



## **SHU-JEN D. CHIANG, Ph.D.**

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### ***SUMMARY***

Thirty-five years of experience in recombinant DNA technology, genetics and biochemistry, including 28 years of industrial experience in R&D, fermentation and product purification process development. Applied genetic engineering technology to microbial and fungal strain improvement, metabolic pathway engineering, recombinant protein expression and biotransformation. Has experience in pharmaceutical fermentation and purification process optimization, scale-up, process validation and GMP operations. Also has experience in CMC document preparation and filing to health regulatory agencies. Technical accomplishments include gene cloning, vector construction, heterologous gene products, fermentation and purification process improvement and implementation of improved process in commercial scales. Offers excellent project planning, project management and interpersonal skills.

### ***PROFESSIONAL EXPERIENCE***

#### ***Sr. Advisor, Rondaxe Pharma, LLC – July 2009 –Present***

Fermentation, biotransformation and biotechnology consulting

#### ***Visiting Professor, Fu-Jen Catholic University – September 2010-January 2011***

Biotechnology, Bridging Basic and Industrial Microbiology

#### ***Bristol-Myers Squibb Company – September 1985-June 2009***

***Associate Director – 2005-2009***

***Group Leader - 2000-2005***

***Manager – 1998 – 2000***

***Senior Scientist – 1985-1998***

- Responsible for scientific leadership, management, internal and external technology transfer, budgeting and establishing intellectual property position.
- Led inter-departmental fermentation and biotransformation projects: manufacturing process development, optimization and scale-up; API manufacturing tech support.
- Responsible for fermentation equipment and process validation.
- Supporting CMC document preparations for new drug applications.
- Experience with the expression and regulation of biosynthetic genes for secondary metabolites in various bacterial species and filamentous fungi; developed cloning and expression vectors, cloned genes for secondary metabolite biosynthesis and industrial enzymes; developed DNA transformation and expression systems in filamentous fungi and various bacterial species.
- Generated recombinant microbial strains with increased productivity of antibiotics and industrial enzymes: strain improvement; fermentation and biotransformation process development, enzyme and antibiotic manufacturing.
- Generated recombinant fungal strains producing new  $\beta$ -lactam antibiotics.

#### ***Molecular Biologist, Abbott Laboratories, Department of Molecular Biology – December 1983-August 1985***

Investigated genetic and biochemical controls of antibiotic biosynthesis in streptomycetes: development of *E.coli-Streptomyces* cloning vectors, actinophage vectors, and cloning of antibiotic biosynthesis genes of streptomycetes.



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### ***Research Molecular Biologist, SDS Biotech Corporation (Diamond Shamrock Corp) – February 1982 – November 1983***

Studied transcriptional regulation of heterologous gene expression in *E.coli*. Identified molecular targets for animal and plant growth enhancers or inhibitors. Developed and implemented high throughput assays for synthetic compounds and natural products screening. Initiated research areas in *Streptomyces* genetics.

### ***NIH Postdoctoral Fellow, University of Alabama in Birmingham, Department of Microbiology – January 1981-January 1982***

Conducted research in molecular cloning of the RNA genomes of and genetic mapping of the viral genes.

### ***Research Fellow, University of Texas at Dallas, Department of Biology – September 1979-December 1980***

Studied the transposition mechanism of an ampicillin-resistant transposon. Studied genetics and functional organization of plasmid R6K.

### **EDUCATION**

Ph.D., University of Texas at Dallas, 1979, Major-Molecular Biology

M.S., University of Texas at Dallas, 1976, Major – Molecular Biology

B.S., Fu-Chem Catholic University, 1971, Major - Biology

### **HONORS, AWARDS AND GRANTS**

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| 2009      | BMS Tech Ops Presidents Award   |
| 2010      | US EPA Presidential Green Chemistry Challenge Award                       |
| 2003      | IMPACT One BMS Award  |
| 2003      | One BMS Achievement Award   |
| 1996-1998 | BMS Excellence Award  |
| 1981      | American Cancer Society Institutional Research Grant (Molecular Virology) |

### **PUBLICATIONS**

Nayem, A., S.J.,Chiang, S.W.Liu, Y.Sun, L. Lou and J. Basch, 2009 – Engineering Enzymes for improved catalytic efficiency. A computational study of site mutagenics in epothilone-B hydroxylase. *Protein Engineering, Design and Selection*, 22:257-266.

