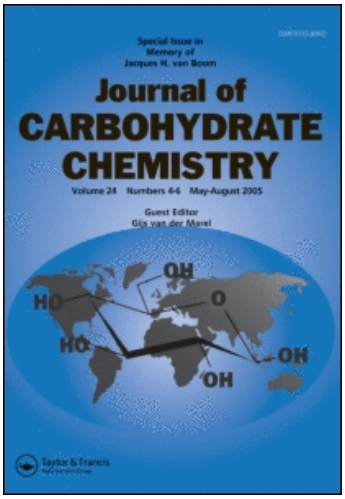

Journal of Carbohydrate Chemistry
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713617200

Unambiguous Assignment of the Stereochemistry at the Anomeric Carbon in Methyl-α-D-*C*-Aryl-glucopyranoside Derivative: A Representative of Products from our New Strategy for 2-Deoxy-*C*-aryl-glucopyranosides

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To cite this Article Mahalingam, Sakkarapalayam M. , Vijayasaradhi, Sivalenka , Aidhen, Indrapal Singh and Varghese, Babu(2005) 'Unambiguous Assignment of the Stereochemistry at the Anomeric Carbon in Methyl-α-D-*C*-Aryl-glucopyranoside Derivative: A Representative of Products from our New Strategy for 2-Deoxy-*C*-aryl-glucopyranosides', Journal of Carbohydrate Chemistry, 24: 3, 321 — 325
To link to this Article: DOI: 10.1081/CAR-200063680
URL: http://dx.doi.org/10.1081/CAR-200063680

Journal of Carbohydrate Chemistry, 24:321–325, 2005

ISSN: 0732-8303 print 1532-2327 online
DOI: 10.1081/CAR-200063680

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The X-ray study firmly establishes the stereochemistry at the anomeric carbon in methyl-α-D-*C*-aryl-glucopyranoside derivative.

2-Deoxy glycosides are important structural units in many natural products, including antitumor drugs, antibiotics active against Gram-positive bacteria,

Received November 17, 2004; accepted April 11, 2005
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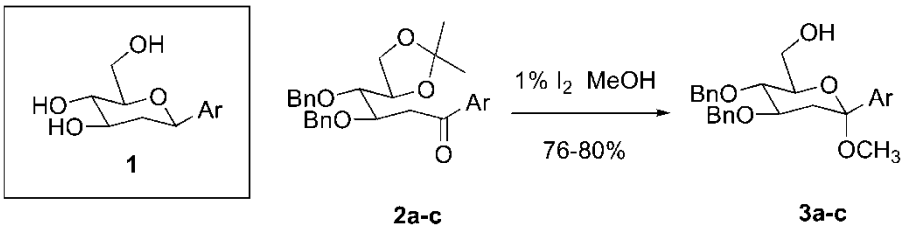
and antibiotics inhibiting platelet aggregation. The class 2-deoxy-C-aryl glycosides, in particular, constitutes a common structural feature of several groups of antitumor antibiotics such as angucyclines,[1] pluramycin,[2] gilvocarcins,[3] and vineomycins.[4] Hence, they have become a vital subject of synthetic interest to practicing carbohydrate chemists and also drew our attention.

Recently[5] we had reported the results obtained while executing a new strategy to arrive at 2-deoxy-C-aryl-glucopyranoside skeleton **1**. The strategy was based on the umpolung concept to arrive at the aryl ketones **2a–c** and its subsequent cyclization under 1% I_2 in methanol to furnish methyl-α-D-*C*-aryl-glucopyranoside derivatives **3a–c**.



a: Ar = phenyl
b: Ar = 4-chlorophenyl
c: Ar = 3,4,5-trimethoxyphenyl

Unambiguous assignments of all the proton signals in compound **3a** were performed by DQF-COSY experiment. All the carbons in the molecule were correlated with certainty to the proton signals by performing HMQC experiments. A further ROESY correlation revealed an Overhauser enhancement peak for O-CH_3-C(1)/H-C(3) and O-CH_3-C(1)/H-C(5), clearly placing all these substituents on the same side of the ring. Since OCH_3 is located α, the orientation of the aryl moiety was inferred to be β. Fortunately, one of the products **3b** crystallized well to furnish X-ray-suitable crystals for further confirmation of our deduction. Presented herein are the results of the X-ray crystallographic studies.

The six-membered ring C(15)-C(16)-C(17)-O(3)-C(18)-C(19) is a near perfect chair with asymmetry parameters[6] $\Delta Cs = 3.0(3)^\circ$, $\Delta C_2 = 4.3(3)^\circ$. The inset with the stereochemically fixed hydrogen atoms at C(15) and C(18) clearly indicate the parallelness of OCH_3 at C(17). This is in accordance with the observed nuclear Overhauser experiments results.[5] The present X-ray studies firmly establish the orientation of aryl ring as β. Summary of the crystal data is presented in Table 1. To conclude, the X-ray data presented herein firmly establishes that our strategy furnishes exclusive obtainment of β-aryl glucopyranoside derivatives (Figure 1).

Table 1: Summary of crystal data and data collection parameters for methyl 3,4-di-*O*-benzyl-1-*C*-(4-chlorophenyl)-2-deoxy-*β*-*D*-*arabino*-hexopyranoside (**3b**).

