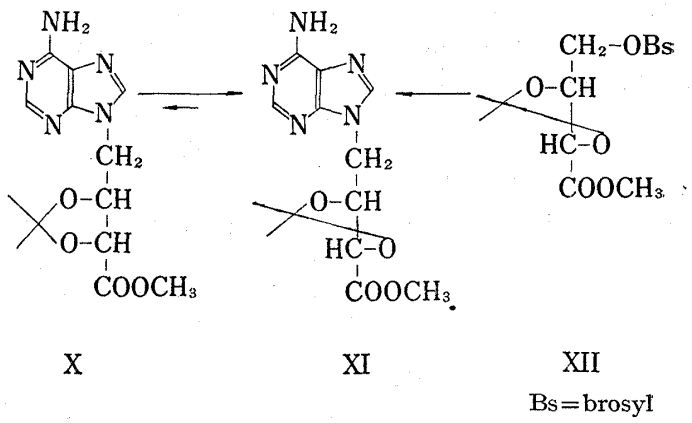

Chart 3

An alternative route to this product (XI) from the hydroxy ester (VII) provided an evidence that XI is the stereochemically stable 1,2-*trans* epimer. In this sequence, VII was converted into the brosylate (XII) by treatment with *p*-bromobenzenesulfonyl chloride in pyridine and then XII was subjected to react with sodium adenide according to the method of Leonard and coworkers[8] to give the condensation product (XI). In order to examine the influence of the adenine substituent on the equilibration, XI was conversely treated with sodium methoxide to result in a mixture of X and XI in a ratio of 1:16 as shown by the NMR analysis. This different ratio from that in the case of VI—VII suggests that the

7) R. Weidenhagen and H. Wegner, *Chem. Ber.*, 72, 2010 (1939).
8) N.J. Leonard, F.C. Sciavalino, and V. Nair, *J. Org. Chem.*, 33, 3169 (1968).

equilibrium positions are governed by the steric factors of the 4-substituents (the adenine nucleus and the hydroxyl groups, respectively) to the methoxycarbonyl group in the two sets of the acetonides. To return to our original purpose, XI was finally subjected to consecutive alkaline and acidic hydrolysis, yielding the desired D-*threo*-eritadenine (II), the structure of which was conclusively comfirmed by comparison with L-*threo*-eritadenine (III) synthesized by an independent route as follows.

Having succeeded in the preparation of D-*threo* isomer (II), we next turned attention to the synthesis of its optical antipode, L-*threo*-eritadenine (III).[2] In view of success in the condensation of the brosylate (XII) with adenine, our initial program was directed toward the preparation of a sulfonate derivative suitable for the construction of the L-threonic acid moiety. Thus, L-threonolactone dibenzoate (IX), which is readily accessible from ascorbic acid,[7] was chosen as the starting material compatible for this purpose. Treatment of IX with ethanol containing hydrobromic acid gave the oily hydroxy ethyl ester (XIII). This crude product was then treated with *p*-toluenesulfonyl chloride in pyridine and, after purified by chromatography on silica gel, the oily tosylate (XIV) was obtained. In an attempt to effect the condensation of XIV with adenine in the same way as described for the brosylate (XII), the reaction was examined under various conditions but all trials were unsuccessful. This unfavourable result may be attributed principally to steric hindrance of the benzoyl protective groups to entry of the adenide anion.

With this effort frustrated, we next undertook a more reliable but rather roundabout approach requiring an imidazole ring closure and accordingly directed our investigation toward the preparation of the amino ester (XVI) which might serve as a key intermediate for this synthetic program. For this purpose, the tosylate (XIV) was treated with sodium azide in dimethyl sulfoxide and the resulting oily azido compound (XV) was hydrogenated on palladium charcoal in the presence of hydrochloric acid in ethanol to yield the desired amine hydrochloride (XVI). With the desired intermediate (XVI) in hand, the remaining task was to construct the adenine ring system by a suitable procedure. In the same manner as mentioned earlier for the synthesis of eritadenine,[4] XVI was allowed to react with 4-amino-6-chloro-5-nitropyrimidine[9] to give the oily condensation product (XVII), which was characterized as the hydrochloride salt. XVII was hydrogenated on palladium charcoal in formic acid and the reductive formylation product (XVIII), without purification, was then treated with 1N sodium hydroxide. By this latter treatment, XVIII was effectively cyclized, with the protective groups simultaneously removed, to L-*threo*-eritadenine (III), which was identical with D-*threo* isomer (II) in all respects except optical rotation.

