Unusual Tritylation Reactions of Tricyclic Analogues of Acyclovir and an Attempt to Elucidate Their Mechanism

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Dedicated to Prof. Dr. *Frank Seela* on the occasion of his 60th birthday

In reference to our earlier observation that the 3,9-dihydro-3-[(2-hydroxyethoxy)methyl]-6-methyl-9-oxo-5*H*-imidazo[1,2-*a*]purine (6-Me-TACV) tricyclic antiviral agent derived from acyclovir undergoes unusual *C*-tritylation to 7-trityl and 7-[4-(benzhydryl)phenyl] derivatives enforced by a 6-Me substituent, we studied tritylation of 6-Ph (**1a**) and 6-(4-MeOPh) (**1b**) TACV derivatives. The treatment of **1a** and **1b** with TrCl in K_2CO_3/DMF resulted exclusively in the formation of 7-[4-(benzhydryl)phenyl] derivatives **2a**, **2b**, **3a**, **3b**, and **4a**. Inhibition experiments with radical scavengers DNB and DBNO indicated a single-electron-transfer (SET) mechanism for this reaction. Analogous experiments with unsubstituted TACV and 6-Me-TACV suggest that the nature of the substituent at C(6) determines the reaction mechanism. The presence of a 6-aryl substituent results in the exclusive formation of 4-(benzhydryl)phenyl derivatives *via* a SET mechanism. On the contrary, when C(6) is unsubstituted, trityl derivatives are the only products of the S_N reaction. In the case of 6-Me-TACV, concomitant SET and S_N mechanisms direct the reaction towards 4-(benzhydryl)phenyl and trityl products.

Introduction. – The triphenylmethyl (trityl) group has been broadly used as a primary alcohol protecting group in the carbohydrate and oligonucleotide fields and to a smaller extent for *S*- and *N*-protection of amino acids. Its application in the area of heterocycles has been limited [1]. We have recently reported that the 3,9-dihydro-3-[(2-hydroxyethoxy)methyl]-6-methyl-9-oxo-5*H*-imidazo[1,2-*a*]purine (6-Me-TACV[2]) tricyclic antiviral agent derived from acyclovir, when tritylated under conditions suitable for regioselective *N*(5)-alkylation, undergoes *C*-substitution instead to give the 7-trityl (major) and 7-[4-(benzhydryl)phenyl] (minor) derivatives. The unusual regioselectivity of the reaction seems to be driven mainly by the steric hindrance of the 6-Me group because, in the case of 6-unsubstituted congener (TACV), *N*(5)-tritylation highly prevails [2]. A search of *Beilstein* [3] for heterocycles substituted with the 4-(benzhydryl)phenyl group resulted in only few examples. Either *N*- [4] or *C*-substitutions [5] with this group were accomplished by experimental approaches different than direct tritylation in solid K_2CO_3/DMF medium. We describe now further tritylation reactions of 6-substituted TACV that shed some light on the mechanism of the unusual *C*-tritylation and reactivity of its products.

