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# Polymethylene Derivatives of Nucleic Bases Bearing ω-Functional Groups. VIII.[1] ω-Oxo-ω-Phenylalkylpyrimidines and -Purines

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**Abstract**—Novel polymethylene derivatives of nucleic bases containing a phenylketo functional group at the ω-position were synthesized by the alkylation of uracil, thymine, cytosine, hypoxanthine, adenine, and *N*-isobutyrylguanine with ω-chloro-l-phenylalkan-1-ones and their physicochemical properties were studied.

*Key words: alkylation, nucleosides, polymethylene analogues*

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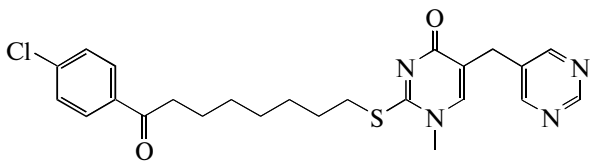
## INTRODUCTION

Among highly active neuroleptic drugs, there is a group of antipsychotic agents that effectively inhibit dopamine receptors, lack hypnosedative activity, and stimulate the central nervous system.[3] This group includes haloperidol, trifluperidol, droperidol, and others [2]. These compounds bear a piperidine heterocycle, which is linked at the nitrogen atom to a *p*-fluorobutyrophenone. These drugs received the group name of "butyrophenones."

A large number of medicines displaying a wide spectrum of physiological activity contain an arylketo fragment similar to a butyrophenone one. Antiarrhythmic (propafenone and amiodarone), ganglion blocking (lobeline), nonsteroidal anti-inflammatory (ketoprofen) drugs, etc., can be given as examples [2]. A recently described nucleoside analogue, 1-(3-cyclopenten-1-yl)-6-(3,5-dimethylbenzoyl)-5-ethyl-2,4-pyrimidinedione [3], bearing an arylketo fragment manifested high antiviral activity towards both HIV-2 and HIV-1.



Smith et al. have found a compound with an arylketo fragment that can inhibit phospholipase $A_2$ ($IC_{50}$ 54 nM) [4]. It is known that the products of oxidized low-density lipoproteins formed upon the hydrolysis with lipoprotein-associated phospholipase $A_2$ provoke inflammatory processes and are involved in atherosclerosis pathology. Thus, this enzyme is an attractive target in the search for agents for atherosclerosis treatment.

Polymethylene derivatives of nucleic bases with ω-functional groups proved to be convenient tools for the regulation of various biochemical processes. For example, compounds bearing carboxy, alkoxycarbonyl, or hydroxyl groups at the ω-position can inhibit DNA topoisomerase I [5]. Among polymethylene β-diketo derivatives of the pyrimidine series, compounds were found that inhibited the activity of *E. coli* thymidine- and uridine phosphorylase with an efficacy close to that for known inhibitors [6]. Similar adenine and hypoxanthine derivatives display antiproliferative properties and can be regarded as potential antitumor agents [1].

Earlier, we reported the preparation and properties of purine and pyrimidine γ-butyrophenones, new polymethylene nucleoside analogues bearing an arylketo function at the γ-position of the hydrocarbon backbone [7]. These derivatives are structurally similar to drugs of the butyrophenone group and, therefore, can be expected to possess neuroleptic activity. Indeed, when studying the behavior reactions in rats and mice s following the administration of 1-(4-oxo-4-phenylbutyl)thymine, N.A. Bondarenko (Zakusov Research Institute of Pharmacology, Russian Academy of Medical Sciences) demonstrated that this compound reduced the intensity of stereotypical reactions in rats administered with *L*-DOPA (*L*-3,4-dihydroxyphenylalanine), which supports its neuroleptic potential [8]. The administration of this compound in mice did not cause catalepsy but, on the contrary, stimulated the motor activity of the animals. This

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[3] Abbreviations: DBU, 1,8-diazabicycle[5.4.0.]undec-7-ene.

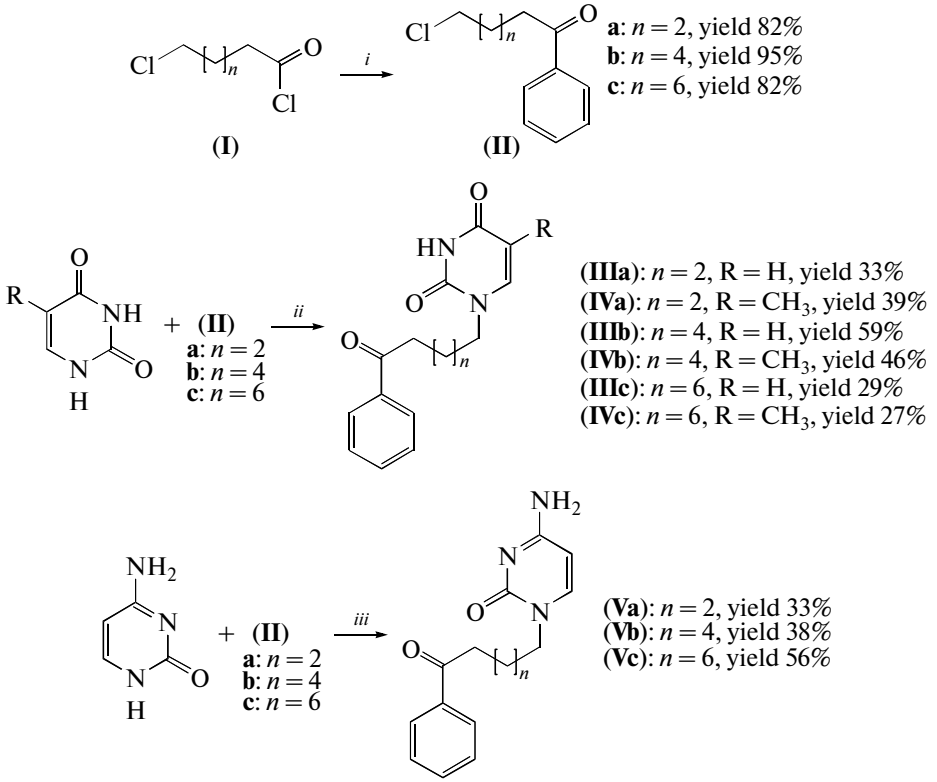
allowed for the assumption that this compound was a neuroleptic agent with $D_2$ blocker properties.

Based on the above observations, it seems rational to obtain similar compounds with longer polymethylene chains bearing a phenylcarbonyl residue at the ω-position of the hydrophobic hydrocarbon backbone.

## RESULTS AND DISCUSSION

Target compounds were synthesized by the alkylation of pyrimidine (uracil, thymine, and cytosine) and purine (adenine, hypoxanthine, and guanine) nucleic bases with the corresponding ω-chloropolymethylenephenones.

Alkylating agents (**IIa**)–(**IIc**) were prepared in high yields under Friedel–Crafts reaction conditions by the acylation of benzene with ω-chloroacyl chlorides (Scheme 1). The reactions were carried out at reduced temperature with aluminum trichloride being added to the reaction mixture in small portions to avoid the formation of alkylation products.




*i* – $AlCl_3/C_6H_6$, *ii* – DBU/DMF, 90°C (method **A**); *iii* – NaH/DMF, 90°C (method **B**).

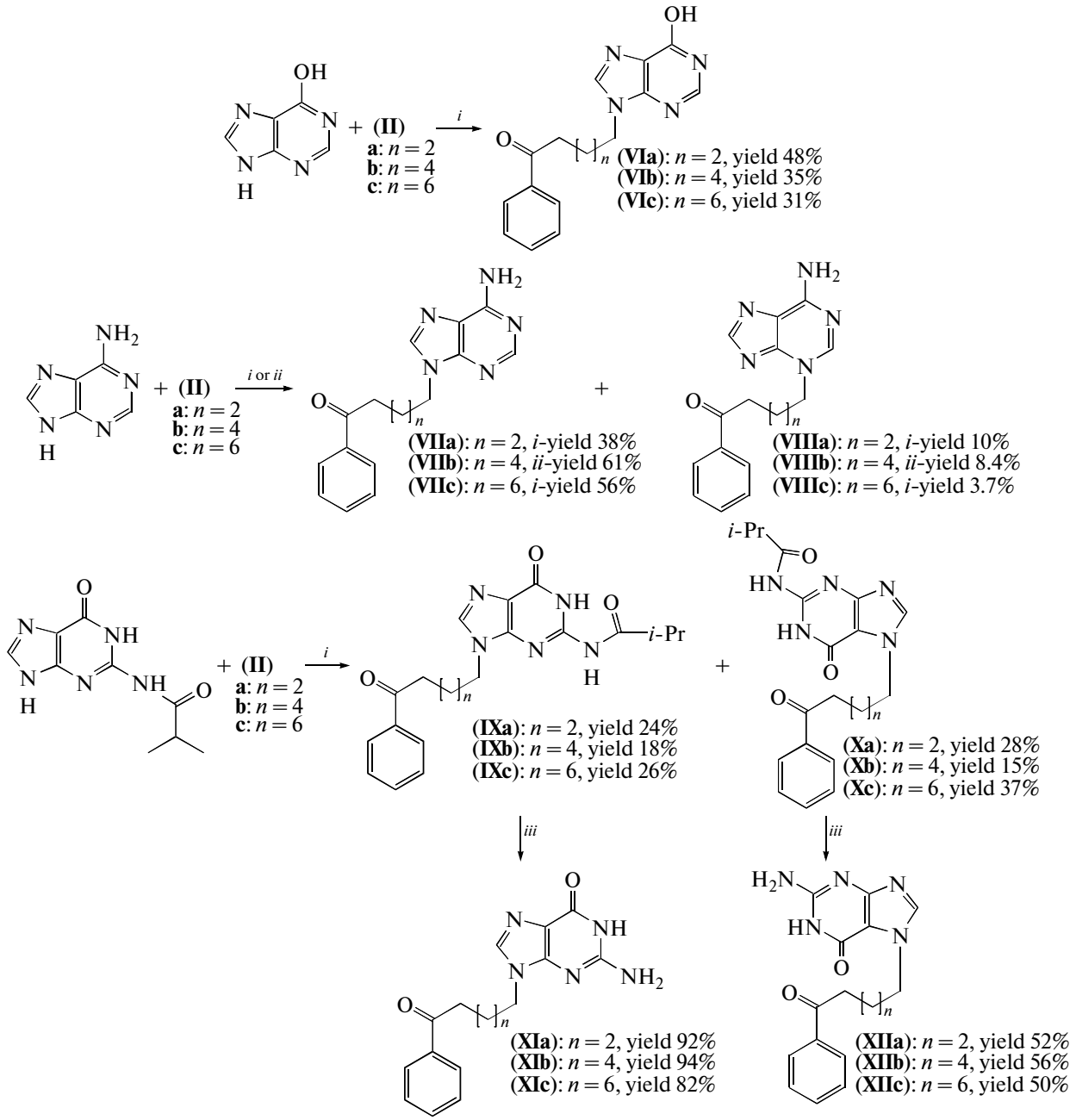
**Scheme 1.**

Compounds (**IIa**)–(**IIc**) became accessible after Nesmeyanov et al. had published classical works on the synthesis and study of the properties of telomeres, the products of ethylene radical telomerization with carbon tetrachloride [9]. In our experiments, we used telomeres of $C_5$ (1,1,1,5-tetrachloropentane), $C_7$ (1,1,1,7-tetrachloroheptane), and $C_9$ (1,1,1,9-tetrachlorononane). They were hydrolyzed to ω-chlorocarboxylic acids [10], which were transformed into the corresponding acyl chlorides (**Ia**)–(**Ic**).

