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MODIFIED TAXOLS, 8.[1] DEACYLATION AND REACYLATION OF BACCATIN III

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ABSTRACT.—Hydrogenation of baccatin III over platinum converted it to its hexahydro derivative, and deacylation of this as its 7-triethylsilyl derivative was achieved with methoxide ion. The 10-acetate was hydrolyzed first, followed by the C-4 acetate and then the C-2 cyclohexylcarboxylate; an explanation for this unexpected order is presented. Base treatment also yielded a rearranged analogue with a tetrahydrofuran ring in place of the oxetane ring of baccatin III. Acetylation of 4,10-bis(deacetyl)-2-debenzoyl-7-triethylsilylbaccatin III proceeded readily at the C-13 position, in contrast to baccatin III which is only acetylated with difficulty at this position. Further acylation could be carried out selectively at the C-2 and C-10 positions, but acetylation at C-4 was possible only under vigorous conditions.

The diterpenoid natural product taxol [**1**], first isolated by Wani *et al.* (1), has shown excellent clinical activity against both ovarian cancer (2) and breast cancer (3) and is currently being developed for general clinical use. Its chemistry (4) and clinical development (5) have been the subject of recent reviews. In spite of its excellent activity, its development as a clinical agent has been impeded both by its poor H_2O-solubility and the difficulty of isolation from the bark of the western yew, *Taxus brevifolia* (4,5). The development of various analogues of taxol, preferably showing improved H_2O-solubility and potency, is thus an urgent need.

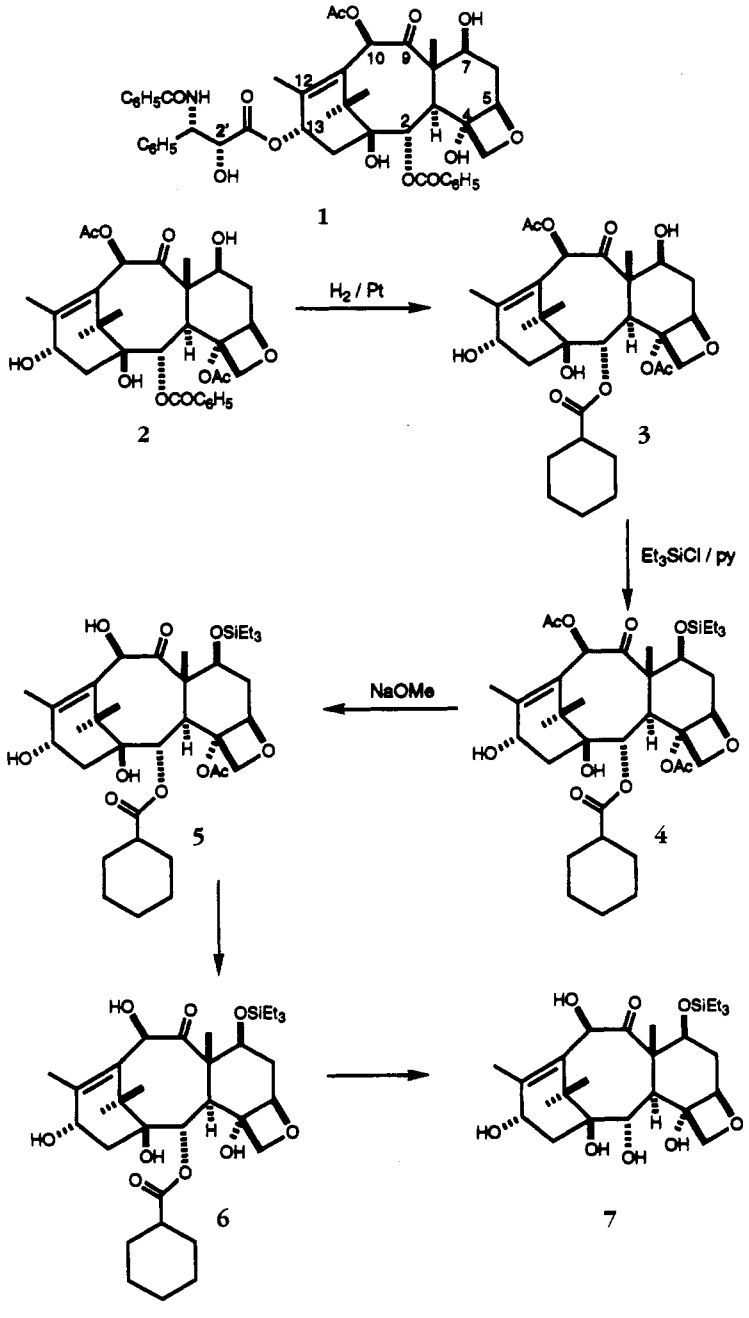
One approach to the preparation of taxol analogues is by the acylation of baccatin III [**2**] with the C-13 side chain of taxol or a related acid. Using this approach, a wide variety of modified taxols has been prepared by Potier (6,7) and Swindell (8) and their collaborators. To date, however, this approach has focused on the preparation of side-chain analogues only, and variations in structure of the baccatin III portion have been largely unexplored. Although we have explored the effect of variations in the structure of the baccatin III nucleus of taxol on its activity (9–11), these studies were carried out on intact taxol and were thus limited by its lability in base (4). A potentially valuable approach to the synthesis of novel taxol analogues would be to prepare baccatin III analogues by appropriate chemical manipulation and then to convert these into the corresponding taxol analogues by acylation at C-13. As a preparation for such a study, we have investigated the deacylation of baccatin III and the reacylation of the resulting deacylated products.

RESULTS AND DISCUSSION

Our initial study investigated the possible selective debenzoylation of baccatin III by treatment with borohydride in the hope that complexation of borohydride with the C-1 hydroxyl group might allow selective reduction of the C-2 benzoate. Although the C-1 hydroxyl group is anti to the C-2 benzoate, it was thought that an accessible high-energy conformation of baccatin III might allow selective cleavage under forcing conditions, much as the side chain of taxol can be selectively cleaved (12). In the event, however, reaction of baccatin III with tetrabutylammonium borohydride under forcing conditions failed to yield any deacylation product.

[1]For Part 7, see D.G.I. Kingston, A.A.L. Gunatilaka, and C.A. Ivey, *J. Nat. Prod.*, **55**, 259 (1992).

The next approach investigated was that of selective hydrolysis of the ester groups of baccatin III (Scheme 1). Because hydrolysis of an aliphatic ester was anticipated to be easier than that of a benzoate ester, baccatin III was first subjected to hydrogenation over platinum in EtOAc. Previous work on taxol (13) had shown that the Δ^{11} double bond is inert to these conditions, and baccatin III was cleanly converted to its hexahydro derivative **3**. The C-7 hydroxyl group was then protected as its triethylsilyl derivative **4**, to prevent the known epimerization at this position under basic conditions (14). The



SCHEME 1

fact that silylation occurred at C-7 rather than C-13 was inferred from the known relative reactivity of these positions (12), since silylation did not materially affect the chemical shift of the C-7 proton; this inference was fully supported by the subsequent chemistry of **4**.

Treatment of 7-triethylsilylhexahydrobaccatin III [**4**] with an aqueous MeOH solution of $NaHCO_3$ failed to yield any hydrolyzed product even after standing for 2 days. This is in contrast to the case with baccatin III itself where these conditions lead to predominant production of 10-deacetylbaccatin III (15) and suggests that a free 7-OH group is necessary for this reaction.

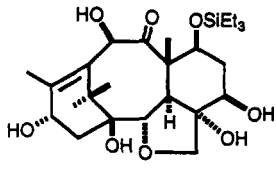
Treatment of 7-triethylsilylhexahydrobaccatin III [**4**] with methanolic NaOMe led to the formation of a mixture of deacylated products, which were identified as the compounds **5**, **6**, **7**, and **8**. Compound **5** was identified as 10-deacetyl-7-triethylsilylhexahydrobaccatin III by spectroscopic data. In particular,the chemical shift of the C-10 methine proton shifted from 6.4 ppm in **4** to 5.1 ppm in **5**, and the $[MH]^+$ peak at *m/z* 665 in the fabms of **5** was consistent with a composition $C_{35}H_{56}O_{10}Si$ for this compound.