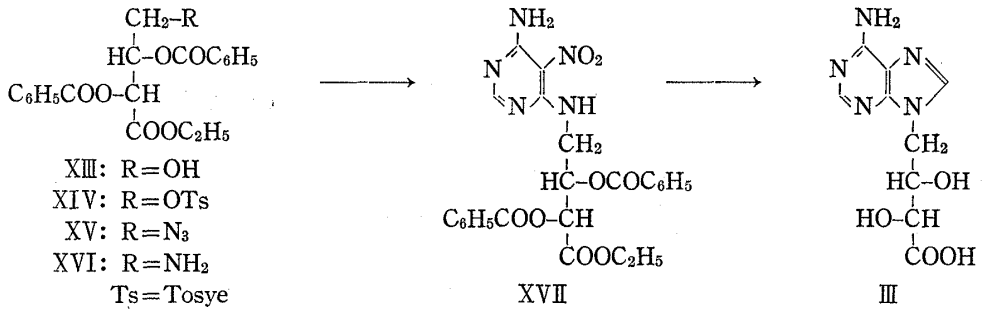

Chart 4

The final objective in the present work was the synthesis of L-eritadenine (IV). For this purpose, a feasible approach appeared to be the utilization of the method developed for a convenient synthesis of eritadenine.[5] This approach required L-erythronolactone acetonide

9) W.R. Boon, W.G.M. Jones and G.R. Ramage, *J. Chem. Soc.*, **1951**, 96.

(XX), which was efficiently prepared from 2,3-O-isopropylidene-L-erythrose (XIX),[10] readily obtainable from L-rhamnose, by oxidation with bromine. Condensation of the lactone (XX) with adenine was carried out after the procedure of the eritadenine synthesis.[5] The resulting reaction mixture, after removal of the dimethylformamide solvent, was directly hydrolyzed with 10% acetic acid to yield L-eritadenine (IV) with accompany of a small amount of its 3-isomer (XXI). These were satisfactorily separated by recrystallization into the pure forms and confirmed respectively to be the optical antipodes of eritadenine and its 3-isomer by optical rotation and infrared spectral comparison.

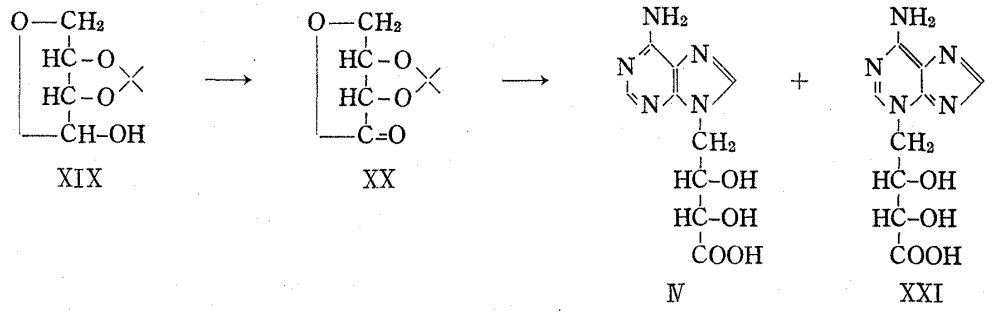

Chart 5

Hypocholesterolemic bioassays were carried out on all the three stereoisomers with eritadenine as a standard.[11] As the result, all these compounds were found to be less active than eritadenine. The D-*threo* (II) and L-*threo* (III) isomers show moderate activities, respectively, whereas the activity of L-eritadenine (IV) is considerably low. From these facts, it may be concluded that either of the asymmetric centers is required to be R-configuration for hypocholesterolemic activity in this series.

Experimental

Melting points were determined with a Thomas–Hoover melting point apparatus in unsealed capirally tubes and are uncorrected. Infrared (IR) and ultraviolet (UV) spectra were recorded on a Hitachi Type EPI-S2 spectrophotometer and Hitachi Type EPS-3T spectrophotometer, respectively. NMR spectra were determined on a Varian A-60 spectrometer with TMS as an internal standard. Gas liguid chromatography (GLC) analyses were carried out on a Varian Aerograph Model 700 gas chromatograph. Ootical rotations were measured with a JASCO Model ORD/UV-5 optical rotatory dispersion recorder. Evaporations of solvent were performed on rotary evaporators *in vacuo*.

