

This article was downloaded by:

On: 26 January 2011

Access details: Access Details: Free Access

Publisher Taylor & Francis

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



Nucleosides, Nucleotides and Nucleic Acids

Publication details, including instructions for authors and subscription information:

<http://www.informaworld.com/smpp/title~content=t713597286>

Synthesis and Conformational Properties of *O*- β -D-Ribofuranosyl-(1''-2')-guanosine and (Adenosine)-5''-phosphate

Ekaterina V. Efimtseva^a; Alexandra A. Shelkunova^a; Sergey N. Mikhailov^a; Koen Nauwelaerts^b; Jef Rozenski^b; Eveline Lescrinier^b; Piet Herdewijn^b

^a Engelhardt Institute of Molecular Biology, Russian Academy of Sciences, Moscow, Russia ^b Rega Institute, Katholieke Universiteit Leuven, Leuven, Belgium

Online publication date: 09 August 2003

To cite this Article Efimtseva, Ekaterina V. , Shelkunova, Alexandra A. , Mikhailov, Sergey N. , Nauwelaerts, Koen , Rozenski, Jef , Lescrinier, Eveline and Herdewijn, Piet(2003) 'Synthesis and Conformational Properties of *O*- β -D-Ribofuranosyl-(1''-2')-guanosine and (Adenosine)-5''-phosphate', *Nucleosides, Nucleotides and Nucleic Acids*, 22: 5, 1109 – 1111

To link to this Article: DOI: 10.1081/NCN-120022748

URL: <http://dx.doi.org/10.1081/NCN-120022748>

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: <http://www.informaworld.com/terms-and-conditions-of-access.pdf>

This article may be used for research, teaching and private study purposes. Any substantial or systematic reproduction, re-distribution, re-selling, loan or sub-licensing, systematic supply or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

Synthesis and Conformational Properties of *O*- β -D-Ribofuranosyl-(1''-2')-guanosine and (Adenosine)-5''-phosphate

Ekaterina V. Efimtseva,^{1,*} Alexandra A. Shelkunova,¹
Sergey N. Mikhailov,¹ Koen Nauwelaerts,²
Jef Rozenski,² Eveline Lescrinier,²
and Piet Herdewijn²

¹Engelhardt Institute of Molecular Biology, Russian Academy of Sciences,
Moscow, Russia

²Rega Institute, Katholieke Universiteit Leuven, Leuven, Belgium

ABSTRACT

The efficient synthesis of Grp and Arp, minor tRNA components, has been developed.

Key Words: Minor tRNA components; Chemical synthesis; Phosphorylation.

Nucleic acids consist of over 100 modified nucleosides, in addition to 8 major ribo- and deoxyribonucleosides. Although a few modifications have been found in DNA, 81 modified nucleosides were found in tRNA's and 15 were found in other

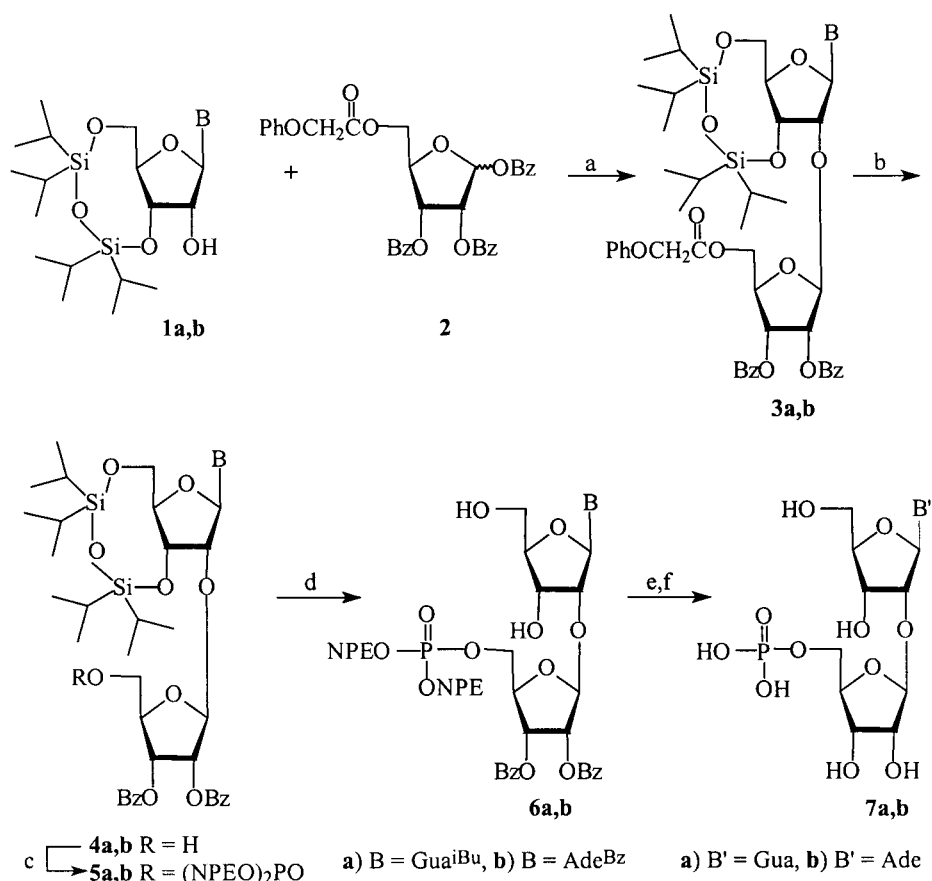
*Correspondence: Ekaterina V. Efimtseva, Engelhardt Institute of Molecular Biology, Russian Academy of Sciences, Vavilov str. 32, 119991 Moscow, Russia; Fax: +7 095 135 1405; E-mail: smikh@imb.ac.ru.