Compound **6** was identified as 4,10-bis(deacetyl)-7-triethylsilylhexahydrobaccatin III by analysis of its mass spectrum and its ^{1}H-nmr spectrum. The acetate signal at 2.16 ppm in **5** was lacking in **6**, and the AB quartet for the diastereotopic C-20 protons showed a smaller chemical shift difference than that observed for compounds with an intact acetoxy group. Baccatin III derivatives typically show a chemical shift difference of 0.25 ppm for these protons, but in compound **6** the difference was only 0.07 ppm. Interestingly, the C-7 methine proton shifted upfield to 3.95 ppm from 4.37 ppm in **5**, and the other protons in the concave (α) face of the molecule also showed smaller upfield shifts.

Compound **7** was identified as 4,10-bis(deacetyl)-2-debenzoyl-7-triethylsilylbaccatin III. The $[MNa]^+$ peak at *m/z* 535 in its fabms was consistent with a molecular mass of 512 for **7**. Its ^{1}H-nmr spectrum was similar to that of **6** except that it lacked signals for the cyclohexylcarbonyl group, and H-2 was shifted from 5.35 ppm in **6** to 3.77 ppm. In addition, H-13 appeared as a broad doublet instead of the more normal apparent triplet, and the C-14 protons appeared as two well-separated multiplets suggesting a change in conformation of ring A as a result of deacylation at C-2. Assignment of H-5 and H-7 of **7** to signals at 4.76 and 3.94 ppm, respectively, was made by selective decoupling of the C-6 protons. In other baccatin III derivatives only one C-6 proton shows significant coupling to H-5. Selective irradiation of this proton collapsed the signal at 3.94 ppm to a broad singlet, identifying it as that of H-5: the signal at 4.76 ppm collapsed to a doublet, indicating it to be that of H-7.

The final compound isolated was **8**, which was obtained as the most polar of the four products when base treatment was prolonged. It was isomeric with the fully deacylated product **7** but showed significant differences from **7** in the chemical shifts of the C-2, C-5, and C-20 protons. It was identified as the isobaccatin III derivative **8** on the basis of acetylation experiments described below; the formation of this compound by alkaline hydrolysis of 7-triethylsilyl-10-deacetylbaccatin III has recently been described (17), and a similar compound has also been obtained by treatment of 7,13-diacetylbaccatin III with tributyltin methoxide in 1-methyl-2-pyrrolidinone (18).

The time course of the methanolysis reaction was initially surprising, as was the formation of the 4-deacetyl products **6** and **7** and the rearranged product **8**. The 10-deacetyl product **5** was formed first, as judged by tlc analysis of a methanolysis mixture after a short reaction time. This is consistent with other results indicating that the 10-acetate is readily hydrolyzed (14). Surprisingly, the second product detected was the 4-



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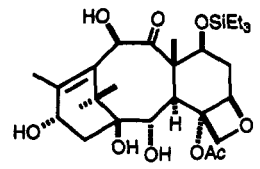

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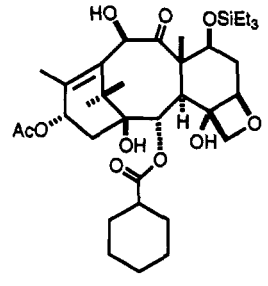

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deacetyl product **6**, and this was followed by the formation of the fully deacylated products **7** and **8**; we were not able to find conditions which resulted in the formation of the 2,10-deacylbaccatin derivative **9**.

The most probable explanation for the ready deacetylation of the baccatin derivative **5** to its 4-deacetyl derivative **6** is that an intramolecular acetyl transfer from the C-4 position to the C-13 position occurs to give the ester **10**, followed by a facile hydrolysis of the resulting C-13 acetate group. A three-dimensional view of compound **5** (Figure 1) shows that such an intramolecular transfer is possible, since the C-13 hydroxyl group is close to the C-4 acetate group. To test this hypothesis, 7,13-bis(triethylsilyl)-hexahydrobaccatin III [**11**] was prepared by reaction of hexahydrobaccatin III [**3**] with triethylsilyl chloride and imidazole. Methanolysis of **11** under the same conditions used to convert **4** to **6** and **7** yielded exclusively the 10-deacetyl product **12**: no product which had undergone deacetylation at C-4 was detected. This result thus confirms that facile deacetylation at C-4 occurs via intramolecular acetyl transfer to the C-13 hydroxyl group.

Methanolysis of compound **11** for a longer period of time still gave the 10-deacetyl derivative **12** as the major product (Scheme 2). In addition to compound **12**, a complex mixture of other products could be detected by tlc. Complete characterization of this mixture was not achieved, due to the small amounts of material available, but the most polar product was characterized as the fully deacylated product **7** in which the 13-triethylsilyl ether had undergone hydrolysis. The desired 10-deacetyl-2-debenzoyl derivative **13** could not be isolated pure, but a partially purified fraction had a ^{1}H-nmr spectrum which suggested the presence of this material. The yield of this fraction was very low, however, and thus this approach does not appear to be a useful one for the synthesis of compounds **9** or **13**.

The formation of the rearranged baccatin III derivative **8**, which we name as 7-triethylsilyl-4,10-bis(deacetyl)-2-debenzoylisobaccatin III, was also unexpected. It is formed in increased amounts if the reaction with NaOMe is prolonged, and thus it must be formed by an intramolecular displacement of the 2-oxide on the neighboring oxetane

