

Neal C. Connors, Ph.D.

Phoenix BioConsulting, LLC

Microbial Fermentation – Industrial Microbiology – Biotechnology

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PROFESSIONAL SUMMARY

- Senior scientist with two decades of experience in the fermentation/microbiology/biotechnology fields; bench-top through pilot scale and manufacturing.
- Consultant for an assortment of clients of varying sizes with various scientific and business needs.
- Experience with a diverse bioprocess development portfolio: fermentation and strain improvement for producing bioactive natural products (e.g., Cancidas®), therapeutic protein and monoclonal antibody production by mammalian cell culture (HEK-293, CHO, hybridomas), bacterial and yeast expression systems, whole-cell biocatalysis for the production of chiral intermediates, fermentation of pathogenic bacteria for polysaccharide vaccine development.
- Group leader of 2-5 research staff. Veteran of inter-disciplinary and inter-departmental project teams charged with bioprocess and pre-clinical phase drug development.
- Contributing author on numerous peer-reviewed papers, book chapters, patents, and conference abstracts.
- Society for Industrial Microbiology and Biotechnology, former president and director; *Journal of Industrial Microbiology and Biotechnology* editorial board; *Enzyme and Microbial Technology* editorial board.

SCIENTIFIC/LEADERSHIP EXPERIENCE and HIGHLIGHTS

Phoenix BioConsulting, LLC. Fanwood, NJ

Owner/President (January 2009 – Present)

- Scientific consulting for companies in the microbial fermentation, industrial microbiology, or biotechnology sectors (research project leadership/guidance, business development, due diligence, subject-matter expert, expert witness).
- Flexible and cost effective alternative to employing full-time, permanent senior scientific staff.
- Example Projects:
 - Development of a therapeutic protein.
 - Strain improvement for an organic pesticide produced by fermentation.
 - Process development and preservation of an organic vermin control product produced by fermentation.
 - Key consultant/advisor to an algal biotech start-up.
 - Founder and key consultant to Kalion, Inc. – synthetic biology start-up.
 - Natural product manufacturing strategy development for an agricultural products company.
 - Strain and process development consulting for a start-up producing a commodity biochemical by microbial fermentation.
 - Scale-up trouble shooting for large company producing vaccine antigens by heterologous expression in yeast.

- Patent litigation/lost revenue case expert witness (Canadian Federal Court – expert witness statement, direct and cross examination; Goodmans, LLP).
- Inventorship arbitration expert witness (International Chamber of Commerce – expert witness statement, rebuttal, direct and cross examination; Finnegan, Henderson, Farabow, Garrett & Dunner, LLP).
- Scale-up and trouble shooting for academic research group producing biofuels with a photosynthetic microbe.
- Platform technology transfer for contract research organization producing proteins by transient transfection of HEK-293 cells.
- Patent infringement/invalidity case expert witness (International Trade Commission – expert witness statement, rebuttal, deposition, direct and cross examination; Adli Law Group/DNL Zito).

Massachusetts Institute of Technology Professional Education – Fermentation Technology Course, Cambridge, MA (July 2012 – Present)

- Teach statistical experimental design as part of a week-long short course on fermentation technology taught to industry professionals.

Drew University, Research Institute for Scientists Emeriti (RISE), Madison, NJ Associate (February 2012 – Present)

- Provide undergraduate students with the unique opportunity of carrying out laboratory research projects with a scientist having industrial research experience.
- Mentored 10 students in research projects and taught in an honors seminar course.

Kalion, Inc.

Chief Technology Officer (January 2010 – Present)

- Commercialization of glucaric acid and 3-hydroxybutyrolactone production by fermentation of a metabolically engineered *E. coli* strain.
- Developed business plan, process development time line, and pursued dilutive and non-dilutive funding.
- Managed outsourcing partnership with CRO

Society for Industrial Microbiology and Biotechnology (non-profit professional organization)

Past-president/President/President-elect (July 2010 – August 2013)

- Provide leadership to a non-profit professional society serving over 1000 members. Expanded SIMB's presence in industry and increased membership and meeting attendance. Planning initiative developed to fully leverage social media (LinkedIn, Facebook).