The alkylation of the nucleic bases of the pyrimidine series (**IIa**)–(**IIc**) was carried out in DMF in the presence of DBU similar to [5] (method **A**) (Scheme 1). It was found in the preliminary experiments that the carbonyl groups of compounds (**IIa**)–(**IIc**) do not need to be protected, in contrast to the earlier described synthesis of polymethylene derivatives with terminal phenylketo groups separated from the nucleic base residues by a three-unit methylene chain, where such protection was absolutely necessary [7]. The reaction was completed at 80–100°C in 20 h to give the target monoalkyl uracil and thymine derivatives (**IIIa**)–(**IIIc**) and (**IVa**)–(**IVc**) in good yields. In addition, the reaction yielded significant amounts of bisalkylated products, which were also isolated and characterized. Derivatives (**Va**)–(**Vc**) were obtained by the alkylation of cytosine sodium salt, because the alkylation of cytosine in the presence of DBU led to a complex mixture of side reaction products with only traces of the target compound [11] (Scheme 1).

The corresponding polymethylene derivatives of purine nucleic bases were prepared, for the most part,

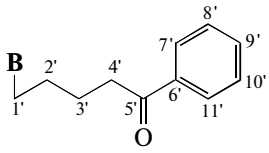
by alkylation in the presence of DBU (Scheme 2) except compounds (**VIIb**) and (**VIIIb**), which were obtained by the alkylation of adenine sodium salt with reagent (**IIb**). The only products of hypoxanthine alkylation with reagents (**IIa**)–(**IIc**) were its 9-substituted derivatives (**VIa**)–(**VIc**). The alkylation of adenine using either method resulted in a major product alkylated at position 9 of the purine heterocycle and minor 3-substituted isomer. Isomeric pairs (**VIIa**)–(**VIIIa**), (**VIIb**)–(**VIIIb**), and (**VIIc**)–(**VIIIc**) were characterized by significant differences in the $^{13}C$ NMR spectra, which A. Holy called "characteristic alkylation effects" [12] and provided an unambiguous assignment of the side chain position at the purine nucleus (Tables 1, 2; see Experimental section). For 3-substituted isomers (**VIIIa**)–(**VIIIb**), the C2 signal was shifted upfield by 9 ppm and the C2 signal, by about 11.6 ppm downfield if compared with 9-substituted isomers (**VIIa**)–(**VIIb**). In addition, the C1' signals of the side chain also considerably differed: the signal of the 3-substituted derivatives was shifted by about 6-ppm upfield relative to the corresponding signals of the 9-substituted derivatives.




*i*—DBU/DMF (method **A**), 90°C; *ii*—NaH/DMF (method **B**), 90°C, *iii*—$NEt_3$/EtOH/$H_2O$, Δ (method **C**).

**Scheme 2.**

**Table 1.** $^1$H NMR spectral data of synthesized compounds **(IIIa)**–**(VIIa)**, **(XIa)**, and **(XIIa)**




**B** =
**(IIIa)**: uracil-1-yl; **(IVa)**: thymine-1-yl;
**(Va)**: cytosine-1-yl; **(VIa)**: hypoxantine-9-yl;
**(VIIa)**: adenine-9-yl; **(VIIIa)**: adenine-3-yl;
**(XIa)**: guanine-7-yl; **(XIIa)**: guanine-7-yl.

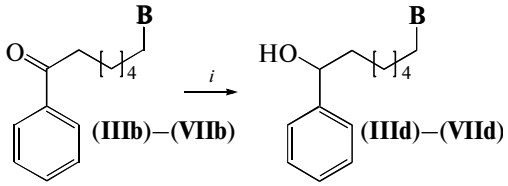
| Protons | Compound, δ, ppm | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **(IIIa)** | **(IVa)*** | **(Va)** | **(VIa)** | **(VIIa)** | **(VIIIa)** | **(XIa)** | **(XIIa)** |
| 1 H, H1 or H3 | 11.24, s | 11.22, s | – | 12.21, s | – | – | 10.52, s | 10.67, s |
| 1 H, H2 or H5 | 5.55, d** | – | 5.64, d*** | 7.85, s | 8.13, s | 7.76, s | – | – |
| 1 H, H6 or H8 | 7.66, d** | 7.52, s | 7.58, d*** | 8.18, s | 8.16, s | 8.35, s | 7.65, s | 7.87, s |
| 2 H, 2-$NH_2$ or 4-$NH_2$, or 6-$NH_2$ | – | – | 7.00, s | – | 7.2, s | 7.84, s | 6.71, s | 6.34, s |
| 2 H, *J* 7.16, H1' | 3.69, t | 3.66, t | 3.65, t | 4.18, t | 4.19, t | 4.35, t | 3.96, t | 4.20, t |
| 4 H, H2' and H3' | 1.59, m | 1.61, m | 1.59, m | 1.6–1.9, m | 1.5–1.9, m | 1.5–1.9, m | 1.5–1.8, m | 1.4–1.9, m |
| 2 H, *J* 6.88, H4' | 3.06, t | 3.05, t | 3.05, t | 3.05, t | 3.07, t | 3.09, t | 3.05, t | 3.04, t |
| 2 H, *J* 7.48, H7' and H11' | 7.95, d | 7.94, d | 7.95, d | 7.91, d | 7.92, d | 7.95, d | 7.93, d | 7.92, d |
| 2 H, H8' and H10' | 7.51, m | 7.49, m | 7.51, m | 7.48, m | 7.50, m | 7.50, m | 7.50, m | 7.49, m |
| 1 H, *J* 7.16, H9' | 7.62, t | 7.61, t | 7.62, t | 7.59, t | 7.61, t | 7.62, t | 7.61, t | 7.61, t |

Notes: * For compound **(IVa)**, the 5-$CH_3$ signal was observed at 1.73 ppm (s, 3H);
** *J* 7.8;
*** *J* 7.16.

Since the alkylation of guanine in the presence of DBU did not result in satisfactory yields because of the low solubility, we used 2-isobutyrylguanine. The reaction yielded a mixture of 9-substituted **(IXa)**–**(IXc)** and 7-substituted **(Xa)**–**(Xc)** derivatives with close $R_f$ values. The isolation of homogeneous isomers required multifold column chromatography. Target guanine derivatives **(XIa)**–**(XIc)** and **(XIIa)**–**(XIIc)** were obtained by the hydrolysis of 2-isobutyrylguanine derivatives **(IXa)**–**(IXc)** and **(Xa)**–**(Xc)** under mild basic conditions (Scheme 2).

The differences in the $^{13}$C NMR spectra of 9-substituted **(XIa)**–**(XIc)** and 7-substituted **(XIIa)**–**(XIIc)** isomers were also essential: for 7-substituted isomers in comparison with 9-substituted an upfield shift (about 8.5 ppm) of the C5 signal, a downfield shift (about 6 ppm) of the C8 signal, and a downfield shift of the side chain C1' signal (about 3 ppm) were observed [13]. These results allow for the NMR identification of isomeric products. The UV spectroscopy generally used for this purpose is inapplicable in this case because the absorption band resulting from the electron transfer from the carbonyl group to the phenyl radical is located at around 245 nm (ε 13000 $M^{-1}$ $cm^{-1}$) and overlaps with that of the nucleic base. Thus, the UV spectra give little information. The structures of the synthesized compounds are confirmed by $^1$H and $^{13}$C NMR spectra (Tables 1, 2; see the Experimental section).

The carbonyl group of the synthesized compounds can easily be reduced to a hydroxyl group in the presence of sodium borohydride, which was exemplified by the reduction of pyrimidine and purine derivatives **(IIIb)**–**(VIIb)** (Scheme 3, Table 3).



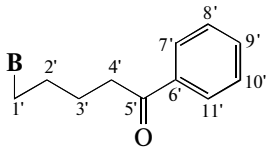

*i* – $NaBH_4$/EtOH/$H_2O$ (method **D**).