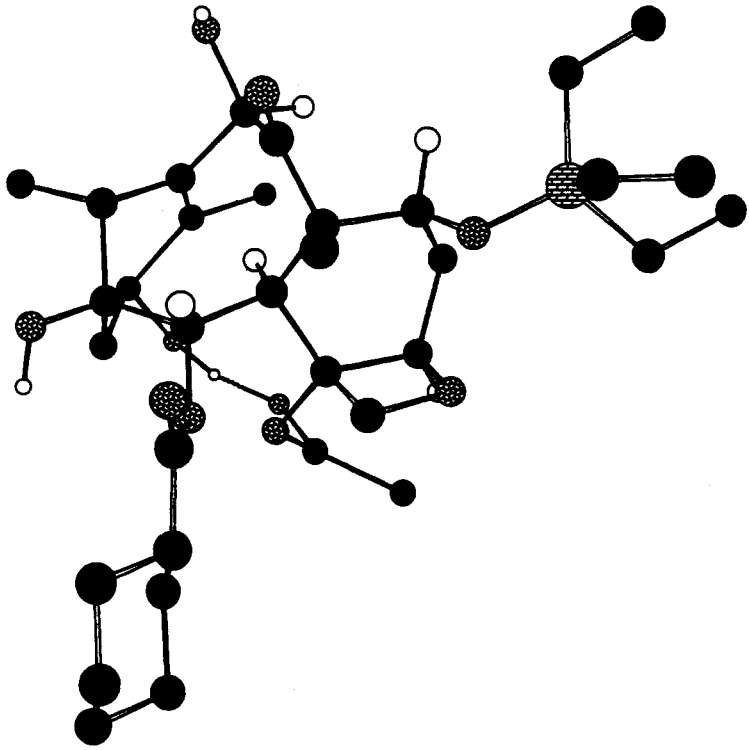


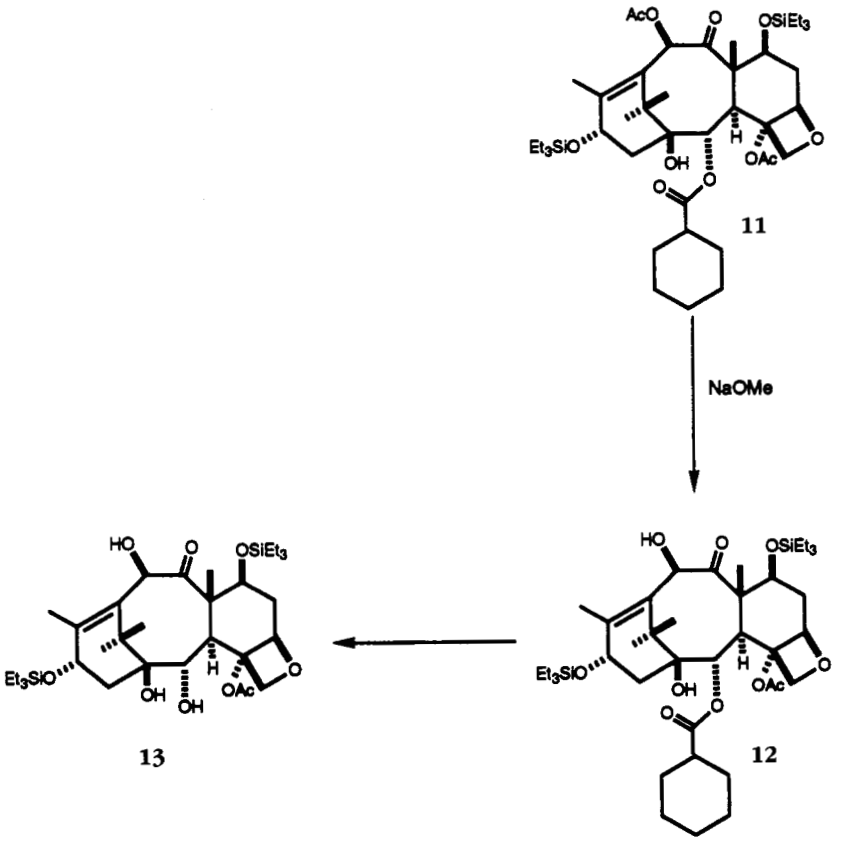
FIGURE 1. Stereoview of 10-deacetyl-7-triethylsilyl-hexahydrobaccatin III [**5**].

ring; oxetanes are well known to undergo ring opening with nucleophilic reagents (16). The ^{1}H-nmr and fabms data for **8** were essentially identical with those previously reported (17).

Acetylation of the isobaccatin III derivative **8** provided important confirmatory evidence for its structure. Acetylation under standard conditions yielded two products which were identified as the triacetate **14** and the tetraacetate **15**. Compound **14**, which was the major product and was the more polar of the two, had a ^{1}H-nmr spectrum in which the signal for H-2 was essentially unchanged from that of **8**. H-5, however, was shifted downfield from 3.79 ppm in **8** to 5.19 ppm in **14** confirming that acetylation had occurred at C-5. The other observed chemical shifts were all consistent with structure **14** for this product.

Compound **15**, which was obtained only in small amounts, also showed a downfield shift for H-5. This compound, however, also showed a downfield shift for H-7 (from 3.95 ppm in **14** to 4.54 ppm), consistent with acetylation at C-4. Since the mass spectrum of the compound indicated that it was a tetraacetate, it is assigned structure **15**.

The stereochemistry of the C-5 hydroxyl or acetoxyl group in compounds **8**, **14**, and **15** is assigned on the basis of an assumed S_N2 mechanism for oxetane ring opening under basic conditions. The observed coupling constants for H-5 in these compounds support this conclusion. Thus the C ring of these compounds is in a boat conformation, as shown both by molecular mechanics calculations (using the Chem-3D program) and by the coupling constants of the C-6 and C-7 protons. Thus for compound **8** the two $J_{6,7}$ values are calculated to be 8 and 4 Hz for the boat conformation and 6 and 1 Hz for the chair conformation; the observed values of 10 and 8 Hz are clearly in better agreement with the boat conformation. The observed $J_{5,6}$ values of 4 and 9 Hz for this conformation with



SCHEME 2

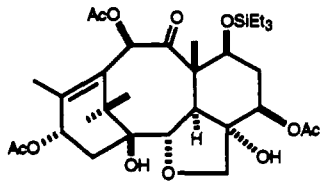
a 5β-OH group configuration then fit well with the calculated values of 3 and 8 Hz; the alternate 5α configuration would require coupling constants of about 8 and 0.5 Hz. Similar arguments hold for the configuration of the acetates **14** and **15**.

Although the formation of the isobaccatin III derivative **8** clearly occurred under basic conditions, there were indications that rearrangement could occur even more readily in acid. In particular, the amount of **8** obtained in a reaction appeared to vary with workup conditions, being smallest when workup was carried out by carefully neutralizing the base and increasing if an excess of acid was used. We thus conducted a study of the formation of **8** from **7** under various conditions.

The tris(deacyl)baccatin III derivative **7** was treated with both acidic [$AlCl_3$, 1 M HCl, and toluenesulfonic acid (TsOH)] and basic (DMAP, NaOMe) reagents on a small scale. Analysis of the reactions by tlc showed that both acidic and basic reagents could convert **7** to **8**. Reaction was fastest with $AlCl_3$, 1 M HCl, and TsOH, giving almost complete conversion after 60 min. Reaction with NaOMe was slower, requiring 2 h for complete conversion, and reaction with DMAP was incomplete even after 2 h.

Having completed our study of the deacylation of the hexahydrobaccatin III derivative **4**, we next turned to the deacylation of unreduced baccatin III. Treatment of 7-triethylsilylbaccatin III [**16**] with methanolic NaOMe for 30 min yielded the fully deacylated baccatin III derivative **7** as the major product. Small amounts of isobaccatin III derivative **8** and of 4,10-bis(deacetyl)baccatin III [**17**] were also obtained.

With the availability of the fully deacylated baccatin III derivative **7**, it became



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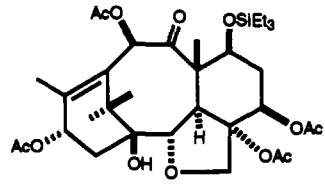

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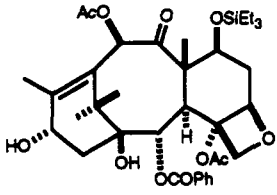

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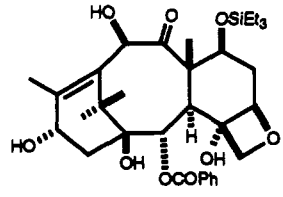

