Synthesis of Heterocyclic *C*-Glycosyl Compounds by 1,3-Dipolar Cycloaddition of Diazomethane to Acetylenic-Carbohydrate Derivatives (1)

M. T. García-López, G. García-Muñoz and R. Madroñero

Instituto de Química Orgánica General, Departamento de Química Médica
Juan de la Cierva, 3, Madrid-6, Spain

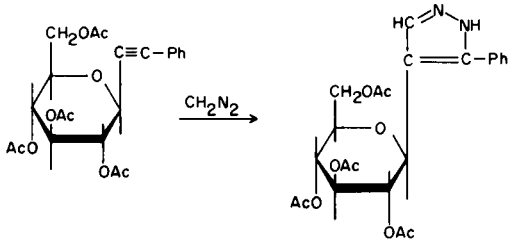
Received December 12, 1970 – Revised April 6, 1971

Sir:

In the recent years there has been an increased interest in the synthesis of heterocyclic *C*-glycosyl compounds (2,3,4,5) as a consequence of the biological activity of several natural *C*-nucleosides, such as showdomycin (6,7), formycin (8) and pyrazomycin (9).

We wish to report a synthetic approach to *C*-glycosyl compounds starting from acetylenic-sugar derivatives, having the acetylenic group attached to the anomeric carbon atom.

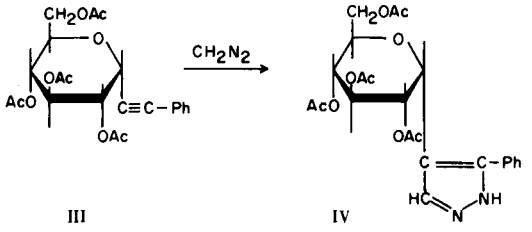
Treatment of 1-phenyl-2-(2,3,4,6-tetra-*O*-acetyl-β-D-glucopyranosyl)acetylene (I) (10) in ether with a ethereal solution of diazomethane, furnished after seven days at room temperature a pyrazole derivative II (11) in 72% yield (90% yield based on the recovered I), m.p. 129-130° (ethyl acetate-cyclohexane); $[\alpha]_D$ + 4° (c, 0.41, chloroform); U.V. λ max (ethanol), 240 mμ (ε, 11,232).



I II

The structure of II was ascertained by permanganate oxidation to give 3(5)-phenylpyrazole-4-carboxylic acid which on decarboxylation afforded 3(5)-phenylpyrazole, identical with a sample obtained from the reaction of phenylacetylene and diazomethane (12).

On the other hand, the treatment in the same experimental conditions as above of 1-phenyl-2-(2,3,4,6-tetra-*O*-acetyl-α-D-glucopyranosyl)acetylene (III), m.p. 104-105° (from benzene-cyclohexane) $[\alpha]_D$ + 211° (c, 0.62, chloroform) obtained by thick-layer chromatography (silica gel PF_{254}, Merck, 2 mm thickness, petroleum ether-ethyl acetate 2:1; four developments) from the mother liquor left from crystallization of I, furnished the pyrazole derivative IV, in 59% yield, m.p. 78-80° (ethanol-water); $[\alpha]_D$ + 115.8° (c, 1.41, chloroform); U.V. λ max 242 mμ (ε, 10,220).



III IV

The anomeric assignments of the two acetylenic carbohydrates and of the pyrazole derivatives are based so far on the values of their specific rotations. This point and the synthesis of other heterocyclic *C*-glycosyl derivatives by 1,3-dipolar cycloaddition reactions to acetylenic sugars are under investigation in our laboratory.

REFERENCES

(1) This investigation was supported by a research grant from the Fondo Nacional para el Fomento de la Investigación.

(2) M. Bobek, J. Farkaš and F. Šorm, *Tetrahedron Letters*, 4611 (1970).

(3) J. M. J. Tronchet, A. Jotterand and N. Le Hong, *Helv. Chim. Acta*, **52**, 2569 (1969). J. M. Tronchet and F. Perret, *ibid.*, **53**, 648 (1970). J. M. J. Tronchet, *et al.*, *ibid.*, **53**, 1484 (1970).

(4) E. M. Acton, K. J. Ryan and L. Goodman, *Chem. Commun.*, 313 (1970).

(5) H. El Khadem, D. Horton and M. H. Meshreki, *Carbohyd. Res.*, **16**, 409 (1971).

(6) H. Nishimura, M. Mayama, Y. Komatsu, H. Kato, N. Shimaoka and Y. Tanaka, *J. Antibiot.* (Tokyo), Ser. A, **17**, 148 (1964).

(7) K. R. Darnall, L. B. Townsend and R. K. Robins, *Proc. Nat. Acad. Sci.*, U. S., **57**, 548 (1967).

(8) R. K. Robins, L. B. Townsend, F. Cassidy, J. F. Gerster, A. F. Lewis and R. L. Miller, *J. Heterocyclic Chem.*, **3**, 110 (1966).

(9) R. H. Williams, K. Gerzon, M. Hoehn, M. Gorman and D. C. Detone, Abstracts 158th National Meeting of the American Chemical Society, New York, N. Y., Sept. 1969.

(10) R. Zelinski and R. E. Meyer, *J. Org. Chem.*, **23**, 810 (1958).

(11) Satisfactory elemental analysis have been obtained for the compounds described.

(12) W. Kirmse and L. Horner, *Ann. Chem.*, **614**, 1 (1958).