**Scheme 3.**

## EXPERIMENTAL

Uracil, thymine, cytosine, adenine, hypoxanthine, and guanosine were purchased from Sigma (United States); sodium hydride as an 80% suspension in mineral oil, and aluminum trichloride were from Fluka (Switzerland); 1,8-diazabicycle[5.4.0]undec-7-ene (DBU) was from Aldrich (United States); and sodium borohydride was from Acros (Belgium). Solvents were purified using routine procedures [14]. Mass spectra

**Table 2.** $^{13}C$ NMR spectral data of synthesized compounds (**IIIa**)–(**VIIa**), (**XIa**), and (**XIIa**)




**B** =
(**IIIa**): uracil-1-yl; (**IVa**): thymine-1-yl;
(**Va**): cytosine-1-yl; (**VIa**): hypoxantine-9-yl;
(**VIIa**): adenine-9-yl; (**VIIIa**): adenine-3-yl;
(**XIa**): guanine-9-yl; (**XIIa**): guanine-7-yl.

| Carbon atoms | Compound, δ, ppm | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **(IIIa)** | **(IVa)*** | **(Va)** | **(VIa)** | **(VIIa)** | **(VIIIa)** | **(XIa)** | **(XIIa)** |
| C2 | 150.9 | 150.9 | 155.8 | 147.2 | 152.3 | 143.3 | 154.8 | 156.3 |
| C4 | 163.7 | 164.2 | 165.9 | 148.0 | 149.6 | 149.8 | 151.4 | 152.7 |
| C5 | 100.8 | 108.4 | 93.1 | 114.3 | 118.8 | 120.5 | 116.7 | 108.2 |
| C6 | 145.6 | 141.3 | 146.0 | 153.6 | 155.9 | 154.9 | 156.8 | 159.5 |
| C8 | – | – | – | 140.7 | 140.8 | 152.4 | 137.1 | 142.5 |
| C1' | 47.2 | 46.9 | 48.2 | 46.1 | 42.7 | 49.1 | 42.4 | 45.6 |
| C2' | 28.0 | 28.0 | 28.2 | 28.7 | 28.9 | 28.2 | 29.0 | 30.0 |
| C3' | 20.4 | 21.1 | 20.6 | 20.5 | 20.7 | 20.5 | 20.7 | 20.3 |
| C4' | 37.3 | 37.4 | 37.4 | 37.3 | 37.1 | 37.2 | 37.2 | 37.2 |
| C5' | 199.7 | 199.7 | 199.8 | 199.6 | 199.7 | 199.7 | 199.8 | 199.8 |
| C6' | 136.7 | 136.7 | 136.7 | 136.6 | 136.7 | 136.7 | 136.6 | 136.7 |
| C7' and C11' | 128.7 | 128.6 | 128.7 | 128.6 | 128.6 | 128.6 | 128.7 | 128.6 |
| C8' and C10' | 127.8 | 127.8 | 127.8 | 127.8 | 127.8 | 127.8 | 127.9 | 127.8 |
| C9' | 133.0 | 133.0 | 133.0 | 133.0 | 133.0 | 133.0 | 133.1 | 133.0 |

* For compound (**IVa**), the 5-$CH_3$ signal was observed at 11.2 ppm.

were registered on an MS-30 mass spectrometer (Kratos, Japan); electron impact was used as an ionization method. NMR spectra (δ, ppm, *J*, Hz) were registered on a Bruker AMXIII-400 (Germany) with a working frequency of 400 MHz for $^1H$ and 100 MHz for $^{13}C$ NMR at 300 K in $CDCl_3$ and DMSO-$d_6$. TLC was carried out on Kieselgel 60 F254 plates (Merck, Germany) in chloroform–ethanol systems: 19 : 1 (A); 19.7 : 0.3 (B); 19.5 : 0.5 (C); 18 : 2 (D); 18.5 : 1.5 (E); 17 : 3 (F); 17.5 : 2.5 (G); 16 : 4 (H); and 15 : 5 (I). Column chromatography was performed on Kieselgel 60 (0.040–0.063 mm, Merck, Germany).

**5-Chloro-1-phenylpentanone-1 (IIa).** Anhydrous aluminum trichloride (17.3 g, 0.13 mol) was added by small portions under stirring for 25 min to a cooled to 0°C solution of 5-chloropentanoate chloride (18.6 g, 0.12 mol) (**Ia**) in absolute benzene (30 ml). The resulting solution was stirred for 1 h at 0°C and then for 1 h at 20°C and then poured out onto ice (200 g). The organic layer was separated, and the aqueous layer was extracted with benzene (2 ×30 ml). The extracts were combined, dried with anhydrous sodium sulfate, and the solvent was evaporated and distilled in a vacuum to give 19.45 g (82.4%); mp 50–51°C; Mass: *m/z* 196.7 [$M^+$]. Calc. *M* 196.7 ($C_{11}H_{13}ClO$). $^1H$ NMR ($CDCl_3$): 1.75–1.9 (4 H, m,$CH_2CH_2CH_2Cl$); 2.95 (2 H, t, *J* 6.8, $COCH_2$); 3.52 (2 H, t, *J* 6.2, $CH_2Cl$); 7.41 (2 H, m, *m*-H, Ph); 7.51 (1 H, t, *J* 7.5, *p*-H, Ph); 7.91 (2 H, d, *J* 7.5, *o*-H, Ph). $^{13}C$ NMR ($CDCl_3$): 21.31 ($CH_2CH_2CO$); 31.86 ($CH_2CH_2Cl$); 37.32 ($COCH_2$); 44.51 ($CH_2Cl$); [127.78 (2 C); 128.41 (2 C); 132.83; 136.71] ($C_6H_5$); 199.29 (*C*O). Published data [15]: mp 48–50°C, bp 128–130°C/1 mmHg.

**Table 3.** Reaction yields of the reduction of compounds (**IIIb**)–(**VIIb**)

| Starting compound/reaction product | Nucleic base, **B** | Yield, % |
|---|---|---|
| **(IIIb)/(IIId)** | Ura | 89 |
| **(IVb)/(IVd)** | Thy | 95 |
| **(Vb)/(Vd)** | Cyt | 97 |
| **(VIb)/(VId)** | Hyp | 80 |
| **(VIIb)/(VIId)** | Ade | 81 |

**7-Chloro-1-phenylheptanone-1 (IIb)** was synthesized similar to (**IIa**) from 7-chloroheptanoate chloride (**Ib**) (33.7 g, 0.18 mol). Yield 38.5 g (95%); bp 152–154°C/4 mmHg. Mass: *m/z* 224.7 [$M^+$]. Calc. *M* 224.7 ($C_{13}H_{17}ClO$). $^1$H NMR ($CDCl_3$): 1.25–1.61 (8 H, m, $CH_2CH_2CH_2CH_2CH_2Cl$); 2.92 (2 H, t, *J* 7.16, $COCH_2$); 3.488 (2 H, t, *J* 6.52, $CH_2Cl$); 7.40 (2 H, m, *m*-H, Ph); 7.50 (1 H, t, *J* 7.5, *p*-H, Ph); 7.91 (2 H, d, *J* 7.2, *o*-H, Ph). $^{13}$C NMR ($CDCl_3$): 23.89 ($CH_2CH_2CO$); 26.53 ($CH_2CH_2CH_2Cl$); 28.36 ($CH_2CH_2Cl$); 32.24 ($CH_2CH_2CH_2CH_2Cl$); 38.15 ($COCH_2$); 44.78 ($CH_2Cl$); [127.83 (2 C); 128.38 (2 C); 132.71; 136.91] ($C_6H_5$), 199.98 (*C*O). Published data [9]: bp 147–148°C/1.5 mmHg.

**9-Chloro-1-phenylnonanone-1 (IIc)** was synthesized similar to (**IIa**) from 9-chlorononanoate chloride (**Ic**) (28.55 g, 0.135 mol). Yield 28 g (82%). Mass: *m/z* 252.78 [$M^+$]. Calc. *M* 252.78 ($C_{15}H_{21}ClO$). $^1$H NMR ($CDCl_3$): 1.24–1.9 (12 H, m, $CH_2CH_2CH_2CH_2CH_2CH_2Cl$); 2.92 (2 H, t, *J* 7.16, $COCH_2$); 3.47 (2 H, t, *J* 6.85, $CH_2Cl$); 7.41 (2 H, m, *m*-H, Ph); 7.50 (1 H, t, *J* 7.5, *p*-H, Ph); 7.93 (2 H, d, *J* 7.2, *o*-H, Ph). $^{13}$C NMR ($CDCl_3$): 23.80 ($CH_2CH_2CO$); 26.39 ($CH_2CH_2CH_2CH_2Cl$); 28.29 ($CH_2CH_2CH_2Cl$); 28.78 ($COCH_2CH_2CH_2$); 28.87 ($CH_2Cl$); 32.19 ($CH_2CH_2CH_2CH_2CH_2Cl$); 38.00 ($COCH_2$); 44.56 ($CH_2Cl$); [127.56 (2 C); 128.08 (2 C); 132.34; 136.70] ($C_6H_5$); 199.55 (*C*O).

**Alkylation of nucleic bases in the presence of DBU (method A).** The corresponding alkylating agent (15 mmol) and DBU (2.2 ml, 15 mmol) were added to a suspension of a nucleic base or its protected derivative (10 mmol) in absolute DMF (25 ml), and the mixture was heated for 20 h at 80–100°C (TLC control), cooled, and evaporated in a vacuum. The residue was suspended in a minimal volume of chloroform and chromatographed on a silica gel (200 g) column (5 × 28 cm) eluting in a gradient of ethanol in chloroform (0 → 20%). The target fractions were evaporated and the residue was recrystallized.

**Alkylation of adenine and cytosine sodium salts (method B).** Sodium hydride (80% suspension in mineral oil, 0.33 g, 11 mmol) was added to a suspension of adenine or cytosine (10 mmol) in absolute DMF (25 ml). The mixture was stirred for 30 min at 20°C and the corresponding alkylating agent (12 mmol) was added. The reaction mixture was heated at 80–100°C for 20 h (TLC control). The solvent was evaporated in a vacuum and the residue was dissolved in chloroform (50 ml). Water (20 ml) was added and the mixture was poured into a funnel. The organic layer was separated and the aqueous phase was extracted with chloroform (5 × 30 ml). The extracts were combined, dried with sodium sulfate, the solvent was evaporated, and the residue was purified by column chromatography (for conditions, see method A). The target fractions were evaporated, and the residue was recrystallized from the proper solvent.

**Removal of an isobutyryl group from isobutyrylguanine derivatives (IXa)–(IXc) and (Xa)–(Xc), the preparation of guanine derivatives (XIa)–(XIc) and (XIIa)–(XIIc) (method C).** Triethylamine (0.28 ml, 2 mmol) was added to a solution of the corresponding isobutyrylguanine derivative (1 mmol) in ethanol (10 ml) and water (2 ml). The solution was refluxed and the reaction course was monitored by TLC in the proper eluting system. After 16 h, the solvents and triethylamine were evaporated in a vacuum and the residue was chromatographed on a silica gel column (30 g, 5 × 10 cm) eluting in a gradient of ethanol in chloroform (0 → 30%). Target fractions were evaporated and the residue was recrystallized from a 1 : 1 water–ethanol mixture.

**1-(5-Oxo-5-phenylpentyl)uracil (IIIa)** was obtained by method A in a yield of 33%, $R_f$ 0.49 (A), mp 146–147°C (propanol-2). Mass: *m/z* 272.3 [$M^+$], 273.3 [$M + H^+$]. Calc. *M* 272.3 ($C_{15}H_{16}N_2O_3$). NMR spectra: see Tables 1 and 2.