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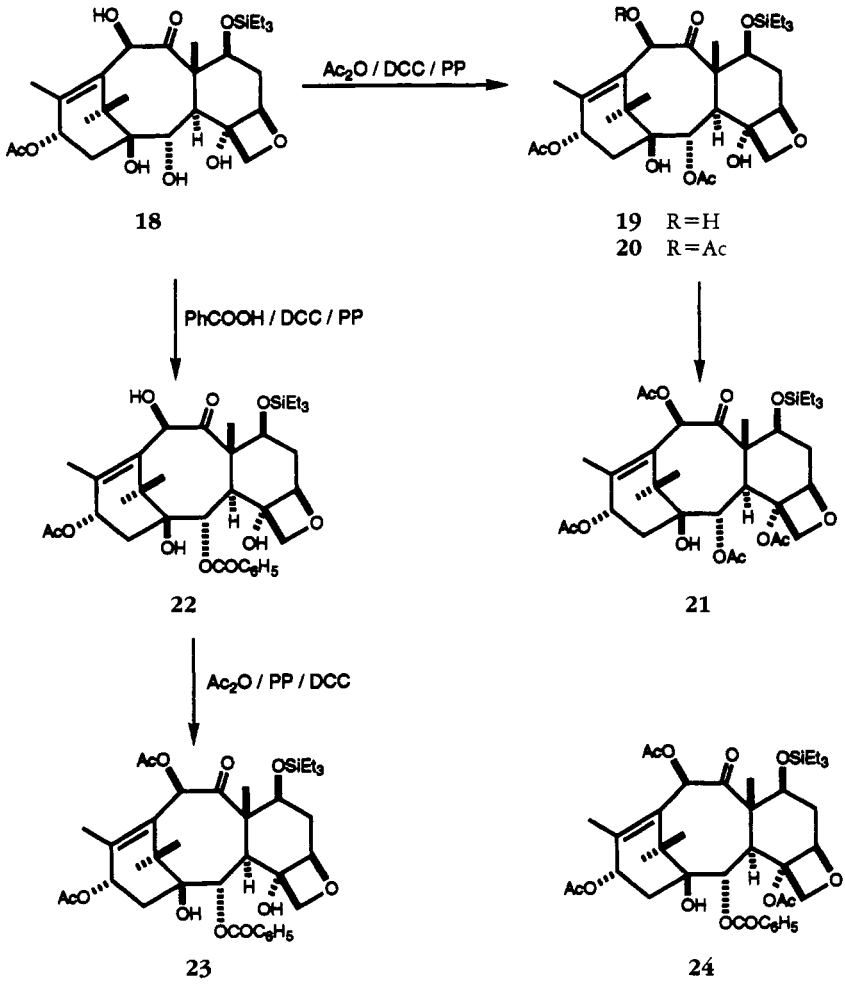
possible to study the reactivity of the various hydroxyl groups towards reacylation. Acetylation of **7** under mild conditions yielded 13-acetyl-4,10-deacetyl-2-debenzoyl-7-triethylsilylbaccatin III [**18**] as the only product. The presence of the 13-OAc group was indicated by the downfield shift of H-13 to 5.84 ppm; irradiation of this signal led to collapse of the multiplet for C-14 protons at 2.44 ppm.

The ready formation of the 13-acetyl derivative of **7** was surprising in light of the lack of reactivity of the C-13 hydroxyl group in baccatin III itself. Thus acetylation of baccatin III under mild conditions gave only 7-acetylbaccatin III, and forcing conditions were required to prepare the 7,13-diacetate (12). In the case of 10-deacetylbaccatin III, acetylation under mild conditions gave the 7-acetate and the 7,10-diacetate, and forcing conditions were again required to produce the 7,10,13-triacetate (7). This lack of reactivity of the 13-OH group has been attributed to intramolecular hydrogen bonding to the C-4 acetate (7) (cf. Figure 1), and the increased reactivity of the 13-OH group in compound **7** supports this hypothesis.

Acetylation of the 13-acetate **18** under somewhat more vigorous conditions yielded a mixture of products which could be separated into three fractions (Scheme 3). The most polar fraction was deduced to be a 1:2 mixture of the 2,13-diacetate **19** and the 2,10,13-triacetate **20** by analysis of its ^{1}H-nmr spectrum, and the fraction of intermediate polarity was a complex mixture and was not further identified. The least polar fraction was the 2,4,10,13-tetraacetate **21**, which was identified on the basis of its ^{1}H-nmr and mass spectra. In particular, the C-2 and C-10 protons of **21** showed appropriate downfield shifts, confirming acetylation at these positions.

The formation of the 2,13-diacetate **19** with some selectivity over the 2,10,13-triacetate **20** suggested that a selective acylation at C-2 might be possible under appropriate conditions. To test this hypothesis, benzoylation of the 13-acetate **18** was attempted, as a model for the conversion of compounds of this type into taxol analogues. Benzoylation at room temperature was not effective but treatment of **18** with benzoic acid in the presence of dicyclohexylcarbodiimide (DCC) and pyrrolidinopyridine (PP) at 55 ° for 72 h gave the benzoate **22** in low yield. No other benzoylation products were detected, however, and the low yield may be attributable in part to losses in the purification of **22** on a small scale.



SCHEME 3

Acetylation of **22** under forcing conditions yielded only the C-10 acetate derivative **23**. This is in contrast to the acetylation of **18** under similar conditions, where the 4-OH group was acetylated to give the fully acetylated product **21**, and suggests that the C-2 benzoate groups acts as a steric barrier to acetylation at C-4. The ^{1}H-nmr spectrum of **23** showed an upfield shift of H-7 to 4.07 ppm as compared with 4.47 ppm in a sample of 13-acetyl-7-triethylsilylbaccatin III [**24**] prepared directly from baccatin III.

This work leads to some important conclusions about the reactivity of baccatin III towards deacylation and reacylation. In the first place, reasonably, clean deacylation to a 2,4,10-deacyl product can be achieved under basic conditions, provided that the 7-OH group is protected as its triethylsilyl derivative and the reaction is carefully controlled. Selective deacetylation at C-10 can also be achieved, at least when the C-2 benzoate is reduced to the cyclohexylcarboxylate derivative. However, selective deacylation at C-2 is not possible, because rapid deacetylation at C-4 occurs via an intramolecular transesterification mechanism to the 13-OH group. If the 13-OH group is protected as its triethylsilyl derivative, a low yield of a 10-deacetyl-2-debenzoyl analogue is obtainable, but the yield is too low for this to be a practicable synthesis of derivatives of this type.

The hydroxyl groups in the fully deacylated baccatin III derivative **7** have different reactivities than the corresponding groups in 10-deacetylbaccatin III. The 13-OH group is the most reactive group to acylation, followed by the 2-OH group and the 10-OH group. The 4-OH group can be acetylated only with difficulty, and is not acetylated at all when the 2-OH group is esterified with a benzoate group. The 1-OH group is inert to all the acetylation conditions attempted.

EXPERIMENTAL

GENERAL EXPERIMENTAL PROCEDURES.—The general procedures used were as previously described (10). Molecular mechanics calculations were performed using the Chem-3D program (Cambridge Scientific Computing, Inc.). Baccatin III was obtained by reductive cleavage of a crude mixture of taxol and cephalomannine (12); the taxol/cephalomannine mixture was obtained from the National Cancer Institute. ^{1}H-nmr spectra were obtained in $CDCl_3$, using TMS as a reference.

HEXAHYDROBACCATIN III [**3**].—Baccatin III (219 mg, 0.374 mmol) in EtOAc (14 ml) was hydrogenated over Pt/C (250 mg) at atmospheric pressure for 10 h. The catalyst was filtered off through Si gel with additional EtOAc, and the crude product was crystallized from EtOAC/hexane to give homogeneous hexahydrobaccatin III [**3**] (200 mg, 90%): mp 150–154°; ir (KBr) 3500 (s), 2950 (s), 1720 (s) cm^{-1}; fabms *m/z* [MNa]$^+$ 615 (10), [MNa−HOAc]$^+$ 555 (3), 461 (2), [MNa−C_6H_{11}COOH]$^+$ 487 (3); ^{1}H nmr see Table 1.