Bioprocess R&D, Merck Research Laboratories, Merck & Co., Rahway, NJ

Sr. Research Biochemist, Research Fellow, Sr. Research Fellow, Sr. Investigator (1991- 2008)

- Established and led small scale protein production team charged with providing 10s-100s mg of pre-clinical therapeutic proteins for evaluation (biophysical, PK/PD, efficacy). ~350 proteins delivered during 18 month time frame. Protein production carried out using HEK-293 transient transfection, CHO cells, hybridoma cultivation, and *Pichia pastoris* expression systems. Established outsourcing partnerships for non-core activities.
- Led fermentation and strain improvement efforts – well plate and shake-flask through pilot fermentor scale – for a variety of anti-bacterial, anti-fungal, statins, ion-channel inhibitors, and immunoregulant natural products produced by actinomycetes and filamentous fungi. Led development of the *Glarea lozoyensis* fermentation process for producing Cancidas®, first in class systemic anti-fungal

- Established a robust, high-throughput (1000-2000) microbial screening platform using 24 deep well plates, commercially available liquid handling equipment (TECAN), bioassays where applicable, and high-throughput HPLC.
- Whole-cell biocatalysis for the production of chiral intermediates. *Pseudomonas putida* dioxygenase bioconversion process converting indene to the corresponding chiral diol, an intermediate in Crixivan®
- Fermentation of *Neisseria meningitidis* (A, C, Y, W135 serotypes) for polysaccharide vaccine development.
- Group leader of 2-5 associate scientists – foster creativity, independence and provide career development opportunities. Lead by example style.
- Inter-departmental/inter-disciplinary team member - process development scientists, biologists, engineers, and chemists collaborating on early drug development.
- Oversaw outsourcing of R&D activities to US and emerging market vendors.
- Implementation of value stream mapping and 5S principles to improve efficiency and decrease cycle times.

EDUCATION

Ph.D. Microbiology. The Ohio State University, Columbus, OH. Thesis title: Studies on the biochemistry and physiology of anthracycline biosynthesis by streptomycetes.

B.S. Biology, chemistry minor (summa cum laude). Norwich University, Northfield, VT

PROFESIONAL AFFILIATIONS

Former President: Society for Industrial Microbiology and Biotechnology (July 2010 – August 2013).

Editorial boards: *Journal of Industrial Microbiology and Biotechnology* and *Enzyme and Microbial Technology*.

Board of Directors: Society for Industrial Microbiology and Biotechnology (August 2006-August 2009)

Program Chair: Society for Industrial Microbiology and Biotechnology Annual Meeting and Exhibition (July 2006)

Program Chair: Recent Advances in Fermentation Technology (RAFT V, November 2003).

Session organizer for several SIMB annual meetings.

PUBLICATIONS AND PATENTS

Peer-Reviewed Publications

Junker, B., A. Walker, M. Hesse, M. Lester, D. Vesey, J. Christensen, B. Burgess, and N. Connors. Actinomycetes scale-up for the production of the antibacterial, nocathiacin. *Biotechnology Progress* 25(1), 176-188 (2009).

Junker, B., A. Walker, M. Hesse, M. Lester, J. Christensen, and N. Connors. Pilot-scale process development and scale up for antifungal production. *Bioprocess Biosystems Engineering*. 32(4), 443-458 (2009).

Singh, SB., K. Herath, NX. Yu, A. Walker, and N. Connors. Biosynthetic studies of nocathiacin I. *Tetrahedron Letters*. 49(43), 6265-6268 (2008).

Jayasuriya, H., K. Herath, JG. Ondeyka, C. Zhang, DL. Zink, M. Brower, FP. Galliot, J. Greene, G. Birdsall, J. Venugopal, M. Ushio, B. Burgess, G. Russotti, A. Walker, M. Hesse, A. Seeley, B. Junker, N. Connors, O. Salazar, O. Genilloud, K. Liu, P. Masurekar, JF. Barrett, and SB. Singh. Isolation and structure elucidation of thiazomycin – a potent thiazolyl peptide antibiotic from *Amycolatopsis fastidiosa*. *Journal of Antibiotics*. 609(5), 554-564 (2007).

Junker, B., A. Walker, N. Connors, A. Seeley, P. Masurekar, and M. Hesse. Production of indole diterpenes by *Aspergillus alliaceus*. *Biotechnology and Bioengineering*. 95(5), 919-937 (2006).