RNA's. Most of the minor ribonucleosides have modified heterocyclic bases. Only two types of sugar-modified nucleosides were found in RNA, namely 2'-*O*-methyl and 2'-*O*- β -D-ribofuranosyl derivatives. The last derivatives, Grp and Arp (**7a,b**), were isolated from initiator tRNAs of yeasts.^[1]

The selective blocking of five hydroxyl groups in 2'-*O*- β -D-ribofuranosyl nucleosides is an essential strategy in the preparation of the title compounds. Condensation of **2** with **1a,b** according to the earlier developed method^[2] gave fully protected **3a,b**. Selective deblocking of phenoxyacetyl group was achieved in 0.1 M K₂CO₃ in MeOH. The overall yields for the preparation of **4a,b** were 46% and 38%, respectively, higher than the earlier preparation of **4b** (26%).^[3] Further phosphorylation gave **5a,b**, after complete deblocking **7a,b** were prepared in high overall yield (18–20%).^[4]

According to the NMR studies and molecular modeling these molecules are rather flexible and show free rotation around the *O*- and *N*-glycosidic bonds.



a. SnCl₄/ClCH₂CH₂Cl, 0°C; b. 0.1 M K₂CO₃ in MeOH; c. bis(p-nitrophenylethyl)-phosphate/TPSCI/1-methylimidazole/Py; d. Bu₄NF/THF; e. DBU/Py; f. NH₃/MeOH.

ACKNOWLEDGMENT

Authors thank KUL Research Council and RFBR for financial support.

REFERENCES

1. Rozenski, J.; Crain, P.F.; McCloskey, J.A. The RNA modification database: 1999 update. *Nucl. Acids Res.* **1999**, *27*, 196–197.
2. Mikhailov, S.N.; Efimtseva, E.V.; Gurskaya, G.V.; Zavodnik, V.E.; De Bruyn, A.; Rozenski, J.; Herdewijn, P. An efficient synthesis and physico-chemical properties of 2'-*O*-β-D-ribofuranosyl-nucleosides, minor tRNA components. *J. Carbohydr. Chem.* **1997**, *16*, 75–92.
3. Rodionov, A.A.; Efimtseva, E.V.; Mikhailov, S.N.; Rozenski, J.; Luyten, I.; Herdewijn, P. Synthesis and properties of *O*-β-D-ribofuranosyl-(1''-2')-adenosine-5''-*O*-phosphate and its derivatives. *Nucleosides, Nucleotides and Nucleic Acids* **2000**, *19*, 1847–1859.
4. Efimtseva, E.V.; Shelkunova, A.A.; Mikhailov, S.N.; Nauwelaerts, K.; Rozenski, J.; Lescrinier, E.; Herdewijn, P. Synthesis and properties of *O*-β-D-ribofuranosyl-(1''-2')-guanosine-5''-*O*-phosphate and its derivatives. *Helv. Chim. Acta* **2003**, *86*, 504–511.