**1,3-Bis(5-oxo-5-phenylpentyl)uracil** was obtained as a side product in the synthesis of (**IIIa**), method A, in a yield of 31%; $R_f$ 0.41 (B), oil. Mass: *m/z* 432.5 [$M^+$] 433.5 [$M + H^+$]. Calc. *M* 432.5 ($C_{26}H_{28}N_2O_4$). $^1$H NMR ($CDCl_3$): 1.74 (8 H, m, H2', H2", and H3', H3"), 2.95–3.05 (4 H, m, H4' and H4"); 3.75 (2 H, t, *J* 6.2, H1"); 3.95 (2 H, t, *J* 7.5, H1'); 5.68 (1 H, d, *J* 7.8, H5); 7.13 (1 H, d, *J* 7.8, H6); 7.40 (4 H, m, *m*-H, Ph); 7.50 (2 H, t, *J* 7.8, *p*-H, Ph); 7.90 (4 H, d, *J* 8.1, *o*-H, Ph). $^{13}$C NMR ($CDCl_3$): 20.67 (C3'); 21.27 (3"); 26.98 (C2'); 28.40 (C2"); 37.51 (C4'); 37.90 (C4"); 40.59 (C1'); 49.45 (C1"); 101.51 (C5); [127.85 (2 C); 127.92 (2 C); 128.41 (2 C); 128.52 (2 C); 132.79; 133.05; 136.60; 136.81] (Ph); 142.12 (C6); 151.31 (C2); 162.92 (C4); 199.36 (C5'); 199.35 (C5").

**1-(5-Oxo-5-phenylpentyl)thymine (IVa)** was obtained by method A in a yield of 39%; $R_f$ 0.28 (C), mp 156–157°C (propanol-2). Mass: *m/z* 286.3 [$M^+$], 287.3 [$M + H^+$]. Calc. *M* 286.3 ($C_{16}H_{18}N_2O_3$). NMR spectra: see Tables 1 and 2.

**1,3-Bis(5-oxo-5-phenylpentyl)thymine was obtained as a side product in the synthesis of (IVa)**, method A, in a yield of 36%; $R_f$ 0.72 (C), oil. Mass: *m/z* 446.5 [$M^+$]. $^1$H. Calc. *M* 446.5 ($C_{27}H_{30}N_2O_4$). $^1$H NMR ($CDCl_3$): 1.69 (8 H, m, H2', H2" and H3', H3"); 1.83 (3 H, s, 5-$CH_3$); 2.94 (4 H, m, H4' and H4"); 3.68 (2 H, t, *J* 6.2, H1"); 3.92 (2 H, t, *J* 6.5, H1'), 6.96 (1 H, s, H6); 7.36 (4 H, m, *m*-H, Ph); 7.44 (2 H, t, *J* 7.8, *p*-H, Ph); 7.86 (4 H, d, *J* 7.8, *o*-H, Ph). $^{13}$C NMR ($CDCl_3$): 12.75 (5-*C*$H_3$); 20.58 (C3'); 21.18 (C3"); 26.90 (C2'); 28.28 (C2"); 37.41 (C4'); 37.78 (C4"); 40.62 (C1'); 48.90 (C1"); 109.40 (C5); [127.70 (2 C); 127.76 (2 C); 128.26 (2 C); 128.36 (2 C); 132,64; 132.87; 136.48; 136.65] (Ph); 138.26 (C6); 151.12 (C2); 163.48 (C4); 199.29 (C5'); 199.73 (C5").

**1-(5-Oxo-5-phenylpentyl)cytosine (Va)** was obtained by method B in a yield of 33%; $R_f$ 0.22 (D), mp 199–200°C dec. (propanol-2–water). Mass: *m/z*

271.3 [$M^+$], 272.3 [$M$ + H$^+$]. Calc. $M$ 271.3 ($C_{15}H_{17}N_3O_2$). NMR spectra: see Tables 1 and 2.

**9-(5-Oxo-5-phenylpentyl)hypoxantine (VIa)** was obtained by method A in a yield of 48%; $R_f$ 0.79 (D), mp 114–115°C dec. (EtOAc–heptane). Mass: $m/z$ 296.3 [$M^+$], 297.3 [$M$ + H$^+$]. Calc. $M$ 296.3 ($C_{16}H_{16}N_4O_2$). NMR spectra: see Tables 1 and 2.

**9-(5-Oxo-5-phenylpentyl)adenine (VIIa)** was obtained by method A in a yield of 38%, $R_f$ 0.51 (D), mp 207–208°C dec. (EtOAc–heptane). Mass: $m/z$ 295.3 [$M^+$], 296.3 [$M$ + H$^+$]. Calc. $M$ 295.3 ($C_{16}H_{17}N_5O$). NMR spectra: see Tables 1 and 2.

**3-(5-Oxo-5-phenylpentyl)adenine (VIIIa)** was obtained by method A as a side product in a yield of 10%; $R_f$ 0.26 (D), mp 216–217°C dec. (propanol-2). Mass: $m/z$ 295.3 [$M^+$], 296.3 [$M$ + H$^+$]. Calc. $M$ 295.3 ($C_{16}H_{17}N_5O$). NMR spectra: see Tables 1 and 2.

**$N^2$-(2-Methylpropionyl)-9-(5-oxo-5-phenylpentyl)guanine (IXa)** was obtained by method A in a yield of 24%, $R_f$ 0.375 (E), mp 141–142°C (EtOAc–octane). Mass: $m/z$ 381.4 [$M^+$], 382.4 [$M$ + H$^+$]. Calc. $M$ 381.4 ($C_{20}H_{23}N_5O_3$). $^1$H NMR (DMSO-$d_6$): 1.08 (6 H, d, $J$ 6.9, COCH(C$H_3$)$_2$); 1.56 (2 H, m, H3'); 1.82 (2 H, m, H2'); 2.78 (1 H, m, COC$H$(CH$_3$)$_2$); 3.04 (2 H, t, $J$ 7.2, H4'); 4.08 (2 H, t, $J$ 6.9, H1'); 7.47 (2 H, m, $m$-H, Ph); 7.59 (1 H, t, $J$ 7.5, $p$-H, Ph); 7.91 (2 H, d, $J$ 7.5, $o$-H, Ph); 8.00 (1 H, s, H8); 11.91 (2 H, br s, H1 and 2-N$H$). $^{13}$C NMR (DMSO-$d_6$): 18.83 (2 C, COCH($C$H$_3$)$_2$); 20.57 (C3'); 28.92 (C2'); 34.70 (CO$C$H(CH$_3$)$_2$); 37.07 (C4'); 42.95 (C1'); 119.99 (C5); [127.72 (2 C); 128.53 (2 C); 132.94; 136.55] (Ph); 139.55 (C8); 148.14 (C4); 148.70 (C2); 155.21 (C6); 180.11 ($C$OCH(CH$_3$)$_2$); 199.53 (C5').

**$N^2$-(2-Methylpropionyl)-7-(5-oxo-5-phenylpentyl)guanine (Xa)** was obtained by method A in a yield of 28%, $R_f$ 0.575 (E), mp 181–182°C (EtOAc–octane). Mass: $m/z$ 381.4 [$M^+$], 382.4 [$M$ + H$^+$]. Calc. $M$ 381.4 ($C_{20}H_{23}N_5O_3$). $^1$H NMR (DMSO-$d_6$): 1.09 (6 H, d, $J$ 6.8, COCH(C$H_3$)$_2$); 1.52 (2 H, m, H3'); 1.86 (2 H, m, H2'); 2.72 (1 H, m, COC$H$(CH$_3$)$_2$); 3.02 (2 H, t, $J$ 7.2, H4'); 4.30 (2 H, t, $J$ 6.9, H1'); 7.45 (2 H, m, $m$-H, Ph); 7.57 (1 H, t, $J$ 7.5, $p$-H, Ph); 7.89 (2 H, d, $J$ 7.5, $o$-H, Ph); 8.19 (1 H, s, H8); 11.53 (1 H, br s, 2-N$H$); 12.09 (1 H, br s, H1). $^{13}$C NMR (DMSO-$d_6$): 18.79 (2 C, COCH($C$H$_3$)$_2$); 20.18 (C3'); 29.91 (C2'); 34.66 (CO$C$H(CH$_3$)$_2$); 37.07 (C4'); 46.05 (C1'); 111.27 (C5); [127.70 (2 C); 128.52 (2 C); 132.88; 136.59] (Ph); 144.19 (C8); 146.97 (C4); 152.50 (C2); 157.24 (C6); 179.87 ($C$OCH(CH$_3$)$_2$); 199.49 (C5').

**9-(5-Oxo-5-phenylpentyl)guanine (XIa)** was obtained by method C from compound (**IXa**) in a yield of 92%, $R_f$ 0.265 (F), mp >250°C (1 : 1 water–ethanol). Mass: $m/z$ 311.3 [$M^+$], 312.3 [$M$ + H$^+$]. Calc. $M$ 311.3 ($C_{16}H_{17}N_5O_2$). NMR spectra: see Tables 1 and 2.

**7-(5-Oxo-5-phenylpentyl)guanine (XIIa)** was obtained by method C from compound (**Xa**) in a yield of 52%, $R_f$ 0.265 (F), mp >250°C (1 :1 water–ethanol). Mass: $m/z$ 311.3 [$M^+$], 312.3 [$M$ + H$^+$]. Calc. $M$ 311.3 ($C_{16}H_{17}N_5O_2$). NMR spectra: see Tables 1 and 2.

**1-(7-Oxo-7-phenylheptyl)uracil (IIIb)** was obtained by method A in a yield of 59%, $R_f$ 0.2 (B), mp 153–154°C (ethanol). Mass: $m/z$ 300.3 [$M^+$], 301.3 [$M$ + H$^+$]. Calc. $M$ 300.3 ($C_{17}H_{20}N_2O_3$). $^1$H NMR ($CDCl_3$): 1.30–1.80 (8 H, m, H2'–H5'); 2.95 (2 H, t, $J$ 7.2, H6'); 3.70 (2 H, t, $J$ 7.2, H1'); 5.67 (1 H, d, $J$ 7.8, H5); 7.14 (1 H, d, $J$ 7.8, H6); 7.44 (2 H, m, $m$-H, Ph); 7.53 (1 H, t, $J$ 7.2, $p$-H, Ph); 7.93 (2 H, d, $J$ 7.5, $o$-H, Ph); 9.40 (1 H, s, H3). $^{13}$C NMR ($CDCl_3$): 23.85 (C5'); 26.18 (C3'); 28.68 (C2'); 28.77 (C4'); 38.21 (C6'); 48.67 (C1'); 102.07 (C5); [127.96 (2 C); 128.54 (2 C); 132.93; 136.94] (Ph); 144.35 (C6); 150.40 (C2); 163.74 (C4); 200.12 (C7').

