

Supplement I. Papers from the Woodward Research Institute

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β -Lactam Antibiotics

- R. B. Woodward, "Recent Advances in the Chemistry of Natural Products" (1965 Nobel Prize Lecture): (a) *Nobel Lectures, Chemistry 1963-1970*, Elsevier, Amsterdam, 1972, pp 100-121. (b) <https://www.nobelprize.org/uploads/2018/06/woodward-lecture.pdf>; (c) *Science* **1966**, *153*, 487-493.
- R. B. Woodward, K. Heusler, J. Gosteli, P. Naegeli, W. Oppolzer, R. Ramage, S. Ranganathan and H. Vorbrüggen, "The Total Synthesis of Cephalosporin C," *J. Am. Chem. Soc.*, **1966**, *88*(4), 852-853.
- K. Heusler, "Total Synthesis of Penicillins and Cephalosporins," in E. H. Flynn, Ed., *Cephalosporins and Penicillins*, Academic Press, New York, 1972, ch. 6, pp 255-279.
- R. B. Woodward, K. Heusler, I. Ernest, K. Burri, R. J. Friary, F. Haviv, W Oppolzer, R. Paioni, K. Syhora, R. Wenger and J. K. Whitesell, "Synthetic Analogs of β -Lactam Antibiotics. Biologically Active 2-Alkylidene-3-Deacetoxyethyl Cephalosporins," *Nouveau Journal de Chimie*, **1976**, *1*, 85-88.
- H. R. Pfaendler, P. A. Rossy, J. Gosteli and R. B. Woodward, "Synthesis of 3-Hydroxy Cephems," *Heterocycles* **1976**, *5*, 293-297.
- I. Ernest, "Penicillin-derived Diazoketones: Copper (II) Catalyzed Decomposition in Aprotic Media," *Tetrahedron*, **1977**, *33*(5), 547-552.
- I. Ernest, "Penicillin-Derived Diazo Ketones: An Intramolecular Carbene Reaction," in J. Elks, Ed., *Recent Advances in the Chemistry of β -Lactam Antibiotics*, The Chemical Society, Burlington House, London, 1977, pp 252-259.
- R. B. Woodward, "Recent Advances in the Chemistry of β -Lactam Antibiotics," in *Recent Advances in the Chemistry of β -Lactam Antibiotics*, ed. J. Elks, The Chemical Society, Burlington House, London, 1977, pp 167-180.
- R. B. Woodward, "Recent Advances in the Chemistry of β -Lactam Antibiotics, *Acta Pharmaceutica Suecica* **1977**, *14* (Supplement), 23.
- I. Ernest, J. Gosteli, C. W. Greengrass, W. Holick, D. E. Jackman, H. R. Pfaendler and R. B. Woodward "The Penems, a New Class of β -Lactam Antibiotics: 6-Acylaminopenem-3-carboxylic acids," *J. Am. Chem. Soc.*, **1978**, *100*(26), 8214-8222.
- M. Lang, K. Prasad, W. Holick, J. Gosteli, I. Ernest and R. B. Woodward, "The Penems, a New Class of β -Lactam Antibiotics. 2. Total Synthesis of Racemic 6-Unsubstituted Representatives," *J. Am. Chem. Soc.*, **1979**, *101*(21), 6296-6301.
- I. Ernest, J. Gosteli and R. B. Woodward, "The Penems, a New Class of β -Lactam Antibiotics. 3. Synthesis of Optically Active 2-Methyl-(5R)-penem-3-carboxylic acid," *J. Am. Chem. Soc.*, **1979**, *101*(21), 6301-6305.

- H. R. Pfaendler, J. Gosteli and R. B. Woodward, "The Penems, a New Class of β -Lactam Antibiotics. 4. Syntheses of Racemic and Enantiomeric Penem Carboxylic Acids," *J. Am. Chem. Soc.*, **1979**, *101*(21), 6308-6310.
- I. Ernest, "2-Oxocephems. Synthesis and Properties of 7-Acylamino-2-oxocephem-4-carboxylic Acids," *Helvetica Chimica Acta*, **1979**, *62*(8), 2681-2694.
- H. R. Pfaendler, J. Gosteli and R. B. Woodward, "The Penems, a New Class of β -Lactam Antibiotics. 5. Total Synthesis of Racemic 6 α -Hydroxyethylpenemcarboxylic Acids," *J. Am. Chem. Soc.*, **1980**, *102*(6), 2039-2043.
- M. Lang, K. Prasad, J. Gosteli and R. B. Woodward, "The Penems, a New Class of β -Lactam Antibiotics. 6. Synthesis of 2-Alkylthiopenem Carboxylic Acids," *Helvetica Chimica Acta*, **1980**, *63*(4), 1093-1097.
- I. Ernest, "2-Oxocephems. II. Synthesis of 2-Oxocephalexin from Hetacillin," *Helvetica Chimica Acta*, **1980**, *63*(1) 201-213.
- R. B. Woodward, "Penems and Related Substances," *Phil. Trans. R. Soc. Lond. B*, **1980**, *289*(1036), 239-250.
- H. R. Pfaendler, J. Gosteli, R. B. Woodward and G. Rihs, "Structure, Reactivity, and Biological Activity of Strained Bicyclic β -Lactams," *J. Am. Chem. Soc.*, **1981**, *103*(15), 4526-4531.
- I. Ernest, A. J. Main and R. B. Woodward, "2-Oxocephems and 2-Acetylpenems — Selective Formation in an Intramolecular Wittig Reaction," *Helvetica Chimica Acta*, **1981**, *64*(5), 1303-1311.
- H. Vorbrüggen and R. B. Woodward, "The Conversion of β -Amino Esters by Alkylaluminum Compounds into β -Lactams," *Tetrahedron*, **1993**, *49* (8), 1625-1634.

Excursions

- K. Heusler, "The Synthesis of 1-Azatwistane," *Tetrahedron Lett.*, **1970**, 97-100.
- I. Ernest, W. Holick, G. Rihs, D. Schomburg, G. Shoham, D. Wenkert and R. B. Woodward, "1,5-Dithia-2,4,6,8-tetrazocine: A Novel Heterocycle of Unusual Properties," *J. Am. Chem. Soc.* **1981**, *103*(6) 1540-1544.
- H. Vorbrüggen, "The Synthesis of 3-Acyl-2,3-dihydro-2,2-dimethyl-1,3-thiazoles," *Helvetica Chimica Acta*, **1991**, *74*(2), 3739-3741.
- H. Vorbrüggen, "*tert*-Butoxycarbonyl Chloride for the Introduction of N-Boc Groups into Amino Acids," *Synthesis*, **2008**, 3739-3741.

Prostaglandin F_{2 α}

- R. B. Woodward, J. Gosteli, I. Ernest, R. J. Friary, G. Nestler, H. Raman, R. Sitrin, Ch. Suter and J. K. Whitesell, "A Novel Synthesis of Prostaglandin F_{2 α} ," *J. Am. Chem. Soc.*, **1973**, *95*, 6853-6855.
- I. Ernest, "A Synthesis of Prostaglandins: Strategy and Reality," *Angew. Chem., Int. Ed.*, **1976**, *15*, 207-214.