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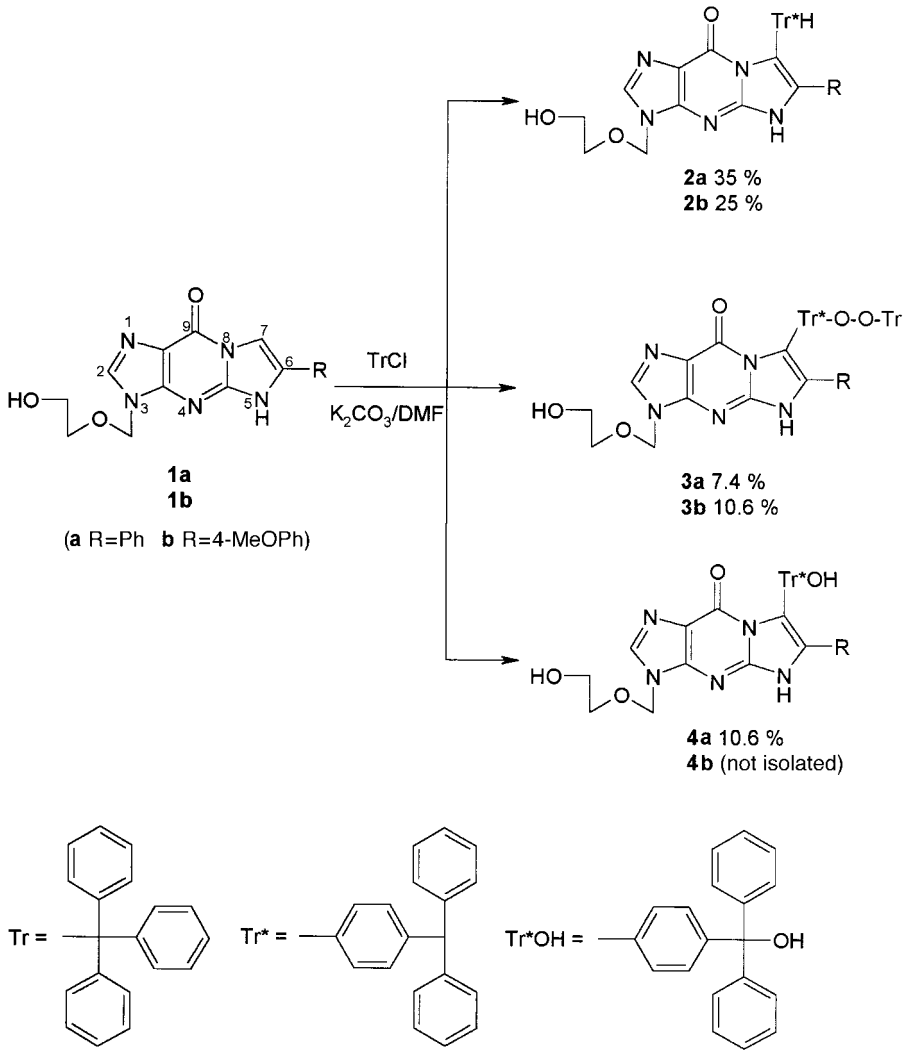
[2]) For the systematic name 3,9-dihydro-3-[(2-hydroxyethoxy)methyl]-9-oxo-5*H*-imidazo[1,2-*a*]purine, the abbreviation TACV is used throughout this paper.

Results and Discussion. – When we treated 6-aryl substituted compounds 6-Ph-TACV (**1a**) [6] or 6-(4-MeOPh)-TACV (**1b**) [7] in DMF with solid K_2CO_3 followed by Ph_3CCl, we found products that carried C(7)-substituents being either 4-(benzhydryl)phenyl (**2a** and **2b**), or substituted 4-(benzydryl)phenyl (**3a**, **3b**, and **4a**) (*Scheme*). Their structures were assigned on the basis of ^{1}H- and ^{13}C-NMR, and mass spectra. The main products **2a** and **2b** were isolated in yields of 35 and 25%, respectively. A comparison of their ^{1}H-NMR spectra with those of the corresponding substrates excluded N(5) as the site of the reaction by the maintenance of N(5) exchangeable proton signal at *ca.* 13 ppm. The substitution at C(7) was indicated by the disappearance of the H–C(7) signal at 8.21 and 8.11 ppm, and confirmed by

Scheme



^{13}C-NMR spectra showing for C(7) a significant downfield shift (from 103.22 ppm in **1a** to 118.85 in **2a**, and from 101.78 in **1b** to 117.72 in **2b**), as well as corresponding changes in C,H coupling patterns. The resonances of the C(7) group of **2a** and **2b** each appeared in ^{1}H-NMR spectra as a *singlet* of one proton at 5.73 and 5.72 ppm, and as a *multiplet* corresponding to 14 protons overlapping in the aromatic region with 6-substituent signals. ^{13}C-NMR Spectra exhibiting signals of one aliphatic trisubstituted C-atom at 55.48 and 55.45 ppm, and two characteristic *pseudoquadruplets* at 143.71, 143.47 and 143.69, 143.29 ppm confirmed the 7-[4-(benzhydryl)phenyl] structure of the substituent.