Methyl 2,3-O-Isopropylidene-D-threonate (VII)——To a solution of 10.00 g of the lactone (V) in 100 ml of anhydrous MeOH was added dropwise 50 ml of 0.3 M methanolic solution of $Ba(OMe)_2$. After stirring at room temperature for 20 hr, the reaction mixture was neutralized by addition of dry ice and the solvent was removed by evaporation. The residue was partitioned in AcOEt and H_2O, and the organic phase was dried over $MgSO_4$ and concentrated to give 9.20 g of a colorless oil. GLC showed the presence of two constituents (VII and V); retention time: VII 19.2 min, V 23.2 min (10% Carbowax 20M, 5 ft×0.25 in., 165°, 90 ml/min). The ratio 6:1 of VII and V in the mixture was estimated from the ratio of the acetonide-methyl signals on the NMR analysis in benzene (VII τ 8.59, V τ 8.67 and 8.85). Chromatography on 160 g of alumina and elution with benzene gave the starting material (V). Further elution with $CHCl_3$ afforded 5.90 g of VII as a colorless oil, which was purified by distillation; bp 90—93°/0.5 mm. IR ν_{max}^{Nujol} cm^{-1}: 3500 (OH) and 1750 (C=O). NMR (benzene) τ: 8.59 (6H, s, $C(CH_3)_2$), 7.56 (1H, t, OH), 6.64 (3H, s, $COOCH_3$), 6.10—6.43 (2H, m, CH_2) and 5.42—6.02 (2H, m, 2 CH–O). *Anal.* Calcd. for $C_8H_{14}O_5$: C, 50.52; H, 7.42. Found: C, 50.37; H, 7.36.

In a similar experiment, a solution of 1.00 g of VII in 10 ml of anhydrous MeOH was treated with 5 ml of 0.3M methanolic solution of $Ba(OMe)_2$ for 20 hr. Work up as in the above experiment yielded 0.72 g of the mixture, which was shown to consist of VII and V in the ratio 6:1 by GLC and NMR analyses.

10) J.N. Baxtor and A.S. Perlin, *Can. J. Chem.*, **38**, 2217 (1960).

11) We are indebted to Dr. H. Kikuchi, and Dr. A. Tensho, Iyakushigen Institute for Medicinal Research, for these bioassays. The detailed biological data will be published in the future.

D-Threonolactone Dibenzoate (VIII)——A 1.50 g sample of the hydroxy ester (VII) was added to 20 ml of 1N HCl and heated at reflux for 2 hr. The resulting solution was evaporated to give a colorless oil, which was dissolved in 10 ml of pyridine and treated with 4.20 g of benzoyl chloride. After being stirred at room temperature for 15 hr, the mixture was poured onto crushed ice and extracted with $CHCl_3$. The extract was washed with H_2O, dried over $MgSO_4$ and concentrated to give a yellow oil, which was chromatographed on 50 g of silica gel. Elution with benzene–$CHCl_3$ (1:1) gave 2.10 g of VIII. An analytical sample was prepared by recrystallization from ether, mp 114°, $[\alpha]_D$ −185.0° (c=2.3, EtOH). IR ν_{max}^{Nujol} cm^{-1}: 1792 (lactone C=O) and 1726 (ester C=O). *Anal.* Calcd. for $C_{18}H_{14}O_6$: C, 66.25; H, 4.32. Found: C, 66.23; H, 4.23. The IR spectrum was identical with that of L-threonolactone dibenzoate (IX).[7]