Junker, B., M. Hesse, B. Burgess, P. Masurekar, N. Connors, and A. Seeley. Early phase process scale-up challenges for fungal and filamentous bacterial cultures. *Appl. Biochem. Biotechnol.* 119, 241-277 (2004)

Petersen, L., R. Olewinski, P. Salmon, and N. Connors. Novel proline hydroxylase activities in the pneumocandin-producing fungus *Glarea lozoyensis* responsible for the formation of trans 3- and trans 4-hydroxyproline. *Appl. Microbiol. Biotechnol.* 62, 263-267 (2003).

Petersen, L., D. Hughes, R. Hughes, L. DiMichele, P. Salmon, and N. Connors. Effects of amino acid and trace element supplementation on pneumocandin production by *Glarea lozoyensis*: impact on titer, analogue levels, and the identification of new analogues of pneumocandin B0. *J. Industr. Microbiol. Biotechnol.* 26, 216-221 (2001).

Pollard, D., R. Buccino, N. Connors, T. Kirschner, R. Olewinski, K. Saini, and P. Salmon. Real-time analyte monitoring of a fungal fermentation, at pilot scale, using in situ mid-infrared spectroscopy. *Bioprocess and Biosystems Engineering* 24, 13-24 (2001)

Connors, N., L. Petersen, R. Hughes, K. Saini, R. Olewinski, and P. Salmon. Residual fructose and osmolality affect the levels of pneumocandins B0 and C0 produced by *Glarea lozoyensis*. *Appl. Microbiol. Biotechnol.* 54, 814-818 (2000).

Zhang, J., C. Roberge, J. Reddy, N. Connors, M. Chartrain, B. Buckland, and R. Greasham. Bioconversion of indene to trans-2S,1S-bromindanol and 1S,2R-indene oxide by a bromoperoxidase/dehydrogenase preparation from *Curvularia protuberata* MF5400. *Enzyme and Microbial Technology*. 24, 86-95 (1999).

Buckland, B.C., S.W. Drew, N.C. Connors, M.M. Chartrain, C. Lee, P.M. Salmon, K. Gbewonyo, P. Galliot, R. Singhvi, R.C. Olewinski, W.-j. Sun, J. Reddy, J. Zhang, W. Zhou, B.A. Jackey, K.E. Goklen, B. Junker, and R.L. Greasham. Microbial conversion of indene to indandiol: a key intermediate in the synthesis of CRXIVAN®. *Metabolic Engineering*. 1, 63-74 (1999).

Sun, W.-j., P. Salmon, J. Wilson, and N. Connors. Crotonic acid-directed biosynthesis of the immunosuppressants produced by *Streptomyces hygroscopicus* var. *ascomyceticus*. *J. of Fermentation and Bioengineering*. 86, 261-265 (1998).

Connors, N., R. Prevoznak, M. Chartrain, J. Reddy, R. Singhvi, Z. Patel, R. Olewinski, P. Salmon, J. Wilson, and R. Greasham. Conversion of indene to cis-(1S),(2R)-indandiol by mutants of *Pseudomonas putida* F1. *J. Indus. Microbiol and Biotechnol.* 18, 353-359 (1997).

Connors, N., R. Prevoznak, T. Brix, A. Seeley, K. Gbewonyo, R. Greasham, and P. Salmon. Effects of medium sterilization on the production of zaragozic acids by the fungus *Leptodontidium elatius*. *J. Indus. Microbiol.* 15, 503-508 (1995).

Connors, N.C., and W.R. Strohl. Partial purification and properties of carminomycin 4-O-methyltransferase from *Streptomyces sp. C5*. J. Gen. Microbiol. 139, 1353-1362 (1993).

Strohl, W.R., and N.C. Connors. Significance of anthraquinone formation resulting from the cloning of actinorhodin genes in heterologous streptomycetes. Molec. Microbiol. 6, 147-152 (1992). (Including the journal cover photograph).

Strohl, W.R., P.L. Bartel, Y. Li, N.C. Connors, and R.H. Woodman. Expression of polyketide biosynthesis and regulatory genes in heterologous streptomycetes. A Review. J. Indus. Microbiol. 7, 163-174 (1991)

Bartel, P.L., N.C. Connors, and W.R. Strohl. Biosynthesis of anthracyclines: analysis of mutants of *Streptomyces sp. C5* blocked in daunomycin biosynthesis. J. Gen. Microbiol. 136, 1877-1886 (1990).