When crystallizing from chromatographic solvents CH_2Cl_2/MeOH, 7-[4-(benzhydryl)phenyl]-6-phenyl-TACV and 7-[4-(benzhydryl)phenyl]-6-(4-methoxyphenyl)-TACV derivatives formed some kind of inclusion compounds with CH_2Cl_2. The solvent could not be removed below 80° under vacuum and appeared in ^{1}H- and ^{13}C-NMR spectra ((D_6)DMSO) at 5.76 and 54.86 ppm, respectively, exactly as reported in a work on chemical-shift values of common impurities in NMR solvents [8]. All our attempts to obtain crystals of **2a** and **2b** from other solvents failed.

The minor products **3a** and **3b** were isolated in yields of 7.4 and 10.6%, respectively. As shown by mass spectra, the enlargement of the molecule involved, in addition to two trityl (or (benzhydryl)phenyl) groups, 32 mass units, which suggests a peroxide system. The majority of NMR signals of ^{1}H- and ^{13}C-NMR spectra of **3a** and **3b** were identical with those of **2a** and **2b**. The differences appearing in ^{1}H-NMR spectra – the absence of the benzhydryl CH signal at 5.73 and 5.72 and the presence of signals corresponding to additional fifteen aromatic protons suggested that C(7) is the only site of substitution of the combined (benzhydryl)phenyl-trityl group. ^{13}C-NMR Spectra confirmed this conclusion by the disappearance of the benzhydryl CH signal at 55.48 and 55.45, and the appearance of new signals at 141.70 and 141.48 ppm (trityl). Additional ^{13}C-NMR signals at 91.29 and 91.46 for **3a**, and 91.52 and 91.33 ppm for **3b**, resonances in the region expected for an sp^3-hybridized C–O established the C(7) substituent as 4-(tritylperoxybenzhydryl)phenyl.

In the case of tritylation of 6-Ph-TACV, we isolated another side-product **4a** in 10.6% yield. The mass spectrum demonstrated an increase in mass corresponding to addition of trityl and O-atom. The ^{1}H-NMR spectrum was identical with that of **2a**, except for the disappearance of the benzhydryl CH signal at 5.73 and the appearance of a new exchangeable-proton signal at 6.61 ppm. On the basis of these data, the structure of 7-[4-(hydroxybenzhydryl)phenyl]-6-Ph-TACV was ascribed to **4a**.

Compound **4a** and all tritylation products of 6-(4-MeOPh)-TACV, **2b**, **3b**, and **4b**, proved to be unstable. On crystallization from CH_2Cl_2/MeOH, they were spontaneously transformed into intensely fluorescent (quantum yield *ca.* 25%) compounds each having m/z 16 units higher than that of parent compound. Work to elucidate these structures is in progress.

The appearance of peroxy products is indicative for a radical mechanism. One could assume that, similarly to reactions studied by *Lempert* and co-workers [9], S_N and SET-initiated processes compete with each other. In that case, the presence of effective radical traps like *m*-dinitrobenzene (DNB) or di(*tert*-butyl) nitroxide (DBNO) during tritylation reaction should result in a decrease in the yield of SET reactions with concomitant increase in the yield of nucleophilic substitution products. Along this line,

we carried out a series of routine reactions of 6-Ph-TACV (0.1 mmol) with TrCl in DMF in the presence of K_2CO_3 with the addition of various amounts of DNB and DNBO against a control experiment. The products were isolated by CC, and their yields were determined. The results are shown in the *Table*.

Table. *Products*[a]) *of the Reactions of TACV Derivatives with TrCl in DMF/K_2CO_3 in the Presence of Radical Inhibitors*