7-TRIETHYLSILYLHEXAHYDROBACCATIN III [**4**].—Triethylsilyl chloride (674 μl, 10 equiv) was added dropwise to a solution of hexahydrobaccatin III [**3**] (238 mg, 0.402 mmol) in pyridine (10 ml) at room temperature. The reaction was quenched after 24 h by addition of H_2O and stirring for 10 min, after which it was cooled, diluted with EtOAc, and carefully neutralized with 3 N HCl to pH 6. The EtOAc layer was then washed, dried, and evaporated to yield a gummy solid which was purified by chromatography (SiO_2, EtOAc/hexane) to yield pure **4** (241 mg, 85%): mp 144–146° (from EtOAc/hexane); ir (KBr) 3500 (s), 2900 (s), 1740 (s) 1640 (w), 1380 (s), 1240 (s), 840 (s) cm^{-1}; fabms *m/z* [MH]$^+$ 707 (45), [MH−H_2O]$^+$ 689 (10), [MH−OAc]$^+$ 648 (70), [MH−OAc−H_2O]$^+$630 (10), [MH−OAc−HOAc−H_2O]$^+$ 570 (10), 600 (20), 371 (100), ^{1}H nmr see Table 1; ^{13}C nmr 9.39 (19), 15.39 (18), 20.83, (2×OAc), 22.46 (17), 25.19 (3×Si*C*H_2), 25.62 (3×SiCH_2Me), 25.78 (3′,5′-cyclohexyl), 35.65 (6), 38.45 (14), 42.78 (15), 43.65 (1′-cyclohexyl), 46.04 (3), 58.86 (8), 68.06 (13), 72.24 (7), 74.46 (20), 76.23 (10,2), 79.19 (1), 80.77 (4), 84.66 (5), 132.50 (11), 146.25 (12), 170.63 (O*C*OMe), 171.25 (O*C*OMe), 188.43 (O*C*Ocyclohexyl), 209.02 (9) ppm.

METHANOLYSIS OF 7-TRIETHYLSILYLHEXAHYDROBACCATIN III: 4,10-BIS(DEACETYL)-2-DEBENZOYL-7-TRIETHYLSILYLBACCATIN III [**7**].—7-Triethylsilylhexahydrobaccatin III [**4**] (10 mg, 0.014 mmol) was dissolved in 0.5 M NaOMe in MeOH (1 ml), and the solution was stirred at room temperature for 5 h. The solution was then cooled in ice-H_2O, neutralized with methanolic HCl to pH 7, and evaporated. The residue was dissolved in EtOAc and purified by cc to yield pure 4,10-bis(deacetyl)-2-debenzoyl-7-(triethylsilyl)baccatin III [**7**] (5 mg, 69%): mp 132–134°; ir (KBr) 3450 (s), 2950 (s), 1710 (s), 1630 (s), 820 (s) cm^{-1}; fabms *m/z* [MNa]$^+$ 577 (22), [MNa−HOAc]$^+$ 517 (100), [517−CH_2O]$^+$ 487 (20), 327 (11); ^{1}H nmr see Table 1; ^{13}C nmr 5.36, 6.68, 9.76, 17.03, 17.87, 29.45, 37.70, 38.26, 41.72, 51.36, 58.33, 69.14, 73.40, 73.63, 75.37, 81.14, 85.47, 137.90, 139.82, 210.4 ppm.

PROLONGED METHANOLYSIS OF 7-TRIETHYLSILYLHEXAHYDROBACCATIN III: FORMATION OF 4,10-BIS(DEACETYL)-2-DEBENZOYL-7-TRIETHYLSILYLISOBACCATIN III [**8**].—7-Triethylsilylhexahydrobaccatin III [**4**] (60.2 mg, 0.085 mmol) was dissolved in 0.5 M NaOMe in MeOH (1.5 ml), and the solution was stirred at room temperature under argon for 12 h. After careful neutralization (1% methanolic HCl, pH 7) and removal of the MeOH, the residue was extracted into EtOAc and purified by preparative tlc (10% iPrOH in CH_2Cl_2), yielding two colorless, amorphous products. The first product, R_f 0.13, was 4,10-bis(deacetyl)-2-debenzoyl-7-triethylsilylbaccatin III [**7**] (24.0 mg, 55.0%), identical with the product described above. The second product, R_f 0.03, was 4,10-bis(deactyl)-2-debenzoyl-7-triethylsilylisobaccatin III [**8**] (7.4 mg, 17.0%): fabms *m/z* [MH]$^+$ 513 (9), 495 (7), 477 (22), 459 (12), 419 (11), 399 (9), 381 (14), 363 (39), 345 (38), 327 (35), 177 (64), 149 (100), 133 (97), 121 (97); ^{1}H nmr see Table 1.

CONTROLLED METHANOLYSIS OF 7-TRIETHYLSILYLHEXAHYDROBACCATIN III: PREPARATION OF 10-DEACETYL-7-TRIETHYLSILYLHEXAHYDROBACCATIN III [**5**] AND 4,10-BIS(DEACETYL)-7-TRIETHYLSILYL-HEXAHYDROBACCATIN III [**6**].—7-Triethylsilylhexahydrobaccatin III [**4**] (85 mg, 0.12 mmol) was dissolved in 0.5 M NaOMe in MeOH (3 ml), and the solution was stirred at room temperature under argon. After 2 h the reaction mixture was neutralized (1% methanolic HCl, pH 7) and evaporated. The residue was

TABLE 1. ^{1}H-nmr Spectra of Compounds **3–8**, **11**.

Proton	Compound						
	3	**4**	**5**	**6**	**7**	**8**	**11**
H-2	5.40 (d, 7)	5.40 (d, 7)	5.32 (d, 7)	5.35 (d, 7)	3.77 (d, 7)	4.14 (d, 6)	5.39 (d, 7)
H-3	3.73 (d, 7)	3.73 (d, 7)	3.80 (d, 7)	3.55 (d, 7)	3.25 (d, 7)	3.51 (d, 6)	3.69 (d, 7)
H-5	5.00 (br d, 11)	4.94 (br d, 8)	4.95 (br d, 7)	4.82 (dd, 3, 8)	4.76 (dd, 3, 8)	4.22 (dd, 8, 10)	4.95 (d, 8)
H-6	[a]	[a]	[a]	[a]	2.40 (m), 1.97 (m)	2.11 (m), 1.81 (m)	2.5 (m), 1.8 (m)
H-7	4.42 (m)	4.44 (m)	4.37 (dd, 7, 10)	3.95 (dd , 7, 13)	3.94 (dd, 5, 11)	3.79 (dd, 4, 9)	4.42 (dd, 6, 11)
H-10	6.23 (s)	6.41 (s)	5.10 (s)	5.15 (s)	5.10 (s)	4.96 (s)	6.42 (s)
H-13	4.83 (br t)	4.80 (br t)	4.80 (br t, 7)	4.55 (br t, 7)	4.55 (br d, 8)	4.49 (br d, 6.5)	4.87 (br t, 9)
H-14	[a]	[a]	[a]	[a]	2.08 (m), 2.40 (m)	2.51 (m), 2.38 (m)	2.3 (m), 2.1 (m)
H-16	1.02 (s)[b]	1.00 (s)[b]	1.00 (s)[b]	1.00 (s)[b]	0.97 (s)	0.92 (s)[b]	1.13 (s)[b]
H-17	1.06 (s)[b]	1.11 (s)[b]	1.04 (s)[b]	1.00 (s)[b]	1.05 (s)	1.06 (s)[b]	1.10 (s)[b]
H-18	2.00 (s)	2.14 (s)	2.03 (s)	2.04 (s)	2.12 (s)	1.99 (s)	2.10 (s)
H-19	1.60 (s)	1.60 (s)	1.70 (s)	1.62 (s)	1.59 (s)	1.32 (s)	1.63 (s)
H-20	4.30 (ABq, 7, $\Delta\nu_{AB}$=72)	4.30 (ABq, 8, $\Delta\nu_{AB}$=70)	4.30 (ABq, 7, $\Delta\nu_{AB}$=83)	4.36 (ABq, 7, $\Delta\nu_{AB}$=19)	4.55 (ABq, 8, $\Delta\nu_{AB}$=89)	3.76 (ABq, 10, $\Delta\nu_{AB}$=32)	3.49 (ABq, 8, $\Delta\nu_{AB}$=81)
4-OAc	2.22 (s)[c]	2.14 (s)[c]	2.16 (s)				2.20 (s)[c]
10-OAc	2.16 (s)[c]	2.15 (s)[c]					2.17 (s)[c]
cyclohexyl	1.2–2.4[d]	1.2–2.4[d]	1.2–2.4[d]	1.2–2.4[d]			1.2–2.4[d]
7-OSi*CH*$_2$Me		0.56 (6H, m)	0.52 (6H, m)	0.51 (6H, m)	0.51 (6H, m)	0.54 (6H, m)	0.52 (6H, m)
13-OSi*CH*$_2$Me							0.55 (6H, m)
7-OSiCH$_2$*Me*		0.90 (9H, t, 7)	0.92 (9H, t, 7)	0.90 (9H, t, 7)	0.91 (9H, t, 7)	0.94 (9H, m)	0.97 (9H, t, 7)
13-OSiCH$_2$*Me*							0.88 (9H, t, 7)

[a]Peak hidden under the cyclohexyl proton envelope.