Connors, N.C., P.L. Bartel, and W.R. Strohl. Biosynthesis of anthracyclines: enzymic conversion of aklanonic acid to aklavinone and ϵ -rhodomycinone by anthracycline-producing streptomycetes. J. Gen. Microbiol. 136, 1887-1894 (1990).

Connors, N.C., P.L. Bartel, and W.R. Strohl. Biosynthesis of anthracyclines: carminomycin 4-O-methyltransferase, the terminal enzymic step in the formation of daunomycin. J. Gen. Microbiol. 136, 1895-1898 (1990).

Piret, J., B. Resendiz, B. Mahro, J.-Y. Zhang, E. Serpe, J. Romero, N.C. Connors, and A.L. Demain. Characterization and complementation of a cephalosporin-deficient mutant of *Streptomyces clavuligerus* NRRL 3585. Appl. Microbiol. Biotechnol. 32, 560-567 (1990)

Bartel, P.L., C.-b. Zhu, J.L. Lampel, D.C. Dosch, N.C. Connors, W.R. Strohl, J.M. Beale, Jr., and H. Floss. Biosynthesis of anthraquinones by interspecies cloning of actinorhodin biosynthesis genes in streptomycetes: Clarification of actinorhodin gene functions. J. Bacteriol. 172, 4816-4826 (1990).

Book Chapters

Wang, F., L. Chen, N. Connors, and H. Mach. Antibody expression in mammalian cells – transient transfection. In Z. An (ed.), Therapeutic monoclonal antibodies: from bench to clinic. Wiley, Inc., Hoboken, NJ (September 2009).

Connors, N. and D. Pollard. Pneumocandin B0 production by fermentation of the fungus *Glarea lozoyensis*: physiological and engineering factors affecting titer and structural analogue formation, pp. 515-538. In Z. An (ed), Handbook of Industrial Mycology. Marcel Dekker, Inc., New York, NY (2004).

Connors, N. Culture medium optimization and scale-up for microbial fermentations, pp. 171-193. In S.R. Parekh and V.A. Vinci (eds.), Handbook for Industrial Cell Culture: Mammalian, Microbial, and Plant Cells. Humana Press Inc., Totowa, NJ (2003).

Strohl, W.R., P.L. Bartel, N.C. Connors, C.-b. Zhu, D.C. Dosch, J.M. Beale, Jr., H.G. Floss, Stutzman-Engwall, S.L. Otten, and C.R. Hutchinson. Biosynthesis of natural and hybrid polyketides by anthracycline-producing streptomycetes, pp. 68-84. In C.L. Hershberger, S.W. Queener, and G. Hegeman (eds.), Genetics and Molecular Biology of Industrial Microorganisms. American Society for Microbiology, Washington, D.C. (1989).

Patents

Buckland, B., N. Connors, M. Chartrain, F.P. Galliot, R. Greasham, B. Jackey, B. Heimbuch, C. Lee, R. Olewinski, F.E. Roberts, P. Reider, T. Verhoeven, and C. Senanayake. Conversion of indene to (1S)-amino-(2R)-indanol free of any stereoisomer, by combination of dioxygenase bioconversion and chemical steps. U.S. Patent 5,858,737 (1999).

Connors, N.C. *Pseudomonas putida* strain with dioxygenase activity. U.S. Patent 5,824,540 (1998).

Chartrain, M., N. Connors, G. Garrity, R. Olewinski, T. Verhoeven, and J. Zhang. Quantitative conversion of indene to (1S,2R) indene oxide and (1S,2R)-indandiol by combination of haloperoxidase bioconversion and chemical steps. U.S. Patent 5,605,819 (1995).

CONFERENCE and UNIVERSITY PRESENTATIONS

Connors, N. A Biotech Industry in the Clouds. Roquette University's, "Developments in Green Chemistry and Fermentation Symposium". Geneva, IL (May 2013)

Connors, N. The Impact of Fermentation on the United States Department of Energy's List of the Top Value Added Chemicals from Biomass. Peking University School of Environment and Energy, Shenzhen, China (October 2011).

Connors, N. Fermentation of *Glarea lozoyensis* for the Production of Pneumocandin B0: The Natural Product Precursor of the Potent Antifungal Agent CANCIDAS®. Symposium on Industrial and Fermentation Microbiology, University of Wisconsin, La Crosse (2007).