TACV 6-R	Inhibitor[b]) (amount)[c])	Yield [%]						
		7-Tr*	7-Tr*OOTr	7-Tr*OH	5-Tr7-Tr*	5-Tr	7-Tr	5,7-di(Tr)
Ph	–	43.2	18.0	8.4	–	–	–	–
	DNB (0.016)	25.4	41.8	13.0	–	–	–	–
	DNB (0.16)	8.8	16.1	–	–	–	–	–
	DBNO (0.016)	15.7	6.2	8.0	–	–	–	–
	DBNO (0.16)	–	5.9	7.0	–	–	–	–
Me	–	13.0	–	–	5.0	–	27.0	–
	DNB (0.016)	–	–	–	–	–	17.4	–
	DNB (0.16)	–	–	–	–	–	15.4	–
H	–	–	–	–	–	60	5	25.0
	DNB (0.016)	–	–	–	–	46.3	16.4	14.0
	DNB (0.16)	–	–	–	–	43.0	10.3	16.6

TACV: 3,9-dihydro-3-[(2-hydroxyethoxy)methyl]-9-oxo-5*H*-imidazo[1,2-*a*]purine. [a]) Tr*: $Ph_2CHC_6H_4$, Tr: Ph_3C. [b]) DNB: *m*-dinitrobenzene; DBNO, di(*tert*-butyl) nitroxide. [c]) mmol per 0.1 mmol of substrate.

Contrary to expectations, even a small addition of DNB (0.16 mol-equiv) distinctly lowered the yield of the main (benzhydryl)phenyl product, from 43 to 25%. Higher amounts (1.6 mol-equiv.) of DNB or of the more effective DBNO led to an almost complete or complete inhibition of (benzhydryl)phenyl derivative formation. Thus evidence was provided that substitution of 6-Ph-TACV with 4-(benzhydryl)phenyl group takes place exclusively *via* a SET mechanism.

Using the same approach, we tested also the mechanistic aspects of the earlier described tritylations of 6-Me-TACV and TACV. As presented in the *Table*, in the case of 6-Me-TACV, DNB completely inhibited the formation of 7-[4-(benzhydryl)phenyl] derivative. No significant change in the yields of 7-trityl derivatives was observed when the amount of DNB was increased from 0.16 to 1.6 mol-equiv. Tritylation of TACV was comparatively unsusceptible to radical traps, which indicates that the reaction proceeds *via* a S_N mechanism.

Conclusion. – Preliminary experiments indicated that the tritylation of TACV derivatives in K_2CO_3/DMF system actually takes place by either an S_N or by a SET mechanism or both. The nature of the substituent at C(6) determines which of these two prevails. The presence of the 6-aryl substituent results in the exclusive formation of 4-(benzhydryl)phenyl derivatives *via* a SET mechanism. On the contrary, when C(6) is unsubstituted, trityl derivatives are the only products of the S_N reaction. In the case of 6-Me-TACV, concomitant SET and S_N mechanisms direct the reaction towards both 4-(benzhydryl)phenyl and trityl products.

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Experimental Part

General. All tritylation reactions were performed under Ar. Column chromatography (CC): on silica gel *60 H*, particle size 5–40 or 40–60 μm (*Merck*). TLC: precoated silica gel *60 F_{254}* glass plates (0.25 mm; *Merck*). Solvent systems for CC, CH_2Cl_2/MeOH gradients; for TLC, CH_2Cl_2/MeOH 9:1.

M.p. *MEL-TEMP II* capillary apparatus; not corrected. UV Spectra: *Beckman DU-65* and *DU-70* spectrophotometers; λ_{max} (ε). ^{1}H- and ^{13}C-NMR Spectra: *Unity 300 Varian* spectrometer operating at 299.95 and 75.43 MHz resp.; δ in ppm downfield from internal $SiMe_4$. Fluorescence spectra (FI): *Hitachi L-2000* fluorescence spectrophotometer; λ_{exc} 305 nm, quantum yield reference 2-aminopurine (H_2O) $\varphi = 1.0$ (*A*); λ_{exc} 350 nm, quantum yield reference quinine sulfate (0.1NH_2SO_4) $\varphi = 0.51$ (*B*); λ_{em} (rel. intensity in %). LR- and HR-MS: *Intectra AMD-604* mass spectrometer (Cs gun, 10 kV, 2 A) by the liquid secondary-ionization MS (LSIMS) method in positive and negative mode with 3-nitrobenzyl alcohol (NBA) as matrix; *m/z* (rel. intensity in %); metastable ions were analyzed with *B*/*E* linked scans. Microanalyses were performed by Microanalytical Laboratories of the Institute of Organic Chemistry, Polish Academy of Sciences in Warsaw.