[b,c]Assignments with the same letter can be reversed.

[d]The resonances of the cyclohexyl protons appeared as a series of broad peaks over the indicated range. Assignments of individual protons were not made.

extracted into EtOAc and purified by preparative tlc (3% MeOH in $CHCl_3$, double elution) to yield three products. The first product, R_f 0.2, was 10-deacetyl-7-triethylsilylhexahydrobaccatin III [**5**] (6 mg, 8%): amorphous solid; ir (KBr) 3500 (s), 2955 (s), 1735 (s), 1720 (s) cm^{-1}; fabms *m/z* $[MH]^+$ 665 (65), $[MH-H_2O]^+$ 647 (45), $[MH-CH_2O]^+$ 635 (10), 617 (10), $[MH-HOAc]^+$ 605 (45), 587 (25), 569 (25), 495 (100); ^1H nmr see Table 1. The second product, R_f 0.16, was 4,10-bis(deacetyl)-7-triethylsilylhexahydrobaccatin III [**6**] (3 mg, 4%): amorphous solid; ir (KBr) 3450 (s), 2900 (s), 1745 (s), 1740 (m), 1700 (s), 1669 (w), 1240 (m), 840 (w) cm^{-1}; fabms *m/z* $[MH-H_2O]^+$ 605 (8), $[MH-2H_2O]^+$ 587, $[MH-C_6H_{11}]^+$ 522 (8), 493 (5); ^1H nmr see Table 1. The third product, R_f 0.09, was 4,10-bis(deacetyl)-2-debenzoyl-7-triethylsilylbaccatin III [**7**] (17 mg, 28%), identical with the product described above.

7,13-Di(triethylsilyl)hexahydrobaccatin III [**11**].—7-Triethylsilylhexahydrobaccatin III [**4**] (30 mg, 0.042 mmol) and imidazole (14 mg, 5 equiv) were dissolved in DMF (500 μl) and treated with triethylsilyl chloride (100 μl, 14 equiv), and the solution was heated at 60°. After 18 h the reaction was quenched by addition of brine and diluted with EtOAc. The aqueous layer was extracted with 4×10 ml EtOAc, and the combined EtOAc extract was washed with 5×5 ml brine and dried. Evaporation of the solvent and purification of the crude product by cc (SiO_2, EtOAc/hexane) gave 7,13-di(triethylsilyl)hexahydrobaccatin III [**11**] as an uncrystallizable amorphous white solid (36 mg, 91%): ir (KBr) 2975 (s), 1750 (s), 1740 (s), 1240 (s), 840 (m) cm^{-1}; fabms *m/z* $[MNa]^+$ 843 (100), $[MNa-HOAc]^+$ 786 (15); ^1H nmr see Table 1.

Hydrolysis of 7,13-di(triethylsilyl)hexahydrobaccatin III.—7,13-Di(triethylsilyl)hexahydrobaccatin III [**11**] (30 mg, 0.023 mmol) was dissolved in 0.5 M NaOMe in MeOH (1 ml) and the solution stirred at room temperature under argon. Tlc of the reaction mixture after 1.5 h showed complete conversion of starting material to a less polar product which was identified as compound **12** as described below. Reaction was continued for a total of 10 h to allow formation of additional products, and the crude product was then loaded directly onto a preparative tlc plate and purified without prior workup. The major product was identified as 10-deacetyl-7,13-bis(triethylsilyl)hexahydrobaccatin III [**12**] (12 mg, 58%); ^1H nmr see Table 2. The intermediate fraction was a mixture (0.6 mg) but 10-deacetyl-2-debenzoyl-7,13-di(triethylsilyl)baccatin III [**13**] could be identified as the major component of this mixture on the basis of its partial ^1H nmr spectrum (Table 2). The third product (0.3 mg, 1.3%) was identified as 4,10-bis(deacetyl)-2-debenzoyl-7-triethylsilylbaccatin III [**7**] on the basis of its tlc behavior and ^1H nmr spectrum.

Acetylation of 4,10-bis(deacetyl)-2-debenzoyl-7-triethylsilylisobaccatin III.—A solution of **8** (11.4 mg, 0.022 mmol) in CH_2Cl_2 (1 ml) was treated with DCC (14.2 mg, 0.069 mmol), Ac_2O (6.5 μl, 0.069 mmol), and a catalytic amount of PP, and the reaction was allowed to proceed for 36 h at room temperature. After quenching with aqueous HOAc, the reaction mixture was extracted with EtOAc and worked up in the usual manner, then purified by preparative tlc (3% iPrOH in CH_2Cl_2), affording two major products. The first product, R_f 0.42, a colorless amorphous solid, was identified as the triacetate **14** (7.9 mg, 55.7%): cims *m/z* $[MH]^+$ 639 (1.5), 621 (2.0), 609 (1.4), 579 (9.0), 561 (29), 543 (14), 519 (89), 501 (62), 489 (19), 473 (12), 459 (72), 441 (47), 429 (21), 413 (16), 401 (14), 387 (43), 369 (21), 359 (12), 343 (40), 327 (44), 309 (49); ^1H nmr see Table 2. The second product, R_f 0.45, a colorless, amorphous solid, was identified as the tetraacetate **15** (1.0 mg, 6.5%): cims *m/z* $[MH]^+$ 681 (0.5), 663 (0.8), 651 (0.8), 621 (1.9), 603 (1.8), 561 (90), 543 (12), 519 (11), 501 (29), 485 (8.0), 473 (10), 459 (43), 441 (21), 411 (16), 397 (39), 383 (16), 369 (18), 355 (10), 341 (19), 327 (24), 309 (26); ^1H nmr see Table 2.

Conversion of 4,10-bis(deacetyl)-2-debenzoyl-7-triethylsilylbaccatin III [**7**] to 4,10-bis(deacetyl)-2-debenzoyl-7-triethylsilylisobaccatin III [**8**].—The conversion reactions were each carried out using 620 μg (1.21 μmol) of **7** in 0.5 ml solvent with a catalytic amount of either acid or base. The results are summarized in Table 3.

Each reaction was monitored by tlc analysis (10% iPrOH in CH_2Cl_2) using pure **8** as reference standard, and in each case the conversion of **7** to **8** proceeded cleanly and nearly quantitatively.

7-Triethylsilylbaccatin III [**16**].—Baccatin III [**2**] (449 mg, 0.766 mmol)was dissolved in 18 ml anhydrous pyridine with stirring. After 5 min, chlorotriethylsilane (1.16 g, 7.66 mmol, 10 equiv) was added, and the reaction was allowed to proceed, at room temperature under argon, for 24 h. At this time the reaction was stopped by the addition of 40 ml distilled H_2O, followed by 30 ml EtOAc. The EtOAc layer was separated, and the aqueous layer was washed with additional EtOAc (2×10 ml). The combined organic layers were then washed with aqueous $CuSO_4$ solution (5×50 ml) to remove the pyridine, followed by brine wash (3×10 ml). After drying with $MgSO_4$, the solution was filtered and evaporated to a pale yellow residue, which was subjected to cc (3% iPrOH in CH_2Cl_2), affording 385.1 mg (72.0%) of pure 7-triethylsilylbaccatin III [**16**]: fabms *m/z* $[MH]^+$ 701 (100), 679 (16), 669 (11), 661 (9), 655 (15), 641 (63), 623 (29), 611 (21), 593 (32), 587 (87), 581 (52), 563 (34); ^1H nmr see Table 2.