**1,3-Bis(7-oxo-7-phenylheptyl)uracil** was obtained by method A as a side product in the synthesis of (**IIIb**) in a yield of 34%, $R_f$ 0.5 (B), oil. Mass: $m/z$ 488.6 [$M^+$], 489.6 [$M$ + H$^+$]. Calc. $M$ 488.6 ($C_{30}H_{36}N_2O_4$). $^1$H NMR ($CDCl_3$): 1.30–1.85 (16 H, m, H2'–H5', H2"–H5"); 2.95 (4 H, m, H6' and H6"); 3.72 (2 H, t, 77.2, H1"); 3.93 (2 H, t, 77.2, H'); 5.69 (1 H, d, $J$ 7.8, H5); 7.09 (1 H, d, $J$ 7.8, H6); 7.45 (4 H, m, $m$-H, Ph); 7.53 (2 H, m, $p$-H, Ph); 7.94 (4 H, d, $J$ 7.2, $o$-H, Ph). $^{13}$C NMR ($CDCl_3$): 23.90 (C5'); 24.18 (C5"); 26.27 (C3'); 26.71 (C3"); 27.39 (C2'); 28.72 (C2"); 28.78 (C4'); 28.96 (C4"); 38.22 (C6'); 38.45 (C6"); 41.08 (C1'); 49.62 (C1"); 101.55 (C5); [127.95 (2 C); 127.98 (2 C); 128.48 (2 C); 128.53 (2 C); 132.74; 132.89; 137.04; 137.15] (Ph); 141.97 (C6); 151.38 (C2); 162.97 (C4); 200.02 (C7'); 200.28 (C7").

**1-(7-Oxo-7-phenylheptyl)thymine (IVb)** was obtained by method A in a yield of 46%, $R_f$ 0.30 (C), mp 113–114°C (EtOAc–octane). Mass: $m/z$ 314.4 [$M^+$], 315.4 [$M$ + H$^+$]. Calc. $M$ 314.4 ($C_{18}H_{22}N_2O_3$). $^1$H NMR ($CDCl_3$): 1.30–1.80 (8 H, m, H2'–H5'); 1.89 (3 H, s, 5-C$H_3$); 2.95 (2 H, t, $J$ 7.2, H6'); 3.67 (2 H, t, $J$ 7.2, H1'); 6.97 (1 H, s, H6); 7.44 (2 H, m, $m$-H, Ph); 7.53 (1 H, t, $J$ 7.2, $p$-H, Ph); 7.93 (2 H, d, $J$ 7.5, $o$-H, Ph); 9.30 (1 H, s, H3). $^{13}$C NMR ($CDCl_3$): 12.22 (5-$C$H$_3$); 23.88 (C5'); 26.20 (C3'); 28.72 (C2'); 28.81 (C4'); 38.23 (C6'); 48.33 (C1'); 110.54 (C5); [127.96 (2 C); 128.54 (2 C); 132.91; 137.05] (Ph); 140.34 (C6); 150.88 (C2); 164.26 (C4); 200.14 (C7').

**1,3-Bis(7-oxo-7-phenylheptyl)thymine** was obtained by method A as a side product in the synthesis of (**IVb**) in a yield of 43% in the synthesis of (**IVb**), $R_f$ 0.71 (C), oil. Mass: $m/z$ 502.6 [$M^+$], 503.6 [$M$ + H$^+$]. Calc. $M$ 502.6 ($C_{31}H_{38}N_2O_4$). $^1$H NMR ($CDCl_3$): 1.31–1.85 (16 H, m, H2'–H5 and H2"–H5"); 1.92 (3 H, s, 5-C$H_3$); 2.97 (4 H, m, H6' and H6"); 3.71 (2 H, t, $J$ 7.2, H1"); 3.95 (2 H, t, $J$ 7.2, H1'); 6.99 (1 H, s, H6); 7.46 (4 H, m, $m$ -H, Ph); 7.54 (2 H, t, $J$ 7.8, $p$-H, Ph); 7.95 (4 H, d, $J$ 7.8, $o$-H, Ph). $^{13}$C NMR ($CDCl_3$): 12.86 (5-$C$H$_3$); 23.83 (C5'); 24.08 (C5"); 26.19 (C3'); 26.65 (C3"); 27.33 (C2'); 28.65 (C2"); 28.75 (C4'); 28.87 (C4"); 38.15 (C6'); 38.37 (C6"); 41.18 (C1'); 49.17 (C1"); 109.51 (C5); [127.85 (2 C); 127.89 (2 C); 128.38 (2 C); 128.44 (2 C); 132.66; 132.80; 136.92;

137.01] (Ph); 138.21 (C6); 151.25 (C2); 163.61 (C4); 199.97 (C7'); 200.21 (C7").

**1-(7-Oxo-7-phenylheptyl)cytosine (Vb)** was obtained by method B in a yield of 38%, $R_f$ 0.33 (G), mp 191–192°C (ethanol). Mass: *m/z* 299.3 [$M^+$], 300.3 [$M$ + $H^+$]. Calc. $M$ 299.3 ($C_{17}H_{21}N_3O_2$). $^1$H NMR (DMSO-$d_6$): 1.22–1.60 (8 H, m, H2'–H5'); 2.98 (2 H, t, $J$ 7.2, H6'); 3.60 (2 H, t, $J$ 7.2, H1'); 5.62 (1 H, d, $J$ 7.2, H5); 6.89 (2 H, 4-N$H_2$); 7.53 (1 H, d, $J$ 7.2, H6); 7.49 (2 H, m, *m*-H, Ph); 7.61 (1 H, t, $J$ 7.2, *p*-H, Ph); 7.94 (2 H, d, $J$ 7.5, *o*-H, Ph). $^{13}$C NMR (DMSO-$d_6$): 23.60 (C5'); 25.72 (C3"); 28.16 (C2'); 28.46 (C4'); 37.70 (C6'); 48.44 (C1'); 92.86 (C5); [127.72 (2 C); 128.56 (2 C); 132.84; 136.69] (Ph); 145.81 (C6); 155.67 (C2); 165.78 (C4); 199.95 (C7').

**9-(7-Oxo-7-phenylheptyl)hypoxantine (VIb)** was obtained by method A in a yield of 35%, $R_f$ 0.28 (D), mp 181–182°C dec. (ethanol). Mass: *m/z* 324.3 [$M^+$], 325.3 [$M$ + $H^+$]. Calc. $M$ 324.3 ($C_{18}H_{20}N_4O_2$). $^1$H NMR (DMSO-$d_6$): 1.21–1.80 (8 H, m, H2'–H5'); 2.96 (2 H, t, $J$ 7.2, H6'); 4.10 (2 H, t, $J$ 7.2, H1'); 7.49 (2 H, m, *m*-H, Ph); 7.60 (1 H, t, $J$ 7.2, *p*-H, Ph); 7.91 (2 H, d, $J$ 7.5, *o*-H, Ph), 8.01 (1 H, H8); 8.08 (1 H, s, H2); 12.27 (2 H, s, 6-O*H*). $^{13}$C NMR (DMSO-$d_6$): 23.30 (C5'); 25.71 (C3'); 27.90 (C2'); 29.38 (C4'); 37.59 (C6'); 43.22 (C1'); [127.36 (2 C); 128.08 (2 C); 132.40; 136.37] (Ph); 123.87 (C5); 139.22 (C8); 145.24 (C2); 154.25 (C4); 156.63 (C6); 199.30 (C7').

**9-(7-Oxo-7-phenylheptyl)hypoxantine (VIIb)** was obtained by method B in a yield of 61%, $R_f$ 0.44 (D), mp 161–162°C dec. (ethanol). Mass: *m/z* 323.4 [$M^+$], 324.4 [$M$ + $H^+$]. Calc. $M$ 323.4 ($C_{18}H_{21}N_5O$). $^1$H NMR (DMSO-$d_6$): 1.2–1.8 (8 H, m, H2'–H5'); 2.95 (2 H, t, $J$ 7.2, H6'); 4.12 (2 H, t, $J$ 7.2, H1'); 7.14 (2 H, C, 6-N$H_2$); 7.49 (2 H, m, *m*-H, Ph); 7.59 (1 H, t, $J$ 7.2, *p*-H, Ph); 7.91 (2 H, d, $J$ 7.5, *o*-H, Ph); 8.12 (1 H, H2); 8.13 (1 H, s, H8). $^{13}$C NMR (DMSO-$d_6$): 23.54 (C5'); 25.78 (C3'); 27.93 (C2'); 29.17 (C4'); 37.67 (C6'); 42.77 (C1'); 118.72 (C5); [127.74 (2 C); 128.59 (2 C); 132.88; 136.67] (Ph); 140.76 (C8); 149.52 (C4); 152.27 (C2); 155.89 (C6); 199.94 (C7').

**3-(7-Oxo-7-phenylheptyl)adenine (VIIIb)** was obtained by method B as a side product in the synthesis of (**VIIb**) in a yield of 84%; $R_f$ 0.20 (D), mp 195–196°C dec. (propanol-2). Mass: *m/z* 323.4 [$M^+$], 324.4 [$M$ + $H^+$]. Calc. $M$ 323.4 ($C_{18}H_{21}N_5O$). $^1$H NMR (DMSO-$d_6$): 1.21–1.92 (8 H, m, H2'–H5'); 2.96 (2 H, t, $J$ 7.2, H6'); 4.28 (2 H, t, $J$ 7.2, H1'); 7.49 (2 H, m, *m*-H, Ph); 7.60 (1 H, t, $J$ 7.2, *p*-H, Ph); 7.76 (1 H, H2); 7.92 (2 H, d, $J$ 7.5, *o*-H, Ph); 7.95 (2 H, s, 6-N$H_2$); 8.34 (1 H, s, H8). $^{13}$C NMR (DMSO-$d_6$): 23.59 (C5'); 25.71 (C3'); 27.96 (C2'); 28.51 (C4'); 37.70 (C6'); 49.32 (C1'); 120.52 (C5); [127.21 (2 C); 128.59 (2 C); 132.73; 136.67] (Ph); 143.21 (C2); 149.83 (C4); 152.51 (C8); 154.89 (C6); 200.03 (C7').