*Tritylation of 3,9-Dihydro-3-[(2-hydroxyethoxy)methyl)]-9-oxo-6-phenyl-5*H-*imidazo[1,2-*a*]purine* (**1a**). Compound **1a** (650 mg, 2 mmol) was dried by co-evaporation with anh. DMF (2 × 50 ml), dissolved in DMF (60 ml), and the soln. was concentrated to 30 ml and treated with anh. K_2CO_3 (359 mg, 2.6 mmol). The suspension was vigorously stirred at r.t., until it became homogenous. Then Ph_3CCl (TrCl; 613 mg, 2.2 mmol) was added, and stirring was continued for 3.5 h. The mixture was filtered through *Celite*, and the filtrate was evaporated. The residue was subjected to CC (15 × 4.5 cm; CH_2Cl_2/MeOH gradient 97:3 → 88:12) to give (in order of elution) **3a**, **2a**, and **4a**.

*7-[4-(Diphenylmethyl)phenyl]-3,9-dihydro-3-[(2-hydroxyethoxy)methyl]-9-oxo-6-phenyl-5*H-*imidazo[1,2-*a*]-purine* (**2a**): 397 mg, (35%). Colorless rhombic crystals from CH_2Cl_2/MeOH. M.p. 191–192°. UV (MeOH): 231 (35600), 295 (16900). ^{1}H-NMR ((D$_6$)DMSO): 3.49, 3.53 (2*t*, $CH_2CH_2CH_2$); 4.70 (*t*, OH); 5.51 (*s*, NCH_2O); 5.73 (*s*, CH); 7.09–7.38 (*m*, 3 Ph, C_6H_4); 8.00 (*s*, H–C(2)); 13.08 (*s*, NH). ^{13}C-NMR ((D$_6$)DMSO): 55.48 (CH); 59.90, 70.45 ($CH_2CH_2CH_2$); 72.27 (NCH_2O); 115.86 (C(9a)); 118.85 (C(7)); 128.12 (C(6)); 125.91; 126.30; 127.62; 128.03; 128.12; 128.36; 128.39; 128.39; 129.05; 131.48 (tert. and quat. arom. C); 139.03 (C(2)); 143.37, 143.71 (2 Ph, C_6H_4); 146.35 (C(4a)); 149.74 (C(3a)); 152.71 (C(9)). FI (MeOH, *A*): 396 (6.0). MS (linked scan): 567.0 (100, M^+), 506.0 (35, $[M - HO(CH_2)_2O]^+$), 416.2 (4, $[MH - Ph - HO(CH)_2OCH_2)]^+$), 400 (1, $[M - CH(Ph)_2]^+$), 493.9 (89, $[MH - HO(CH_2)_2OCH_2]^+$), 416.2 (4, $[MH - HO(CH_2)_2OCH_2 - Ph]^+$). Anal. calc. for $C_{35}H_{29}N_5O_3 \cdot 1/4\ CH_2Cl_2 \cdot 2\ H_2O$: C 70.81, H 5.14, N 11.71; found: C 70.78, H 5.06, N 11.68. CH_2Cl_2 Content according to ^{1}H- and ^{13}C-NMR.