TABLE 2. ^{1}H-nmr Spectra of Compounds **12–17**.

Proton	Compound					
	12[a]	**13**	**14**	**15**	**16**	**17**
H-2	5.33 (d, 7)	4.9 (d)	4.06 (d, 7)	4.07 (d, 7)	5.63 (d, 7)	5.60 (d, 7)
H-3	3.72 (d, 7)	3.3 (d)	3.18 (d, 7)	3.56 (d, 7)	3.88 (d, 7)	3.96 (d, 7)
H-5	4.94 (d, 8)	5.0 (d)	5.19 (t, 9)	5.43 (dd, 5, 10)	4.96 (d, 8)	4.96 (d, 8)
H-6	[b]		2.6 (m), 1.77 (m)	2.68 (m), 1.79 (m)	2.6 (m), 1.9 (m)	2.52 (m), 1.88 (m)
H-7	4.33 (dd, 5, 8)		3.95 (dd, 5, 10)	4.54 (dd, 6, 10)	4.49 (dd, 7, 10)	4.43 (dd, 6, 10)
H-10	5.07 (s)		6.33 (s)	6.34 (s)	6.46 (s)	5.17 (s)
H-13	4.88 (br t, 9)		5.91 (ddd, 10, 6, 1)	6.15 (br t, 9)	4.83 (br m)	4.89 (br, m)
H-14	2.3 (m), 2.0 (m)		2.26 (m), 1.82 (m)	2.28 (m), 1.89 (m)	1.89 (m), 2.53 (m)	1.91 (m), 2.45 (m)
H-16	0.97 (s)[c]		1.07 (s)[c]	1.09 (s)[c]	1.04	1.09 (s)
H-17	1.10 (s)[c]		1.17 (s)[c]	1.23 (s)[c]	1.20 (s)	1.24 (s)
H-18	1.97 (s)	1.95 (s)	2.11 (s)	2.06 (s)	2.19 (s)	2.09 (s)
H-19	1.64 (s)		1.26 (s)	1.25 (s)[c]	1.65 (s)	1.73 (s)
H-20	4.27 (ABq, 8 $\Delta\nu_{AB}$=88)	4.1 (ABq)	3.57 (s)	3.84 (ABq, 10 $\Delta\nu_{AB}$=43)	4.23 (ABq, 8 $\Delta\nu_{AB}$=42)	4.24 (ABq, 8 $\Delta\nu_{AB}$=40)
2-OAc						
4-OAc	2.15 (s)	2.15 (s)		2.22	2.25 (s)[c]	
5-OAc			1.93[c]	1.89		
10-OAc			2.09[c]	2.11	2.18 (s)[c]	
13-OAc			2.18[c]	2.17		
cyclohexyl	1.2–2.4[e]					
7-OSiCH_2Me	0.60 (6H, m)	0.50 (6H, m)	0.57 (6H, q)	0.57 (6H, q)	0.58 (6H, q)	0.56 (6H, q)
13-OSiCH_2Me	0.67 (6H, m)	0.60 (6H, m)				
7-OSiCH$_2$*Me*	0.92 (9H, t, 7)	0.9 (18H, m)	0.93 (9H, t)	0.93 (9H, t)	0.93 (9H, t)	0.94 (9H, t)
13-OSiCH$_2$*Me*	1.02 (9H, t, 7)					
$OCOC_6H_5$(*o*)					8.11 (2H, dd, 1.3, 8.4)	8.10 (2H, dd, 1.4, 8.4)
$OCOC_6H_5$(*m,p*)					7.44–7.64 (3H, m)	7.45–7.66 (3H, m)

[a]Only the indicated peaks were assignable in the spectrum of compound **13**.
[b]Peak hidden under the cyclohexyl proton envelope.
[c,d]Assignments can be reversed.
[e]The resonances of the cyclohexyl protons appeared as a series of broad peaks over the indicated range. Assignments of individual protons were not made.

TABLE 3. Conditions for Conversion of **7** to **8**.

Experiment	Solvent	Acid/Base	Conversion time
1	CH_2Cl_2	TsOH	1 h
2	CH_2Cl_2	$AlCl_3$	0.5 h
3	THF	dilute HCl	1 h
4	CH_2Cl_2	DMAP	>2 h
5	MeOH	NaOMe	2 h

METHANOLYSIS OF 7-TRIETHYLSILYLBACCATIN III.—7-Triethylsilylbaccatin III [**16**] (59.7 mg, 0.085 mmol) was dissolved in 0.5 M NaOMe in MeOH (4 ml), and the solution was allowed to stir at ambient temperature under argon for 30 min. After careful neutralization (10% methanolic HCl, pH 7) and removal of the solvent, the residue was extracted into EtOAc and purified by preparative tlc (10% iPrOH in CH_2Cl_2), affording three products. The first product, R_f 0.43, a colorless, amorphous solid, was identified as 4,10-bis(deacetyl)-7-triethylsilylbaccatin III [**17**] (1.3 mg, 2.5%): ^{1}H nmr see Table 2. The second product, R_f 0.13, was 4,10-bis(deactyl)-2-debenzoyl-7-triethylsilylbaccatin III [**7**] (22.0 mg, 50.4%), identical with compound **7** described previously. The third product, R_f 0.03, was 4,10-bis(deacetyl)-2-debenzoyl-7-triethylsilylisobaccatin III [**8**] (8.4 mg, 19.2%), identical with compound **8** described above.

PREPARATION OF 13-ACETYL-4,10-BIS(DEACETYL)-2-DEBENZOYL-7-TRIETHYLSILYLBACCATIN III [**18**].—4,10-Bis(deacetyl)-2-debenzoyl-7-triethylsilylbaccatin III [**7**] 17 mg, 0.030 mmol) in dry CH_2Cl_2 (1.5 ml) was treated with DCC (3.7 mg, 0.6 equiv), 4-PP (0.04 mg, 0.01 equiv), and Ac_2O (2 μl, 0.7 equiv) at 0° with stirring for 45 min. The reaction was stopped by addition of H_2O, and the mixture was diluted with EtOAc. The EtOAc layer was then separated, washed, dried (Na_2SO_4), and evaporated to give a crude product which was purified by preparative tlc (SiO2; 3% MeOH in $CHCl_3$). 13-Acetyl-4,10-bis(deacetyl)-2-debenzoyl-7-triethylsilylbaccatin III [**18**] was obtained as an uncrystallizable amorphous white solid (12 mg, 72%): ir (KBr) 3350 (s), 2950 (s), 1740 (s), 1710 (m), 1640 (s), 1240 (s) cm^{-1}; fabms did not yield an identifiable molecular ion; ^{1}H nmr see Table 4.