***N*$^2$-(2-Methylpropionyl)-9-(7-oxo-7-phenylheptyl)guanine (IXb)** was obtained by method A in a yield of 18.5%, $R_f$ 0.63(D), mp 140–141°C (EtOAc–octane). Mass: *m/z* 409.5 [$M^+$], 410.5 [$M$ + $H^+$]. Calc. $M$ 409.5 ($C_{22}H_{27}N_5O_3$). $^1$H NMR ($CDCl_3$): 1.18 (6 H, d, $J$ 6.86, COCH(C$H_3$)$_2$); 1.20–1.80 (8 H, m, H2'–H5'); 2.81 (1 H, m, COC$H$(CH$_3$)$_2$); 2.96 (2 H, t, $J$ 7.16, H6'); 3.98 (2 H, t, $J$ 7.16, H1'); 7.43 (2 H, m, *m*-H, Ph); 7.54 (1 H, t, $J$ 7.5, *p*-H, Ph); 7.63 (1 H, s, H8); 7.90 (2 H, d, $J$ 7.16, *o*-H, Ph); 10.19 (1 H, br s, 2-N$H$); 12.13 (1 H, br s, H1). $^{13}$C NMR ($CDCl_3$): 18.94 (2 C, COCH(*C*H$_3$)$_2$); 23.69 (C5'); 25.83 (C3'); 28.09 (C2'); 29.68 (C4'); 36.10 (CO*C*H(CH$_3$)$_2$); 38.21 (C6'); 43.18 (C1'); 120.69 (C5); [127.95 (2 C); 128.61 (2 C); 133.19; 136.94] (Ph); 138.80 (C8); 147.74 (C4); 148.78 (C2); 155.78 (C6); 179.30 (*C*OCH(CH$_3$)$_2$); 201.11 (C7').

***N*$^2$-(2-Methylpropionyl)-7-(7-oxo-7-phenylheptyl)guanine (Xb)** was obtained by method A in a yield of 15.5%, $R_f$ 0.76 (D), oil. Mass: *m/z* 409.5 [$M^+$], 410.5 [$M$ + $H^+$]. Calc. $M$ 409.5 ($C_{22}H_{27}N_5O_3$). $^1$H NMR ($CDCl_3$): 1.18 (6 H, d, $J$ 6.85, COCH(C$H_3$)$_2$); 1.25–1.95 (8 H, m, H2'–H5'); 2.90 (2 H, t, $J$ 7.16, H6'); 2.95 (1 H, m, COC$H$(CH$_3$)$_2$); 4.30 (2 H, t, $J$ 7.16, H1'); 7.40 (2 H, m, *m*-H, Ph); 7.49 (1 H, t, $J$ 7.5, *p*-H, Ph); 7.77 (1 H, s, H8); 7.88 (2 H, d, $J$ 7.16, *o*-H, Ph); 10.75 (1 H, br s, 2-N$H$); 12.35 (1 H, br s, H1). $^{13}$C NMR ($CDCl_3$): 18.94 (2 C, COCH(*C*H$_3$)$_2$); 23.88 (C5'); 26.04 (C3'); 28.53 (C2'); 30.82 (C4'); 35.80 (CO*C*H(CH$_3$)$_2$); 38.17 (C6'); 47.23 (C1'); 112.01 (C5); [127.89 (2 C); 128.45 (2 C); 132.80; 136.93] (Ph); 142.88 (C8); 147.74 (C4); 153.25 (C2); 156.93 (C6); 179.79 (*C*OCH(CH$_3$)$_2$); 200.09 (C7').

**9-(7-Oxo-7-phenylheptyl)guanine (XIb)** was obtained from compound (**IXb**) by method C in a yield of 94%, $R_f$ 0.5 (H), mp 192–193ºC (1 : 1 water–ethanol). Mass: *m/z* 339.4 [$M^+$], 340.4 [$M$ + $H^+$]. Calc. $M$ 339.4 ($C_{18}H_{21}N_5O_2$). $^1$H NMR (DMSO-$d_6$): 1.20–1.71 (8 H, m, H2'–H5'); 2.97 (2 H, t, $J$ 7.16, H6'); 3.90 (2 H, t, $J$ 7.16, H1'); 6.45 (2 H, br s, 2-N$H_2$); 7.49 (2 H, m, *m*-H, Ph); 7.60 (1 H, t, $J$ 7.5, *p*-H, Ph); 7.67 (1 H, s, H8); 7.92 (2 H, d, $J$ 7.16, *o*-H, Ph); 10.58 (1 H, br s, H1). $^{13}$C NMR (DMSO-$d_6$): 23.60 (C5'); 25.80 (CÇ'); 28.01 (C2'); 29.26 (C4'); 37.69 (C6'); 42.52 (C1'); 116.64 (C5); [127.77 (2 C); 128.62 (2 C); 132.93; 136.68] (Ph); 137.37 (C8); 151.11 (C4); 153.41 (C2); 156.79 (C6); 199.99 (C7').

**7-(7-Oxo-7-phenylheptyl)guanine (XIIb)** was obtained from compound (**Xb**) by method C in a yield of 56%, $R_f$ 0.5 (H), mp >250°C (1 : 1 water–ethanol). Mass: *m/z* 339.4 [$M^+$], 340.4 [$M$ + $H^+$]. Calc. $M$ 339.4 ($C_{18}H_{21}N_5O_2$). $^1$H NMR (DMSO-$d_6$): 1.30–1.80 (8 H, m, H2'–H5'); 2.98 (2 H, t, $J$ 7.16, H6'); 4.15 (2 H, t, $J$ 7.16, H1'); 6.09 (2 H, br s, 2-N$H_2$); 7.51 (2 H, m, *m*-H, Ph); 7.62 (1 H, t, $J$ 7.5, *p*-H, Ph); 7.89 (1 H, s, H8); 7.94 (2 H, d, $J$ 7.16, *o*-H, Ph); 10.73 (1 H, br s, H1). $^{13}$C NMR (DMSO-$d_6$): 23.60 (C5'), 25.49 (C3'); 27.97 (C2'); 29.50 (C4'); 37.70 (C6'); 45.93 (C1'); 107.99 (C5); [127.77 (2 C); 128.63 (2 C); 132.92; 137.44] (Ph); 142.96 (C8); 152.62 (C4); 154.48 (C2); 159.96 (C6); 200.00 (C7').

**1-(9-Oxo-9-phenylnonyl)uracil (IIIc)** was obtained by method A in a yield of 29%, $R_f$ 0.63 (C), mp 102–

103°C (EtOAc–heptane). Mass: *m/z* 328.4 [$M^+$], 329.4 [$M$ + $H^+$]. Calc. $M$ 328.4 ($C_{19}H_{24}N_2O_3$). $^1$H NMR ($CD_3CN$): 1.23–1.72 (12 H, m, H2'–H7'); 2.97 (2 H, t, $J$ 7.3, H8'); 3.70 (2 H, t, $J$ 7.2, H1'); 5.56 (1 H, d, $J$ 7.9, H5); 7.35 (1 H, d, $J$ 7.8, H6); 7.48 (2 H, m, *m*-H, Ph); 7.58 (1 H, t, $J$ 7.2, *p*-H, Ph); 7.93 (2 H, d, $J$ 7.5, *o*-H, Ph); 9.65 (1 H, s, H3). $^{13}$C NMR ($CD_3CN$): 24.82 (C7'); 26.75 (C3'); 29.33 (C2'); 29.52 (C6'); 29.62 (C4'); 29.76 (C5'); 39.00 (C8'); 48.93 (C1'); 101.68 (C5); [128.70 (2 C); 129.42 (2 C); 133.69; 138.03] (Ph); 146.42 (C6); 151.91 (C2); 164.93 (C4); 201.49 (C9').

**1,3-Bis-(9-oxo-9-phenylnonyl)uracil** was obtained by method A as a side product in the synthesis of **(IIIc)** in a yield of 29%; $R_f$ 0.90 (C), oil. Mass: *m/z* 544.7 [$M^+$], 545.7 [$M$ + $H^+$]. Calc. $M$ 544.7 ($C_{34}H_{44}N_2O_4$). $^1$H NMR ($CD_3CN$): 1.17–1.70 (24 H, m, H2'–H, H2"–H7"); 2.93 (4 H, t, $J$ 7.32, H8' and H8"); 3.65 (2 H, t, $J$ 7.2, H1");3.80 (2 H, t, $J$ 7.5, H'); 5.59 (1 H, d, $J$ 7.8, H5); 7.30 (1 H, d, $J$ 7.8, H6); 7.45 (4 H, m, *m*-H, Ph);7.55 (2 H, m, *p*-H, Ph); 7.92 (4 H, d, $J$ 7.3, *o*-H, Ph). $^{13}$C NMR ($CD_3CN$): 24.86 (2 C, C7' and C7"); 26.88 (C3'); 27.47 (C3"); 28.14 (C2'); 29.43 (C2"); 29.62 (C4'); 29.73 (C4"); 29.77 (2 C, C6' and C6"); 29.95 (C5'); 29.91 (C5"); 39.06 (2 C, C8' and C8"); 41.47 (C1'); 49.96 (C1"), 101.25 (C5); [128.74 (4 C); 129.45 (4 C); 133.70 (2 C); 138.02 (2 C)] (Ph); 144.21 (C6); 152.25 (C2); 163.95 (C4); 201.21 (2 C, C9' and C9").

**1-(9-oxo-9-phenylnonyl)thymine (IVc)** was obtained by method A in a yield of 27%, $R_f$ 0.62 (C), mp 127°C (EtOAc–heptane). Mass: *m/z* 342.4 [$M^+$], 345.4 [$M$ + $H^+$]. Calc. $M$ 342.4 ($C_{20}H_{26}N_2O_3$). $^1$H NMR ($CD_3CN$): 1.21–1.70 (12 H, m, H2'–H7); 1.81 (3 H, s, 5-C$H_3$); 2.97 (2 H, t, $J$ 7.3, H8'); 3.63 (2 H, t, $J$ 7.2, H1'); 7.19 (1 H, s, H6); 7.48 (2 H, m, *m*-H, Ph); 7.58 (1 H, t, $J$ 7.2, *p*-H, Ph); 7.94 (2 H, d, $J$ 7.5, *o*-H, Ph); 9.33 (1 H, s, H3). $^{13}$C NMR ($CD_3CN$): 12.16 (5-*C*$H_3$); 25.06 (C7'); 26.95 (C7'); 29.53 (C2'); 29.68 (C6'); 29.81 (C4'); 29.90 (C5'); 39.22 (C8'); 48.80 (C1'); 110.37 (C5); [128.87 (2 C); 129.58 (2 C); 133.79; 138.37] (Ph); 142.31 (C6); 152.06 (C2); 165.45 (C4); 201.65 (C9').