*7-(4-[(Diphenyl)[(triphenylmethyl)dioxy]methyl]phenyl)-3,9-dihydro-3-[(2-hydroxyethoxy)methyl]-9-oxo-6-phenyl-5*H-*imidazo[1,2-*a*]purine* (**3a**): 125 mg (7.4%). Colorless small crystals (MeOH/EtOH; 1:1). M.p. 155–156°. UV (MeOH): 218 (45900), 298 (19200). ^{1}H-NMR ((D$_6$)DMSO): 3.50, 3.54 (2*t*, CH_2CH_2); 4.71 (*t*, OH); 5.52 (*s*, NCH_2O); 6.99–7.37 (*m*, 6 Ph, C_6H_4); 8.01 (*s*, H–C(2)); 13.11 (*s*, NH). ^{13}C-NMR ((D$_6$)DMSO): 59.89, 70.44 (CH_2CH_2); 72.21 (NCH_2O); 91.29, 91.46 (Ph_3COOC); 115.82 (C(9a)); 118.54 (C(7)); 126.15; 127.31, 127.36, 127.51, 127.57, 128.15, 128.28, 128.38, 128.62, 129.22, 130.61 (tert. and quat. arom. C); 139.00 (C(2)); 141.70 (Ph_3C); 142.31 ($Ph_2CC_6H_4$); 146.34 (C(4a)); 149.69 (C(3a)); 152.65 (C(9)). LSI-MS (pos. mode): 842.6 (55, $[MH]^+$), 583.5 (55, $[MH - TrO]^+$), 566.5 (100, $[MH - TrOO]^+$), 243.2 (21, Tr^+). LSI-MS (neg. mode): 840.0 (10, $[M - H]^-$), 259.1 (2, TrO^-), 581.0 (16, $[M - H - TrO]^-$), 565.1 (2, $[M - H - TrOO]^-$); 503.9 (8, $[M - H - TrOO - HO(CH_2)_2O]^-$). MS (linked scan): 844.0; (83, $[M + 2H]^+$); 843 (37, $[MH]^+$), 583.1; (100, $[MH - TrO]^+$); 567.1 (18, $[MH - TrOO]^+$); 522.2 (5, $[MH - TrO - HO(CH_2)_2O]^+$); 506.1 (12, $[MH - TrOO - HO(CH_2)_2O]^+$); 492 (7, $[MH - TrOO - HO(CH_2)_2OCH_2]^+$); 444.2 (4, $[M - TrO - HO(CH_2)_2O - Ph]^+$); LSI-MS (pos. mode; NBA + MeCOONa): 886.2 (49, $[M + 2H + Na]^+$). HR-MS (formula $C_{54}H_{44}O_5N_5$): calc. for $[MH]^+$: 842.33423; found: 842.33393. FI (MeOH, *A*): 377 (7.9).

*3,9-Dihydro-7-[4-(Hydroxydiphenylmethyl)phenyl]-3-[(2-hydroxyethoxy)methyl]-9-oxo-6-phenyl-5*H-*imidazo[1,2-*a*]purine* (**4a**): 123 mg (10.6%). Off-white powder (attempts to crystallize from AcOEt, MeOH, or hexane/EtOH 1:1 gave rise to ring-opened product). M.p. >200°. UV (MeOH): 232 (9900), 284 (4000). ^{1}H-NMR ((D$_6$)DMSO): 3.49, 3.53 (2*t*, CH_2CH_2); 4.69 (*t*, OH); 5.51 (*s*, NCH_2O); 6.61 (*s*, Ph_2C); 7.09–7.38 (*m*, 3 Ph, C_6H_4); 8.00 (*s*, H–C(2)); 13.09 (*s*, NH). FI (MeOH, *A*): 398 (8.2). LSI-MS (pos. mode): 584.3 (18, $[MH]^+$). LSI-MS (neg. mode): 582.3 (6, $[M - H]^-$). MS (linked scan): 583.1 (100, M^+), 565.8 (5, $[MH - H_2O]^+$), 509 (11, $[MH - HO(CH)_2OCH_2]^+$), 521.9 (18, $[M - HO(CH_2)_2O]^+$), 506.1 (2, $[MH - HO(CH_2)_2O - OH]^+$), 432.2 (12, $[MH - Ph - HO(CH_2)_2OCH_2]^+$), 491.9 (9, $[MH - HO(CH_2)_2OCH_2 - OH]^+$), 415.8 (4, $[MH - HO(CH_2)_2OCH_2 - PhOH]^+$). HR-MS ($C_{35}H_{30}O_4N_5$): calc. for $[MH]^+$: 584.22980; found: 584.22936.

*Tritylation of 3,9-Dihydro-3-[(2-hydroxyethoxy)methyl]-6-(4-methoxyphenyl)-9-oxo-5*H-*imidazo[1,2-*a*]purine* (**1b**). As described for **1a** with **1b** (649 mg, 1.83 mmol). Chromatographic separation in CH_2Cl_2/MeOH gradient 97:3 → 9:1, order of elution: **3b**, **2b, 4b**.