Methyl 4-(6-Amino-9H-purin-9-yl)-4-deoxy-2,3-O-isopropylidene-D-threonate (XI)——i) A 500 mg sample of ertadenine acetonide methylester (X) was dissolved in 20 ml of 0.025M methanolic solution of NaOMe and allowed to stand at room temperature for 24 hr. The reaction mixture was then cooled under an ice bath and neutralized with a solution of AcOH in MeOH, whereafter the solvent was removed. The residue was dissolved in $CHCl_3$, washed with H_2O and dried over $MgSO_4$. Evaporation of the solvent gave 390 mg of a solid. NMR analysis in $CDCl_3$ showed the crude solid to consist of XI and the starting material (X) in the ratio of 16:1 as judged from the acetonide-methyl signals (XI τ 8.62; X τ 8.37 and 8.69). Recrystallization from acetone–ether gave 290 mg of pure crystals of XI, mp 211—212°, IR ν_{max}^{Nujol} cm^{-1}: 3300 and 3160 (NH_2), 1763 and 1740 (ester C=O), NMR ($CDCl_3$) τ: 8.62 (6H, s, $C(CH_3)_2$), 6.23 (3H, s, $COOCH_3$), 5.25—5.80 (4H, m, CH_2, CH–O, CH–O), 3.97 (2H, broad s, NH_2), 2.10 (1H, s, aromatic H) and 1.67 (1H, s, aromatic H). *Anal.* Calcd. for $C_{13}H_{17}O_4N_5$: C, 50.81; H, 5.58; N, 22.79. Found: C, 50.99; H, 5.50; N, 22.55.

In a similar experiment, 250 mg of XI was treated with 10 ml of 0.025 M methanolic NaOMe solution for 24 hr. Work up as in the above experiment yielded 160 mg of the mixture of XI and X in the ratio of 16:1 as shown by the NMR analysis.

ii) To a cooled suspension of sodium adenide, prepared from 1.62 g oi adenine and 0.53 g of NaH in 50 ml of anhydrous N,N-dimethylformanide (DMF) according to the method of Leonard, *et al.*,[8] was added a solution of 4.91 g of the brosylate (XII) in 15 ml of anhydous DMF and stirred at 50° for 5 hr. After removal of the solvent, the residue was dissolved in $CHCl_3$ washed with H_2O and dried over $MgSO_4$. Evaporation of the solvent left a crystalline solid, which was recrystallized from acetone–ether to give 1.36 g of the pure material (XI), identical with the epimerized product of X on IR comparison and undepressed mixture melting point.

Methyl 4-O-(*p*-bromobenzenesulfonyl)-2,3-O-isopropylidene-D-threonate (XII)——To a cooled solution of 3.80 g of the hydroxy ester (VII) in 15 ml of pyridine was added 6.10 g of *p*-bromobenzenesulfonyl chloride and the mixture was stirred at room temperature for 5 hr. The reaction mixture was poured onto crushed ice and extracted with $CHCl_3$. The extract was washed with H_2O, dried over $MgSO_4$ and evaporated to give a crude crystalline solid. Recrystllization from acetone–ether gave 5.70 g, of the brosylate (XII), mp 70—71°. NMR ($CDCl_3$) τ: 8.61 (6H, s, $C(CH_3)_2$), 6.22 (3H, s, $COOCH_3$), 5.68 (4H, broad s, CH_2, CH–O, CH–O) and 2.24 (4H, s, aromatic H). *Anal.* Calcd. for $C_{14}H_{17}O_7SBr$: C, 41.08; H, 4.19; N, 7.83. Found: C, 40.88; H, 4.14; S, 7.86.

D-*threo*-Eritadenine (II)——To a solution of 150 mg of XI in 15 ml of MeOH was added 1 ml of 1N NaOH and the mixture was refluxed for 30 min. After removal of the solvent, the residue was dissolved in 5 ml of 20% AcOH, followed by refluxing for 1 hr. Cooling the reaction solution in an ice bath separated colorless crystals, which were recrystallized from H_2O to yield 84 mg of II, mp 296—297° (decomp.). $[\alpha]_D$ +82.4° (c=0.8, 1N NaOH). UV $\lambda_{max}^{H_2O}$ mμ (ε): 261 (14,100), $\lambda_{max}^{0.1N\ HCl}$ mμ (ε): 260 (14,000), $\lambda_{max}^{0.1N\ HCl}$ mμ (ε): 261 (14,100). *Anal.* Calcd. for $C_9H_{11}O_4N_5$: C, 42.69; H, 4.39; N, 27.67. Found: C, 42.42; H, 4.52; N, 27.49.