Vesey, D. K. McLaughlin, A Walker, B. Junker, and N. Connors. A 24 deep-well plate cultivation format for classical strain improvement of natural products. Natural Products Discovery and Production: New Challenges; New Opportunities. Santa Fe, NM (2006)

Connors, N. Statistical Experimental Design Using Commercially Available Software. University of Hawaii, Department of Oceanography (2006).

Connors, N. Fermentation Process Development: Producing Beneficial Products by Fermentation of Bacteria and Fungi. University of Hawaii, Department of Oceanography (2006).

Connors, N., D. Vesey, A. Walker, and B. Junker. A 24 deep-well plate cultivation format for classical strain development: matching technology with a natural product-based drug's probability of success. Society for Industrial Microbiology, Annual Meeting. Chicago, IL (2005)

Connors, N. Natural Product-Based Pharmaceuticals Made by Fermentation of Bacteria and Fungi. Norwich University, Department of Biology (2005)

A. Walker, D. Vesey, J. Greene, P. Masurekar, N. Connors. Production of indole diterpenes by *Aspergillus alliaceus*. Society for Industrial Microbiology, Annual Meeting. Anaheim, CA (2004).

Connors, N. Natural product fermentation development: factors affecting titer and analogue formation. Society for Industrial Microbiology, Annual Meeting. St. Louis, MO (2001).

Connors, N., L. Petersen, R. Olewinski, D. Pollard, G. Hunt, and P. Salmon. Physiological aspects of pneumocandin production by fermentation of *Glarea lozoyensis*. Society for Industrial Microbiology, Annual Meeting. San Diego, CA (2000).

Connors, N. Production of natural product pharmaceuticals by fermentation of bacteria and fungi: understanding the key physiological factors affecting titer and analogue formation. Virginia Commonwealth University, Dept. of Medicinal Chemistry (2000).

Connors, N., L. Petersen, R. Hughes, G. Hunt, D. Pollard, P. Masurekar, R. Olewinski, P. Salmon, and B. Buckland. Physiological aspects of pneumocandin production by fermentation of *Glarea lozoyensis*. Society for General Microbiology Symposium. University of East Anglia, UK. (1998).

Connors, N.C., M. Chartrain, C. Lee, J. Reddy, R. Singhvi, R. Olewinski, P. Salmon, J. Wilson, and R. Greasham. Strain improvement for the bioconversion of indene to cis-(1S),(2R)-indandiol: A key raw material for the chemical synthesis of an HIV-1 protease inhibitor. Recent Advances in Fermentation Technology II. San Diego, CA. Abstract S2. (1997).

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Walker, A., G. Russotti, M. Ushio, B. Junker, and N. Connors. Nutrient shot and water addition as methods for reducing broth viscosity and gassed agitator power draw. Society for Industrial Microbiology Annual Meeting. Chicago, IL (2005).

Walker, A., and N. Connors. An HPLC data capture and analysis program facilitating microbial culture screening. Genetics and Molecular Biology of Industrial Microorganisms/Biotechnology of Microbial Products Meeting. San Diego, CA (2004).

Buckland, B., D. Robinson, J. Aunins, B. Junker, N. Connors, R. Greasham, W. Zhou, L. Xie, D. Seifert, J. Zhang, W. Vandusen. Advances and challenges in fermentation and cell culture process development. American Chemical Society 219th National Meeting, San Francisco, California (2000).

Connors, N., L. Petersen, R. Hughes, K. Saini, R. Olewinski, and P. Salmon. Altering medium osmolality affects the production of pneumocandins B0 and C0 by *Glarea lozoyensis*. Recent Advances in Fermentation Technology III. Sarasota, FL. Abstract P36 (1999).

Petersen, L., R. Olewinski, P. Salmon, and N. Connors. Hydroxyproline synthesis in *Glarea lozoyensis* and its impact on pneumocandin biosynthesis. Recent Advances in Fermentation Technology III. Sarasota, FL. Abstract P37 (1999).

Dickens, M., T. Fulton, P. Salmon, and N. Connors. Metabolic engineering of glycerol metabolism in *Hypoxylon sp.* Recent Advances in Fermentation Technology III. Sarasota, FL. Abstract P25 (1999).

Pollard, D., R. Buccino, N. Connors, G. Hunt, T. Kirschner, R. Olewinski, K. Saini, W.-j. Sun, and P. Salmon. Analyte monitoring of pilot scale fungal fermentations using in situ mid infrared spectroscopy. Recent Advances in Fermentation Technology III. Sarasota, FL. Abstract S13 (1999).