ACETYLATION OF 13-ACETYL-4,10-BIS(DEACETYL)-2-DEBENZOYL-7-TRIETHYLSILYLBACCATIN III.—A solution of **18** (12 mg, 0.02 mmol) in CH_2Cl_2 (1 ml) was treated with DCC (5 mg, 1 equiv), Ac_2O (6 μl, 3 equiv), and a catalytic amount of PP at room temperature. The reaction was stopped by the addition of aqueous HOAc after 3 h, when all the starting material had disappeared. The mixture was extracted with EtOAc, and the EtOAc layer was washed, dried, and evaporated to yield a crude product which was purified by preparative tlc [SiO_2; MeOH-$CHCl_3$ (3:97)] to give three products. The first product (R_f 0.25, 3.3 mg, 24%) was 2,13-diacetyl-2-debenzoyl-7-triethylsilylbaccatin III [**21**]; amorphous solid; fabms *m/z* $[MH]^+$ 681 (40), $[MH-CH_2CO]^+$ 639 (40), $[MH-HOAc]^+$ 621 (50), $[MH-HOAc-H_2O]^+$ 603 (55), [MH−2HOAc] 561 (30), 531 (20), 501 (40), 459 (60), 441 (60), 371 (100); ^{1}H nmr see Table 4. The remaining products could not be separated but were identified from spectroscopic data as a 1:2 mixture (3.1 mg) of 4,10-bis(deacetyl)-2,13-diacetyl-2-debenzoyl-7-triethylsilylbaccatin III [**19**] and 4-deacetyl-2,13-diacetyl-2-debenzoyl-7-triethylsilylbaccatin III [**20**]: fabms *m/z* for **20** $[MH]^-$ 639 (10), 597 (3); for **19** $[MH-OH]^-$ 580 (60), $[MN-OH-H_2O]^+$ 562 (60); ^{1}H nmr 0.55, 0.90 (m, $SiEt_3$), 1.03, 10.1, 1.05, 1.02 (s, H-16 and H-17), 1.60 and 1.52 (s, H-19), 1.95 and 2.02 (s, H-18), 2.05, 21.2 and 2.14 (s, OAc), 3.22 and 3.30 (d, H-3), 3.92 and 4.05 (dd, H-7), 4.32 (ABq, H-20), 4.85 (dd, H-5), 5.12 and 6.30 (s, H-10), 5.37 (overlapping d, H-2), 5.65 (m, H-13).

BENZOYLATION OF 13-ACETYL-4,10-BIS(DEACETYL)-2-DEBENZOYL-7-TRIETHYLSILYLBACCATIN III [**18**].—13-Acetyl-4,10-bis(deacetyl)-2-debenzoyl-7-triethylsilylbaccatin III [**18**] (12 mg, 0.022 mmol) in dry THF (1 ml) under argon was treated with DCC (7 mg, 1.5 equiv), benzoic acid (3 mg, 1.1 equiv), and a catalytic amount of PP and heated at 55° for 72 h. The solvent was removed in a stream of argon, EtOAc was added, the precipitated urea derivative was filtered off, and the filtrate was washed with 1 N HCl (1 ml). The organic layer obtained was washed with 5% aqueous $NaHCO_3$ (2×1 ml), H_2O, and brine, and evaporated. Purification of the resulting solid by repeated preparative tlc (SiO_2; 5% MeOH in $CHCl_3$ followed by 3% MeOH in $CHCl_3$) gave 13-acetyl-4,10-bis(deacetyl)-7-triethylsilylbaccatin III [**22**] (2 mg, 14%): amorphous solid; fabms *m/z* $[MH]^+$ 659 (10), $[MH-H_2O]^-$ 641 (100), 623 (90), 605 (60); ^{1}H nmr see Table 4.

ACETYLATION OF 13-ACETYL-4,10-BIS(DEACETYL)-7-TRIETHYLSILYLBACCATIN III [**22**].—Compound **22** (5.5 mg, 0.0084 mmol) in dry THF (1 ml) under argon was treated with DCC (5.2 mg, 3 equiv), Ac_2O (50 μl, 63 equiv), and a catalytic amount of PP. The stirred mixture was heated at 55° for 4.5 h, at which

TABLE 4. ^{1}H-nmr Spectra of Compounds **18**, **21–24**.

Proton	Compound				
	18	**21**	**22**	**23**	**24**
H-2	3.89 (d, 7)	5.40 (d, 6)	5.63 (d, 5)	5.89 (d, 6)	5.66 (d, 6)
H-3	2.97 (d, 7)	3.69 (d, 6)	3.42 (d, 5)	3.34 (d, 6)	3.83 (d, 6)
H-5	4.85 (dd, 4, 10)	4.95 (d, 8)	4.81 (dd, 4, 10)	4.79 (dd, 4, 10)	4.95 (d, 8)
H-6	2.02 (m), 2.44 (m)	[c]	2.42 (m)	1.97 (m), 2.38 (m)	1.80 (m), 2.51 (m)
H-7	3.92 (dd, 7, 12)	4.47 (dd, 7, 11)	3.96 (dd, 5, 11)	4.07 (dd, 4, 10)	4.47 (dd, 7, 11)
H-10	5.06 (s)	6.43 (s)	5.17 (d, 2)	6.43 (2)	6.46 (s)
H-13	5.84 (br t, 8)	6.12 (br t, 9)	5.93 (dd, 5, 8)	5.88 (m)	6.15 (br t, 9)
H-14	2.44 (m)	[c]	2.42 (m)	2.38 (m)	[c]
H-16	0.96 (s)[a]	1.15 (s)[a]	0.92 (s)[a]	1.08 (s)[a]	1.22 (s)[a]
H-17	1.14 (s)[a]	1.22 (s)[a]	0.95 (s)[a]	1.21 (s)[a]	1.17 (s)[a]
H-18	1.91 (s)	2.05 (s)	2.05 (d, 3)	2.02 (d, 1)	2.03 (d, 1)
H-19	1.66 (s)	1.62 (s)	1.67 (s)	1.60 (s)	1.68 (s)
H-20	4.52 (ABq, 8, $\Delta\nu_{AB}$=59)	4.35 (ABq, 8, $\Delta\nu_{AB}$=78)	4.23 (ABq, 8, $\Delta\nu_{AB}$=53)	4.21 (ABq, 8, $\Delta\nu_{AB}$=51)	4.22 (ABq, 8, $\Delta\nu_{AB}$=43)
2-OAc		2.22 (s)[b]			
4-OAc		2.15 (s)[b]			2.20 (s)[b]
10-OAc		2.15 (s)[b]		2.18 (s)[b]	2.21 (s)[b]
13-OAc	2.12 (s)	2.05 (s)[b]	2.22 (2)	2.21 (s)[b]	2.33 (s)[b]
2-OBz(*ortho*)			7.98 (br d)	8.00 (br d)	8.09 (br d)
2-OBz(*m*+*p*)			7.57 (m)	7.51 (m)	7.57 (m)
OSi*CH*$_2$Me	0.52 (7H, m)	0.57 (6H, m)	0.52 (6H, m)	0.55 (6H, m)	0.56 (6H, m)
OSiCH$_2$*Me*	0.90 (9H, t, 7)	0.92 (9H, t, 7)	0.89 (9H, t, 7)	0.91 (9H, t, 7)	0.92 (9H, t, 7)

[a,b]Assignments with the same letter may be reversed.
[c]Not assigned.

time a single product was observed by tlc. Heating for a further 8 h gave no additional products, and the solvent was evaporated. The residue was then dissolved in EtOAc, the urea derivative was filtered off, and the concentrated filtrate was purified by preparative tlc [SiO_2, iPrOH-heptane (1:9)] to give 13-acetyl-4-deacetyl-7-triethylsilylbaccatin III [**23**] (5 mg, 89%) as an amorphous solid: ir (KBr) 3500 (s), 2930 (s), 1700 (s), 1740 (s), 1660 (w), 1240 (s), 840 (m) cm^{-1}; fabms *m/z* $[MH-H_2O]^+$ 683 (10), 665 (5), $[MH-HOAc]^-$ 641 (25), 623 (25), 611 (5), 592 (5), 581 (30), 562 (10), 501 (40), 371 (60), 235 (100); ^{1}H nmr see Table 4.

13-ACETYL-7-TRIETHYLSILYLBACCATIN III [**24**].—7-Triethylsilylbaccatin III was prepared by treatment of baccatin III with Et_3SiCl (24 equiv) in pyridine (25 ml/mmol) at room temperature for 20 h. This material (10 mg) was then acetylated by the DCC/PP/Ac_2O method described above to yield 13-acetyl-7-triethylsilylbaccatin III [**24**] (8.6 mg, 81%) as an amorphous solid: ^{1}H nmr see Table 4.

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