*7-[4-(Diphenylmethyl)phenyl]-3,9-dihydro-3-[(2-hydroxyethoxy)methyl)]-6-(4-methoxyphenyl)-9-oxo-5*H-*imidazo[1,2-*a*]purine* (**2b**): 273 mg (25%). Yellow needles (CH_2Cl_2/MeOH 9:1). M.p. 173–175°. UV (MeOH): 260 (40700), 307 (18300). ^{1}H-NMR ((D$_6$)DMSO): 3.49, 3.52 (2*t*, CH_2CH_2); 3.75 (*s*, MeO); 4.69 (*t*, OH); 5.51 (*s*, NCH_2O); 5.72 (*s*, CH); 6.86, 7.09–7.38 (*d*,*m*, 2 Ph, 2 C_6H_4); 7.99 (*s*, H–C(2)); 12.98 (*s*, NH). ^{13}C-NMR ((D$_6$)DMSO): 55.11 (MeO); 55.45 (CH); 59.86, 70.38 (CH_2CH_2); 72.20 (NCH_2O); 115.80 (C(9a)); 117.72 (C(7)); 128.14 (C(6)); 113.84; 120.30; 125.83; 126.24; 128.03; 128.30; 128.96; 129.00; 131.47 (tert. and quat. arom. C); 138.90 (C(2)); 143.29, 143.69 ($Ph_2CHC_6H_4$); 146.16 (C(4a)); 149.59 (C(3a)); 152.65 (C(9)); 159.20 ($MeOC_6H_4$). LSI-MS (pos. mode): 598.3 (38, $[M]H^+$). MS (linked scan): 597 (100, M^+), 399.7 (2, $[MH - OCH_3 - CH(Ph)_2]^+$), 356.4 (1, $[MH - CH(Ph)_2 - HO(CH_2)_2OCH_2]^+$), 445.9 (2, $[M - HO(CH_2)_2OCH_2 - Ph]^+$), 535.9 (35, $[M - HO(CH_2)_2O]^+$), 523.9 (100, $[MH - HO(CH_2)_2OCH_2]^+$), 566 (2, $[M - OCH_3]^+$), 491.9 (6, $[MH - OCH_3 - HO(CH_2)_2OCH_2]^+$). FI (MeOH, *A*): 400 (3.0). Anal. calc. for $C_{36}H_{31}N_5O_4 \cdot 1/2\ CH_2Cl_2 \cdot 7\ H_2O$: C 65.27, H 5.33, N 10.43; found: C 65.63, H 5.06, N 10.08. CH_2Cl_2 Content according to ^{1}H- and ^{13}C-NMR.

*7-(4-[(Diphenyl)[(triphenylmethyl)dioxy]methyl]phenyl)-3,9-dihydro-3-[(2-hydroxyethoxy)methyl)]-6-(4-methoxyphenyl)-9-oxo-5*H-*imidazo[1,2-*a*]purine* (**3b**): 168 mg (10.6%). Small yellow crystals (i-PrOH). M.p. 158–159°. UV (MeOH): 262 (20000), 306 (8900). ^{1}H-NMR ((D$_6$)DMSO): 3.38 (*s*, MeO); 3.50, 3.54 (2*t*, CH_2CH_2); 4.71 (*t*, OH); 5.52 (*s*, NCH_2O); 6.45, 6.95–7.28, 7.37 (*d*, *m*, *d*, 5 Ph, 2 C_6H_4); 8.01 (*s*, H–C(2)); 13.01 (*s*, NH). ^{13}C-NMR ((D$_6$)DMSO): 54.78 (MeO); 59.91, 70.46 (CH_2CH_2); 72.28 (NCH_2O); 91.33, 91.52 (Ph_3COOC); 115.96 (C(9a)); 117.48 (C(7)); 113.81; 120.15; 126.10, 127.30, 127.40, 127.52, 127.60, 128.21, 128.50, 128.62, 128.91, 129.60, 130.70 (tert. and quat. arom. C); 139.02 (C(2)); 141.48 (Ph_3C); 142.41, 142.47 ($Ph_2CC_6H_4$); 146.22 (C(4a)); 149.66 (C(3a)); 152.69 (C(9)); 159.00 (MeO–*C*). LSI-MS (pos. mode): 872.5 (6, $[M]H^+$), 598.3 (96, $[MH - TrOO]^+$). LSI-MS (neg. mode): 870.1 (8, $[M - H]^-$), 259.1 (2, TrO^-), 612.0 (10, $[M - TrO]^-$). MS (linked scan): 873.7 (51, $[M]H^+$), 612.7 (100, $[MH - TrO]^+$), 583.2 (1, $[MH - TrO - OCH_3]^+$), 596.0 (22, $[M - TrOO]^+$), 841.8 (1, $[MH - OCH_3]^+$), 522.2 (5, $[MH - TrOO - HO(CH_2)_2OCH_2]^+$). HR-MS ($C_{55}H_{46}O_6N_5$): calc. for $[M]H^+$: 872.34479; found: 872.34597. FI (MeOH, A): 408 (9.2).