**1,3-Bis-(9-oxo-9-phenylnonyl)thymine** was obtained by method A as a side product in the synthesis of **(IVc)** in a yield of 25%, $R_f$ 0.91 (C), oil. Mass: *m/z* 558.7 [$M^+$], 559.7 [$M$ + $H^+$]. Calc. $M$ 558.7 ($C_{35}H_{46}N_2O_4$). $^1$H NMR ($CD_3CN$): 1.22–1.70 (24 H, m, H2'–H7, H2"–H7"); 1.80 (3 H, s, 5-C$H_3$); 2.93 (4 H, t, $J$ 7.32, H8' and H8"); 3.63 (2 H, t, $J$ 7.2, H1"); 3.82 (2 H, t, $J$ 7.16, H1'); 7.17 (1 H, s, H6); 7.45 (4 H, m, *m*-H, Ph); 7.55 (2 H, t, $J$ 7.2, *p*-H, Ph); 7.92 (4 H, d, $J$ 7.6, *o*-H, Ph). $^{13}$C NMR ($CD_3CN$): 12.97 (5-*C*$H_3$); 24.83 (2 C, C7' and C7"); 26.84 (C3'); 27.43 (C3"); 28.15 (C2'); 29.44 (C2"); 29.60 (C4'); 29.69 (C4"); 29.73 (2 C, C6' and C6"); 29.87 (C5'); 29.90 (C5"); 39.03 (2 C, C8' and C8"); 41.64 (C1'); 49.59 (C1"); 109.33 (C5); [128.71 (4 C); 129.42 (4 C); 133.69 (2 C); 137.99 (2 C)] (Ph); 140.19 (C6); 152.12 (C2); 164.52 (C4); 201.23 (2 C, C9' and C9").

**1-(9-Oxo-9-phenylnonyl)cytosine (Vc)** was obtained by method B in a yield of 56%, $R_f$ 0.66 (F), mp 172–173°C (1 : 1 water–ethanol). Mass: *m/z* 327.4 [$M^+$], 328.4 [$M$ + $H^+$]. Calc. $M$ 327.4 ($C_{19}H_{25}N_3O_2$). $^1$H NMR (DMSO-$d_6$): 1.14–1.62 (12 H, m, H2'–H7'); 2.97 (2 H, t, $J$ 7.3, H8'); 3.58 (2 H, t, $J$ 7.2, H1'); 5.62 (1 H, d, $J$ 7.16, H5); 7.00 (2 H, br s, 4-N$H_2$); 7.54 (1H, d, $J$ 7.2, H6); 7.49 (2H, m, *m*-H, Ph); 7.60 (1H, t, $J$ 7.2, *p*-H, Ph); 7.93 (2H, d, $J$ 7.5, *o*-H, Ph). $^{13}$C NMR (DMSO-$d_6$): 23.87 (C7'); 25.99 (C3'); 28.64 (C2'), 28.68 (C6'); 28.75 (C4'); 28.89 (C5'); 37.94 (C8'); 48.67 (C1'); 93.12 (C5); [127.93 (2 C); 128.77 (2 C); 133.10; 136.77] (Ph); 146.09 (C6); 155.94 (C2); 165.95 (C4); 200.26 (C9').

**9-(9-Oxo-9-phenylnonyl)hypoxantine (VIc)** was obtained by method A in a yield of 31%, $R_f$ 0.48 (D), mp 159–160°C (EtOAc–heptane). Mass: *m/z* 352.4 [$M^+$], 353.4 [$M$ + $H^+$]. Calc. $M$ 352.4 ($C_{20}H_{24}N_4O_2$). $^1$H NMR (DMSO-$d_6$): 1.1–1.8 (8 H, m, H2'–H7'); 2.94 (2 H, t, $J$ 7.3, H8'); 4.27 (2 H, t, $J$ 6.8, H1'); 7.47 (2 H, m, *m*-H, Ph); 7.58 (1 H, t, $J$ 7.2, *p*-H, Ph); 7.91 (2 H, d, $J$ 7.5, *o*-H, Ph), 7.95 (1 H, H8); 8.22 (1 H, s, H2); 12.27 (2 H, s, 6-O*H*). $^{13}$C NMR (DMSO-$d_6$): 23.74 (C7'); 25.60 (C3'); 28.31 (C2'); 28.50 (C6'); 28.69 (C4'); 30.62 (C5'); 37.82 (C8'); 46.33 (C1'); [127.79 (2 C); 128.61 (2 C); 132.92; 136.70] (Ph); 123.87 (C5); 140.23 (C8); 143.78 (C2); 144.39 (C4); 154.28 (C6); 200.00 (C9').

**9-(9-Oxo-9-phenylnonyl)adenine (VIIc)** was obtained by method A in a yield of 56%, $R_f$ 0.57 (D), mp 165–166°C (ethanol). Mass: *m/z* 351.4 [$M^+$], 352.4 [$M$ + $H^+$]. Calc. $M$ 351.4 ($C_{20}H_{25}N_5O$). $^1$H NMR (DMSO-$d_6$): 1.22–1.83 (12 H, m, H2'–H7'); 2.94 (2 H, t, $J$ 7.3, H8'); 4.11 (2 H, t, $J$ 7.2, H1'); 7.09 (2 H, s, 6-N$H_2$); 7.48 (2 H, m, *m*-H, Ph); 7.59 (1 H, t, $J$ 7.2, *p*-H, Ph); 7.92 (2 H, d, $J$ 7.5, *o*-H, Ph); 8.10 (1 H, H2); 8.12 (1 H, s, H8). $^{13}$C NMR (DMSO-$d_6$): 23.67(C7'); 25.81 (C3'); 28.17 (C2'); 28.38 (C6'); 28.55 (C4'); 29.19 (C5'); 37.74 (C8'); 42.76 (C1'); 118.71 (C5); [127.69 (2 C); 128.52 (2 C); 132.78; 136.71] (Ph); 140.69 (C8); 149.50 (C4); 152.22 (C2); 155.84 (C6); 199.97 (C9').

**3-(9-Oxo-9-phenylnonyl)adenine (VIIIc)** was obtained by method C in a yield of 3.7%, $R_f$ 0.29 (D), mp 151–152°C (ethanol). Mass: *m/z* 351.4 [$M^+$], 352.4 [$M$ + $H^+$]. Calc. $M$ 351.4($C_{20}H_{25}N_5O$). $^1$H NMR (DMSO-$d_6$): 1.22–1.91 (12 H, m, H2'–H7'); 2.96 (2 H, t, $J$ 7.2, H8'); 4.27 (2 H, t, $J$ 7.2, H1'); 7.48 (2 H, m, *m*-H, Ph); 7.59 (1 H, t, $J$ 7.2, *p*-H, Ph); 7.76 (1 H, H2); 7.93 (2 H, d, $J$ 7.5, *o*-H, Ph); 7.93 (2 H, s, 6-N$H_2$); 8.34 (1 H, s, H8). $^{13}$C NMR (DMSO-$d_6$): 23.74 (C7'); 25.77 (C3'); 28.33 (C2'); 28.48 (C6'); 28.58 (C4'); 28.66 (C5'); 37.81 (C8'); 49.31 (C1'); 120.47 (C5); [127.80 (2 C); 128.63 (2 C); 132.93; 136.72] (Ph); 143.26 (C2); 149.68 (C4); 152.45 (C8); 154.92 (C6); 200.08 (C9').

***N*²-(2-Methylpropionyl)-9-(9-oxo-9-phenylnonyl)guanine (IXc)** was obtained by method A in a yield of 26%, $R_f$ 0.25 (B), mp 114–115°C (EtOAc–octane). Mass: *m/z* 437.5 [$M^+$], 438.5 [$M + H^+$]. Calc. *M* 437.5 ($C_{24}H_{31}N_5O_3$). $^1$H NMR (DMSO-$d_6$): 1.09 (6 H, d, *J* 6.9, COCH(C*H*$_3$)$_2$); 1.20–1.80 (12 H, m, H2'–H7'); 2.76 (1 H, m, COC*H*(CH$_3$)$_2$); 2.95 (2 H, t, *J* 7.2, H8'); 4.02 (2 H, t, *J* 7.16, H1'); 7.48 (2 H, m, *m*-H, Ph); 7.59 (1 H, t, *J* 7.5, *p*-H, Ph); 7.91 (2 H, d, *J* 7.5, *o*-H, Ph); 7.98 (1 H, s, H8); 11.63 (1 H, s, 2-N*H*); 12.05 (1 H, s, H1). $^{13}$C NMR (DMSO-$d_6$): 18.79 (2C, COCH(*C*H$_3$)$_2$); 23.71 (C7'); 25.87 (C3'); 28.31 (C2'); 28.45 (C6'); 28.68 (C4'); 29.38 (C5'); 34.62 (CO*C*H(CH$_3$)$_2$); 37.78 (C8'); 43.17 (C1'); 120.05 (C5); [127.75 (2 C); 128.59 (2 C); 132.90; 136.69] (Ph); 139.70 (C8); 147.71 (C4); 148.55 (C2); 154.87 (C6); 180.08 (*C*OCH(CH$_3$)$_2$); 199.99 (C9').

***N*²-(2-Methylpropionyl)-7-(9-oxo-9-phenylnonyl)guanine (Xc)** was obtained by method A in a yield of 37%, $R_f$ 0.44 (B), oil. Mass: *m/z* 437.5 [$M^+$], 438.5 [$M + H^+$]. Calc. *M* 437.5 ($C_{24}H_{31}N_5O_3$). $^1$H NMR (DMSO-$d_6$): 1.10 (6 H, d, *J* 6.86, COCH(C*H*$_3$)$_2$); 1.22–1.84 (12 H, m, H2'–H7'); 2.73 (1 H, m, COC*H*(CH$_3$)$_2$); 2.98 (2 H, t, *J* 7.16, H8'); 4.24 (2 H, t, *J* 7.16, H1'); 7.49 (2H, m, *m*-H,Ph); 7.60 (l H, t, *J* 7.16, *p*-H, Ph); 7.93 (2H, d, *J* 7.16, *o*-H, Ph); 7.92 (1 H, s, H8); 11.55 (1 H, s, 2-N*H*); 12.08 (1 H, s, H1). $^{13}$C NMR (DMSO-$d_6$): 18.80 (2 C, COCH(*C*H$_3$)$_2$); 23.71 (C7'); 25.51 (C3'); 28.24 (C2'); 28.44 (C6'); 28.62 (C4'); 30.38 (C5'); 34.65 (CO*C*H(CH$_3$)$_2$); 37.78 (C8'); 46.23 (C1'); 111.25 (C5); [127.77 (2 C); 128.60 (2 C); 132.89; 136.71] (Ph); 144.15 (C8); 147.71 (C4); 146.94 (C2); 152.50 (C6); 179.87 (*C*OCH(CH$_3$)$_2$); 200.01 (C9').