Chemical formula	$C_{27}H_{29}$ Cl O_5
Formula weight	468.95
Crystal system	Monoclinic
Space groups	$P2_1$
Unit cell dimensions	
a (Å)	9.837 (3)
b (Å)	13.8906 (15)
c (Å)	9.889 (3)
β (°)	117.46 (2)
V (Å)^3	1199.1 (5)
Z	2
D_{calcd} (mg m^{-3})	1.299
Absorption coefficient μ (mm^{-1})	1.702
F(000)	496
Index ranges	$-11 \leq h \leq 10$, $0 \leq k \leq 16$, $0 \leq l \leq 11$
Crystal size (mm)	$0.3 \times 0.2 \times 0.2$
Measured data	2416
Unique data	2281
Parameters	308
Restraints	1
R (all data)	0.0305
wR_2	0.0829
Goodness-of-fit	1.073
Mean and maximum shift/esd	0.000–0.000
Maximum and minimum difference electron density (e Å^{-3})	0.136 and −0.123

X-RAY DIFFRACTION ANALYSIS OF COMPOUND 3b

X-ray diffraction data for compound **3b** were collected on a Nonius CAD-4 diffractometer equipped with graphite monochromated Mo-Kα radiations. Unit cell parameters and orientation matrix were obtained using 25 reflections collected by random search routine from different zones and indexed by method of short vectors followed by least-squares refinement. The intensity data were collected by ω-2θ scan technique at 293°K. Structure was solved by direct method technique using SIR92 (WINGX)[8] program. The non hydrogen atoms were anisotropically refined. Hydrogen atoms were fixed at geometrically meaningful positions and were given riding model refinement. Full-matrix least-squares refinement using F^2 was continued until maximum shift/esd converged to zero. SHELXL97 (WINGX)[9] program was used for refinement.

The X-ray diffraction data of compound **3b** are deposited in Cambridge Crystallographic Data Centre (12, Union Road, Cambridge, CB2 1EZ, UK) and the data deposition number is CCDC 267230.

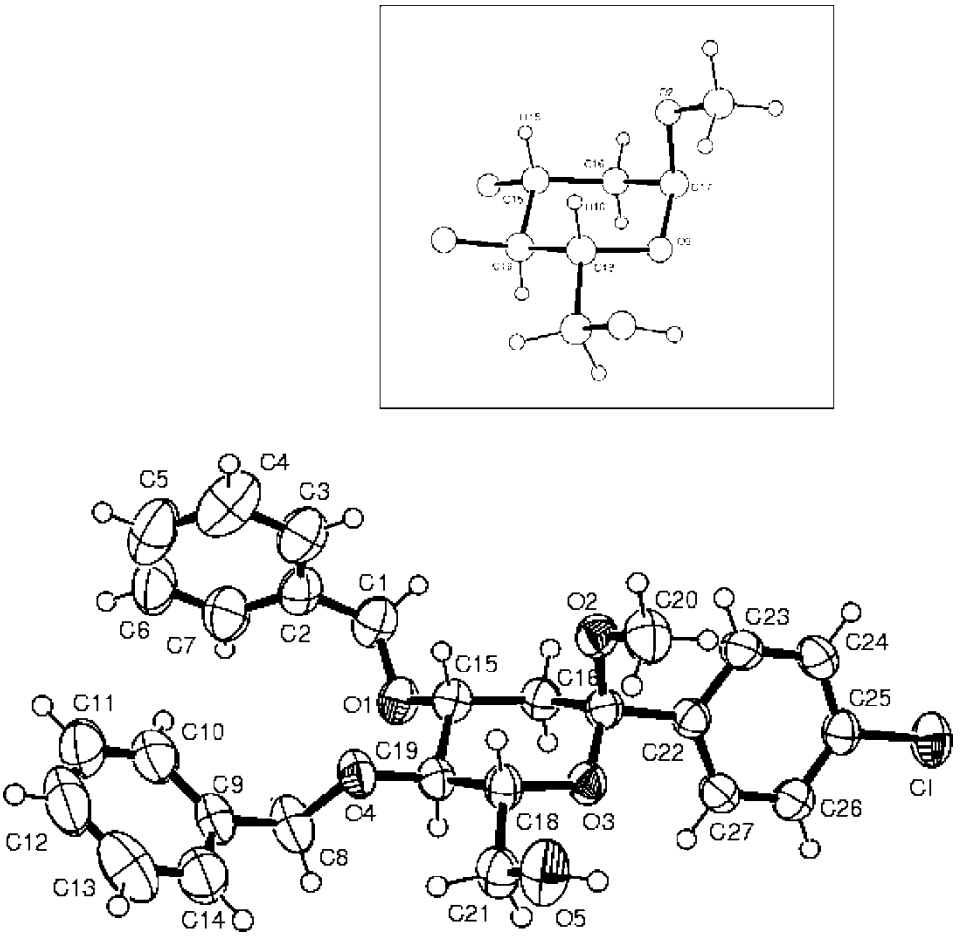


Figure 1: ORTEP plot[7] of the molecule with thermal ellipsoids drawn at 40% probability level.

ACKNOWLEDGMENTS

SMM is thankful to IIT-Madras, for Fellowship. We thank DST, New Delhi, for funding of the project. Funding provided by the Department of Science and Technology, New Delhi, for the 400 MHz NMR machine under IRPHA scheme and ESI-MS facility under the FIST program is also gratefully acknowledged. Sophisticated Analytical Instrumentation Facility (SAIF), IIT Madras, is particularly acknowledged for X-ray facility.

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