Tritylation products of **1b** turned out to be unstable. On crystallization (CH_2Cl_2/MeOH, MeOH, i-PrOH), they were converted spontaneously to intensely fluorescent compounds 'X' of *m*/*z* of parent compound + 16, *e.g.*, **2b** LSI-MS (pos. mode): 598.3 ($[M]H^+$) → 'X' **2b**. LSI-MS (pos. mode): 614.4 ($[M]H^+$). FI (H_2O, *B*): 520 (26.2).

Inhibition Experiments. Tritylation of 6-Ph-TACV in the Presence of DNB and DBNO. Compound **1a** (32.5 mg, 0.1 mmol) was subjected to tritylation as described above. Reactions with addition of DNB (2.7 mg, 0.016 mmol, and 27 mg, 0.16 mmol) were run simultaneously. The products were isolated by CC (silica gel (8.5 g; *Merck*); CH_2Cl_2/MeOH 95:5 → 88:12) in the following order of chromatographic mobility (amounts in mg, (% yields)): control: **3a**: 15.1 (18); **2a**: 24.5 (43.2); **4a**: 4.9 (8.4); **1a**: 4.2 (12.9); 0.016 mmol of DNB: **3a**: 35.2 (41.8); **2a**: 14.4 (25.4); **4a**: 7.6 (13.0); **1a**: 4.4 (12.4); 0.16 mmol of DNB: **3a**: 13.5 (16.1); **2a**: 5.0 (8.8); **1a**: 4.8 (14.8). Experiments with DBNO: **1a** (50 mg, 0.155 mmol) with 4 µl (0.025 mmol) and 38 µl, (0.25 mmol) of DBNO. The products were isolated by CC (silica gel (13 g; *Merck*), CH_2Cl_2/MeOH 95:5 → 88:12) in the following order of chromatographic mobility (amounts in mg, (% yields)): 0.025 mmol of DBNO: **3a**: 8.0 (6.2); **2a**: 13.7 (15.7); **4a**: 7.2 (8.0); 0.25 mmol of DBNO: **3a**: 7.6 (5.9); **4a**, 6.3 (7.0).

Tritylation of TACV and 6-Me-TACV in the Presence of DNB. Procedure of tritylation as described previously [2]: 0.1 mmol of substrate with DNB (0.016 or 0.16 mmol) were added. Products were isolated by TLC in the following order of chromatographic mobility (amounts in mg: (% yields)): TACV with 0.016 mmol of DNB: 5,7-diTr: 10.3 (14.0); 5-Tr: 22.8 (46.3); 7-Tr: 8.1 (16.4); with 0.16 mmol of DNB: 5,7-diTr: 12.2 (16.6); 5-Tr: 21.2 (43.0); 7-Tr: 5.1 (10.3).

6-Me-TACV with 0.016 mmol of DNB: 7-Tr: 8.8 (17.4); with 0.16 mmol of DNB: 7-Tr: 7.8 (15.4).

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