**9-(9-Oxo-9-phenylnonyl)guanine (XIc)** was obtained from compound (**IXc**) by method C in a yield of 82%, $R_f$ 0.3 (D), mp 202–203°C (ethanol). Mass: *m/z* 367.4 [$M^+$], 368.4 [$M + H^+$]. Calc. *M* 367.4 ($C_{20}H_{25}N_5O_2$). $^1$H NMR (DMSO-$d_6$): 1.20–1.81 (12 H, m, H2'–H7'); 2.97 (2 H, t, *J* 7.16, H8'); 3.89 (2 H, t, *J* 7.16, H1'); 6.44 (2 H, br s, 2-N*H*$_2$); 7.49 (2 H, m, *m*-H, Ph); 7.60 (1 H, t, *J* 7.5, *p*-H, Ph); 7.67 (1 H, s, H8); 7.93 (2 H, d, *J* 7.16, *o*-H, Ph); 10.52 (1 H, br s, H1). $^{13}$C NMR (DMSO-$d_6$): 23.74 (C7'); 25.90 (C3'); 28.34 (C2'); 28.48 (C6'); 28.70 (C4'); 29.34 (C5'); 37.81 (C8'); 42.58 (C1'); 116.56 (C5); [127.79 (2 C); 128.63 (2 C); 132.93; 136.71] (Ph); 137.40 (C8); 151.11 (C4); 153.41 (C2); 156.81 (C6); 200.08 (C7').

**7-(9-Oxo-9-phenylnonyl)guanine (XIIc)** was obtained from compound (**Xc**) by method C in a yield of 50%, $R_f$ 0.35 (D), mp >250°C (ethanol). Mass: *m/z* 367.4 [$M^+$], 368.4 [$M + H^+$]. Calc. *M* 367.4 ($C_{20}H_{25}N_5O_2$). $^1$H NMR (DMSO-$d_6$): 1.23–1.81 (12 H, m, H2'–H7'); 2.98 (2 H, t, *J* 7.16, H8'); 4.13 (2 H, t, *J* 7.16, H1'); 6.11 (2 H, br s, 2-N*H*$_2$); 7.50 (2 H, m, *m*-H, Ph); 7.61 (1 H, t, *J* 7.5, *p*-H, Ph); 7.88 (1 H, s, H8); 7.94 (2 H, d, *J* 7.16, *o*-H, Ph); 10.73 (1 H, br s, H1). $^{13}$C NMR (DMSO-$d_6$): 23.74 (C7'); 25.62 (C3'); 28.41 (C2'); 28.52 (C6'); 28.84(C4'); 30.37 (C5'); 37.89 (C8'); 46.04 (C1'); 108.46 (C5); [127.91 (2 C); 128.72 (2 C); 132.93; 136.71] (Ph); 143.11 (C8); 152.72 (C4); 153.51 (C2); 159.41 (C6); 200.21 (C7').

**Reduction of (IIIb)–(VIIb) carbonyl groups (method D).** Sodium borohydride (0.12 g) was added to a solution of the starting phenone (2 mmol) in a mixture of ethanol (25 ml) and water (5 ml). The reaction mixture was heated to reflux under stirring and then cooled to room temperature under stirring. The procedure was repeated. After the reaction was completed (TLC control), the solvents were evaporated and the residue was reevaporated with ethanol (3 × 20 ml). Ethanol (30 ml) was added to the residue, the mixture was heated to reflux, and silica gel (10 g) was added. Ethanol was evaporated and the silica gel with absorbed compound (**V**) was transferred onto a silica gel column (50 g, 5 × 8 cm), chromatographed, and eluted in a gradient of ethanol in chloroform (0 → 30%). The target fractions were combined and evaporated.

**1-(7-Hydroxy-7-phenylheptyl)uracil (IIId)** was obtained by method D in a yield of 89%, $R_f$ 0.58 (E), oil. Mass: *m/z* 302.4 [$M^+$], 303.4 [$M + H^+$]. Calc. *M* 302.4 ($C_{17}H_{22}N_2O_3$). $^1$H NMR (DMSO-$d_6$): 1.14-1.62 (10 H, m, H2'–H6'); 3.60 (2 H, t, *J* 7.2, H1'); 4.47 (1 H, m, H7'); 5.09 (1 H, d, *J* 4.4, 7'-O*H*); 5.51 (1 H, d, *J* 7.8, H5); 7.18 (1 H, m, *m*-H, Ph); 7.28 (4 H, m, *o*-H, Ph and *m*-H, Ph); 7.60 (1 H, d, *J* 7.8, H6); 11.19 (1 H, s, H3). $^{13}$C NMR (DMSO-$d_6$): 25.15 (C5'); 25.75 (C3'); 28.34 (C2'); 28.52 (C4'); 39.16 (C6'); 47.39 (C1'); 72.22 (C7'), 100.69 (C5); [125.74 (2 C); 126.47; 127.85 (2 C); 146.39] (Ph); 145.63 (C6); 150.87 (C2); 163.69 (C4).

**1-(7-Hydroxy-7-phenylheptyl)thymine (IVd)** was obtained by method D in a yield of 95%, $R_f$ 0.67 (A), oil. Mass: *m/z* 316.4 [$M^+$], 317.4 [$M + H^+$]. Calc. *M* 316.4 ($C_{18}H_{24}N_2O_3$). $^1$H NMR (DMSO-$d_6$): 1.15–1.60 (10 H, m, H2'–H6'); 1.74 (3 H, s, 5-C*H*$_3$); 3.58 (2 H, t, *J* 7.2, H1'); 4.03 (1 H, m, H7'); 7.18(1 H, m, *p*-H, Ph); 7.29 (4 H, m, *o*-H, Ph and *m*-H, Ph); 7.51 (1 H, d, *J* 7.8, H6); 11.13 (1 H, s, H3). $^{13}$C NMR (DMSO-$d_6$): 11.75 (5-*C*H$_3$); 25.06 (C5'); 25.69 (C3'); 28.30 (C2'); 28.45 (C4'); 39.66 (C6'); 47.01 (C1'); 72.10 (C7'); 108.24 (C5); [125.68 (2 C); 126.38; 127.77 (2 C); 146.36] (Ph); 141.35 (C6); 150.76 (C2); 164.16 (C4).

**1-(7-Hydroxy-7-phenylheptyl)cytosine (Vd)** was obtained by method D in a yield of 97%, $R_f$ 0.36 (I), oil. Mass: *m/z* 301.4 [$M^+$], 302.4 [$M + H^+$]. Calc. *M* 301.4 ($C_{17}H_{23}N_3O_2$). $^1$H NMR (DMSO-$d_6$): 1.14–1.60 (10 H, m, H2'–H6'); 3.70 (2 H, t, *J* 6.6, H1'); 4.46 (1 H, m, H7'); 5.09 (1 H, d, *J* 4.4, 7'-O*H*); 5.51 (1 H, d, *J* 7.8, H5); 5.64 (1 H, d, *J* 7.2, H5); 6.93 (2 H, s, 4-N*H*$_2$); 7.17 (1 H, m, *p*-H, Ph); 7.28 (4 H, m, *o*-H, Ph and *m*-H, Ph); 7.54 (1 H, d, *J* 7.2, H6). $^{13}$C NMR (DMSO-$d_6$): 25.08 (C5'); 25.60 (C3'); 27.96 (C2'); 28.48 (C4'); 39.12 (C6'); 48.78 (C1'); 72.12 (C7'); 93.04 (C5); [125.72 (2 C); 126.43; 127.81 (2 C); 146.36] (Ph); 147.26 (C6); 149.63 (C2); 159.93 (C4).

**9-(7-Hydroxy-7-phenylheptyl)hypoxanthine (VId)** was obtained by method D in a yield of 80%, $R_f$ 0.57 (D), oil. Mass: *m/z* 326.4 [$M^+$], 327.4 [$M + H^+$]. Calc. *M* 326.4 ($C_{18}H_{22}N_4O_2$). $^1$H NMR (DMSO-$d_6$): 1.16–1.77 (10 H, m, H2'–H6'); 4.10 (2 H, t, *J* 7.2, H1'); 4.44 (1 H, m, H7'); 5.08 (1 H, d, *J* 3.7, 7'-O*H*); 7.18 (1 H, m, *p*-H, Ph); 7.26 (4 H, m, *o*-H, Ph and *m*-H, Ph); 8.00 (1 H, H8); 8.06 (1 H, s, H2); 12.22 (2 H, s, 6-O*H*). $^{13}$C NMR (DMSO-$d_6$): 25.03 (C5'); 25.81 (C3'); 28.23 (C2'); 29.38 (C4'); 39.05 (C6'); 43.19 (C1'); 72.15 (C7'); 123.88 (C5); [125.68 (2 C); 126.43; 127.80 (2 C); 146.33] (Ph); 140.18 (C8); 145.25 (C2); 154.20 (C4); 156.58 (C6).

**9-(7-Hydroxy-7-phenylheptyl)adenine (VIId)** was obtained by method D in a yield of 81%, $R_f$ 0.46 (F), oil. Mass: *m/z* 325.4 [$M^+$], 326.4 [$M + H^+$]. Calc. *M* 325.4 $C_{18}H_{23}N_5O$. $^1$H NMR ($CDCl_3$): 1.19–1.82 (10 H, m, H2'–H6'); 3.80 (1 H, br s, 7'-O*H*); 4.07 (2 H, t, *J* 7.2, H1'); 4.61 (1 H, m, H7'); 6.39 (2 H, s, 6-N$H_2$); 7.20 (1 H, m, *p*-H, Ph); 7.28 (4 H, m, *o*-H, Ph and *m*-H, Ph); 7.63 (1 H, H2); 8.22 (1 H, s, H8). $^{13}$C NMR ($CDCl_3$): 25.46 (C5'); 26.38 (C3'); 28.77 (C2'); 29.79 (C4'); 38.87 (C6'); 43.76 (C1'); 74.03 (C7'); 119.35 (C5); [125.84 (2 C); 127.25; 128.27 (2 C); 145.13] (Ph); 140.14 (C8); 149.84 (C4); 152.72 (C2); 155.58 (C6).

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