Ethyl 4-O-(p-toluenesulfonyl)-2,3-O-dibenzoyl-L-threonate (XIV)——A solution of 16.30 g of L-threonolactone dibenzoate (IX)[7] in 100 ml of EtOH was treated with 50 ml of 2.04M ethanolic solution of HBr at room temperature for 7 hr. After the reaction solution was neutralized with satd. $NaHCO_3$, the solvent was removed and the residue was dissolved in AcOEt. The AcOEt solution was washed with H_2O, dried over $MgSO_4$ and concentrated to give 17.90 g of the hydroxy ester (XIII) as an oil.

To an cooled solution of 15.00 g of XIII in 75 ml of pyridine was added 8.31 g of *p*-toluenesulfonyl chloride and the mixture was stirred at room temperature for 16 hr. The reaction mixture was poured onto crushed ice and extracted with AcOEt. The extract was washed with H_2O, dried over $MgSO_4$ and concentrated to give 17.35 g of the tosylate (XIV) as an oil, a portion (2 g) of which was chromatographed on 40 g of silica gel and elution with benzene: $CHCl_3$ (1:1) gave a pure sample. NMR ($CDCl_3$) τ: 8.85 (3H, t, J=6 Hz, $CH_2C\underline{H}_3$), 7.75 (3H, s, CH_3), 5.82 (2H, q, J=6 Hz, $C\underline{H}_2CH_3$), 5.58 (2H, d, J=5 Hz, CH_2OTs), 4.47 (1H, d, J=5 Hz, CHOBz), 4.20 (1H, q, J=5 Hz, CHOBz) and 1.8—3.0 (14H, m, aromatic H). *Anal.* Calcd. for $C_{27}H_{26}O_9S$: C, 61.58; H, 4.98; S, 6.09. Found: C, 61.32; H, 4.77; S, 5.98.

Ethyl 4-Amino-4-deoxy-2,3-dibenzoyl-L-threonate (XVI)——A solution of 15.00 g of the crude tosylate (XVI) in 100 ml of dimethyl sulfoxide was added 9.00 g of NaN_3 and the mixture was stirred at room temperature for 7 days. The reaction mixture was poured into H_2O and extracted with AcOEt. The extract was washed with H_2O, dried over $MgSO_4$ and evaporated to dryness. The residue was chromatographed on 100 g of silica gel and elution with benzene afforded 7.80 g of the oily azido compound (XV).

A solution of 6.30 g of XV in 60 ml of EtOH containing 1.8 ml of conc. HCl was hydrogenated over 5% Pd-C in the usual way. After the catalyst was filtered off, the filtrate was concentrated to dyness. The residue was crystallized from ether and filtered to yield 5.70 g of XVI·HCl. An analytical sample was prepared by recrystallization from iso-PrOH, mp 197° (decomp.). $[\alpha]_D$ −105.7° (c=0.6, H_2O). *Anal.* Calcd. for $C_{20}H_{21}O_6N$·HCl: C, 58.90; H, 5.44; N, 3.43; Cl, 8.69. Found: C, 59.18; H, 5.44; N, 3.58; Cl, 8.76.

Ethyl 4-(4-Amino-5-nitro-6-pyrimidylamino)-4-deoxy-2,3-O-dibenzoyl-L-threonate (XVII)——To a mixture of 1.84 g of 4-amino-6-chloro-5-nitropyrimidine,[9] 4.32 g of XVI·HCl in 50 ml of EtOH was added 2.15 g of triethylamine and the mixture was stirred at room temperature for 16 hr. After removal of the solvent, the residue was dissolved in AcOEt and washed with H_2O. The organic layer was dried over $MgSO_4$ and concentrated to give 5.30 g of the oily condensation product (XVII), a portion of which was converted to the HCl salt and recrystallized from EtOH, mp 198—200° (decomp.). UV λ_{max}^{EtOH} mμ (ε): 231 (18,000), 338 (9 500). *Anal.* Calcd. for $C_{24}H_{23}O_8N_5$·HCl: C, 52.80; H, 4.43; N, 12.83; Cl, 6.49. Found: C, 52.89*w* H, 4.41; N, 12.89; Cl, 6.60.