Petersen, L., R. Hughes, P. Salmon, and N. Connors. Pneumocandin production by fermentation of *Glarea lozoyensis* is affected by trace element and amino acid supplementation. Society of Industrial Microbiology Annual Meeting. Denver, CO. Abstract P40 (1998).

Sun, W-j., P. Salmon, J. Wilson, and N. Connors. Crotonic acid-directed biosynthesis improves the purity of immunomycin produced by fermentation of *Streptomyces hygroscopicus* var. *ascomyceticus*. Society of Industrial Microbiology Annual Meeting. Denver, CO. Abstract P34 (1998).

Connors, N., R. Prevoznak, M. Chartrain, J. Reddy, R. Singhvi, Z. Patel, R. Olewinski, P. Salmon, J. Wilson, and R Greasham. Conversion of indene by mutants of *Pseudomonas putida* F1. Genetics and Molecular Biology of Industrial Microorganisms. Bloomington, IN. Abstract P35 (1996).

Connors, N.C., R. Prevoznak, T. Brix, A. Seeley, K. Gbewonyo, R. Greasham, and P. Salmon. Effects of medium sterilization on the production of zaragozic acids by the fungus *Leptodontidium elatius*. Recent Advances in Fermentation Technology. San Diego, CA. Abstract P5 (1995).

Connors, N.C., and W.R. Strohl. Analysis of anthracycline production by *Streptomyces* sp. C5. Abstr. Intl. Symp. on the Biology of Actinomycetes. Madison, WI. Abstract P2-061 (1991).

Strohl, W.R., P.L. Bartel, Y. Li, N.C. Connors, and G. Kleman. Expression of polyketide biosynthesis and regulatory genes in heterologous streptomycetes. Ann. Meet. Soc. Industr. Microbiol. Abstract S11 (1990).

Bartel, P.L., N.C. Connors, J.S. Hutton, and W.R. Strohl. Characterization of *Streptomyces* sp. C5 mutants altered in daunomycin production. Ann. Meet. Am. Soc. Microbiol., Abstract O13, (1989).

Connors, N.C., P.L. Bartel, and W.R. Strohl. In vitro biosynthesis of polyketides by anthracycline-producing streptomycetes. Ann. Meet. Am. Soc. Microbiol. Abstract K-52 (1988).

Serpe, E., J. Romero, B. Mahro, B. Resendiz, J.-Y. Zhang, N.C. Connors, A.L. Demain, J. Piret. Complementation by gene cloning of a β -lactam non-producing mutant strain of *Streptomyces clavuligerus*. 4th Am. Soc. Microbiol. Conf. Genet. Molec. Biol. Industr. Microorg., Abstract 10 (1988).

Bartel, P., C.-B. Zhu, J. Lampel, W. Strohl, N. Connors, J. Beale, and H. Floss. Biosynthesis of "hybrid" anthraquinone by interspecies cloning of DNA encoding actinorhodin biosynthesis genes in anthracycline-producing streptomycetes. Ann. Meet. Am. Soc. Microbiol. K-54 (1988).

Bartel, P., C.-B. Zhu, J. Lampel, W. Strohl, N. Connors, J. Beale, and H. Floss. Biosynthesis of "hybrid" anthraquinone by interspecies cloning of DNA encoding actinorhodin biosynthesis genes in anthracycline-producing streptomycetes. Abstracts of International Symposium on the Biology of the Actinomycetes. Abstract P3-27 (1988).

Zhu, C.-b., P. Bartel, J. Lampel, W. Strohl, N. Connors, J. Beale, and H. Floss. Complementation of a *Streptomyces galilaeus* mutant with actinorhodin pathway DNA and the production of new "hybrid" compounds. Abstr. Soc. Industrial Microbiology. Abstract P40 (1988).

Strohl, W.R., P.L. Bartel, N.C. Connors, C.b. Zhu, D.H. Dosch, J.M. Beale, Jr., H.G. Floss, K.J. Stutzman-Engwall, and C.R. Hutchinson. Biosynthesis of natural and hybrid polyketides by anthracycline

producing streptomycetes. 4th Am. Soc. Microbiol. Conf. Genet. Molec. Biol. Industr. Microorg.,
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