L-*threo*-Eritadenine (III)——A solution of 2.50 g of XVII (free base) in 40 ml of 90% HCO_2H was hydrogenated over 5% Pd-C in the usual way. After removal of the catalyst, the filtrate was concentrated to dryness, and the resulting residue was then dissolved in 45 ml of 1N NaOH and refluxed for 30 min. After being cooled in an ice bath, the reaction mixture was neutralized with 45 ml of 1N HCl and concentrated to about 50 ml. The precipitated crystals were collected and recrystallized from 10% AcOH to yield 0.54 g of III, mp 296—297° (decomp.). $[\alpha]_D$ −80.6° (c=0.7, 0.1N NaOH). UV $\lambda_{max}^{H_2O}$ mμ (ε): 261 (14,300), $\lambda_{max}^{0.1N\ HCl}$ mμ (ε): 260 (14,000), $\lambda_{max}^{0.1N\ NaOH}$ mμ (ε): 261 (14,300). *Anal.* Calcd. for $C_9H_{11}O_4N_5$: C, 42.69; H, 4.38; N, 27.67. Found: C, 42.62; H, 4.18; N, 27.47. The IR spectrum was identical with that of D-*threo*-eritadenine (II).

2,3-O-Isopropylidene-L-erythronolactone (XX)——To a stirred mixture of 5.70 g of 2,3,O-isopropylidene-L-erythrose (XIX)[10] and 9.80 g of $BaCO_3$ was added dropwise 6.90 g of Br_2 and the resulting mixture was stirred at room temperature for 24 hr. After N_2 gas was bubbled to expell the excess Br_2, the reaction mixture was acidified with dil. HCl and extracted with AcOEt. The extract was washed with satd. NaCl, dried over $MgSO_4$ and concentrated to dryness. The residue was recrystallized from benzene–hexane to yield 2.05 g of XX, mp 68°, $[\alpha]_D$ +110.3° (c=2.0, acetone). *Anal.* Calcd. for $C_7H_{10}O_4$: C, 53.16; H, 6.37. Found: C, 53.31; H, 6.29. The IR spectrum was identical with that of V.

L-Eritadenine (IV) and 4-(6-Amino-3H-purin-3-yl)-4-deoxy-L-erythronic Acid (XXI)——A mixture of 1.40 g of adenine, 1.90 g of the lactone (XX) and 1.27 g of Na_2CO_3 in 27 ml of DMF was refluxed for 15 hr. After removal of the solvent, the residue was dissolved in H_2O, acidified with dil. HCl and concentrated to deposit a crystalline solid, which was filtered and washed with H_2O. This solid was then added to 30 ml of 10% AcOH and refluxed for 30 min. After the resulting solution was concentrated, the crystalline solid obtained was filtered and washed with H_2O to give 0.86 g of the crude mixture (IV and XXI), which was dissolved in boling 10% pyridine and then cooled to separate the crystals of XXI, mp 293—295° (decomp.). Yield, 80 mg. $[\alpha]_D$ −82.2° (c=0.5, 0.1N NaOH). UV $\lambda_{max}^{H_2O}$ mμ (ε): 275 (15,400), $\lambda_{max}^{0.1N\ HCl}$ mμ (ε): 275 (15,400), $\lambda_{max}^{0.1N\ NaOH}$ mμ (ε): 273 (13,300). *Anal.* Calcd. for $C_9H_{11}O_4N_5$: C, 42.69; H, 4.38; N, 27.67. Found: C, 42.57; H, 4.36; N, 27.41.

The 10% pyridine filtrate was evaporated to dryness and the residue was then recrystallized from 10% AcOH to yield 400 mg of L-eritadenine (IV), mp 274—276° (decomp.). $[\alpha]_D$ −49.7° (c=1.0, 0.1N NaOH). UV $\lambda_{max}^{H_2O}$ mμ (ε): 261 (14,600), $\lambda_{max}^{0.1N\ HCl}$ mμ (ε): 260 (14,400), $\lambda_{max}^{0.1N\ NaOH}$ mμ (ε): 261 (14,600). *Anal.* Calcd. for $C_9H_{11}O_4N_5$: C, 42.69; H, 4.38; N, 27.67. Founc: C, 42.47; H, 4.23; N, 27.38. The IR spectrum was identical with that of eritadenine (I).

Acknowledgement The anthors are grateful to professor Y. Inubushi, Kyoto University, for his helpful criticism of this manuscript.