Basch, J. and S.D. Chiang, 2007 – Cloning and expression of a cytochrome P450 hydroxylase gene from *Amycolatopsis orientalis* strain SC15847: Hydroxylation of epothilone B for production of epothilone F. *J Ind. Microbiol. Biotechnol.* 34:171-177.

Steele, C.L., Y.Chen, B.A. Dougherty, W. Li, S. Hofstead, K.S. Lam, Z. Xing, S. D. Chiang, 2005 – Purification, cloning and functional expression of phenylalanine aminomutase: The first committed step in Taxol side-chain biosynthesis. *Arch. Biochem. Biophys.* 438:1-10.

Basch, J., T. Franceschini, S. Tonzi, S. D. Chiang, 2004 – Expression of a cephalosporin C esterase gene in *Acremonium chrysogenum* for the direct production of deacetylcephalosporin C. *J. Ind. Microbiol. Biotechnol.* 1:531-539.

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Chiang, S. D. – Strain improvement for fermentation and biocatalysis process by genetic engineering technology. *J. Ind. Microbiol. Biotechnol.* 31:99-108.

Chiang, S.D. and J. Basch, 1999 – Cephalosporins. In “*Encyclopedia of Bioprocess Technology: Fermentation, Biocatalysis and Bioseparation.*”, M. D. Flickinger and S. Drew (eds.), John Wiley & Sonc, Inc, New York, pp/ 560-570.

Basch, J. and S. D. Chiang, 1998 – Genetic engineering approach to reduce undesirable by-products in cephalosporin C fermentation. *J. Ind. Microbiol. Biotechnol.* 20:334-353.

Burnett, W.V., S.D. Chiang and R.P. Elander, 1998 – Application of PCR in fungal biotechnology. In “*Application of PCR in Mycology*”, P.S. Bridge, D. Arora, R.P. Elander and C.A. Reddy (eds.), CAB International Wallingford, UK, pp. 187-203.

Chiang, S.D., L.T.Chang, H.H. Hou and R.P. Elander, 1993 – Stain improvement in *Penicillin chrusogenum*: From classical genetics to genetic engineering. In “*50 Yrs of Penicillin Application – History and Trends*”, H. Kleinkauf and H. vonDohren (eds.), Public Ltd., Prague, pp. 245-257.

Kline, E.L., S.D. Chiang, D. Lattora and W. Chuang, 1992 – Cloning of a promoter-like soybean DNA fragment responding to IAA induction in *Escherichia coli* K12. *J. Biochem.* 111: 168-174.

Usher, J.J., D.W. Hughes, M.A. Lewis and S.D. Chiang, 1992 – Determination of the rate-limiting step(s) in the biosynthetic pathways leading to penicillin and cephalosporin. *J. Ind. Microbiol.* 10: 157-163.

Elander, R.P. and S.D. Chiang, 1991 – Genetics and antibiotic process improvement: From classical genetics to genetic engineering. In “*Recombinant DNA Technology and Application*”, A. Prokop, R.K. Bajpai and C.S. Ho (eds.), McGraw Hill, Inc., New York, pp. 153-170.

Whitkop, C. and S.D. Chiang, 1989 – Gene cloning. In “*Genetic Engineering Technology in Industrial Pharmacy: The Principles and Applications*”, J.M.Tabor (ed.), Marcel Dekker, Inc., New York, pp. 17-63.

Brown, D.P., S. D. Chiang, J.S. Tuan and L. Katz, 1988 – Site-specific integration of *Saccharopolyspora erythraea* and multisite integration of *Streptomyces lividans* of *antiomycete* plasmid *pSEI01*. *J. Bacteriol.* 170:2287-2295.

Brown, D.P., J.S. Tuan, A. Boris, J.P. Dewitt, K.B. Idler, S.D. Chiang and L. Katz, 1988 – Plasmid-chromosome interactions in *Saccharopolyspora erythraea* and *Streptomyces lividans*. *Develop. Ind. Microbiol.* 29:97-105.

Katz, L., S.D. Chiang, J.S. Tuan and L.B. Zablen, 1988 – Characterization of bacteriophage C69 of *Saccharopolyspora erythraea* and demonstration of heterologous actinophage propagation in *Streptomyces* and *Saccharopolyspora*. *J. Gen. Microbiol.* 134:1765-1771.

Portmorem, J. W.V. Burnett and S.D. Chiang, 1987 – Bifunctional cosmid vector for *Streptomyces*. *Biotechnol. Lett.* 9:7-12.

Chiang, S.D., E. Jordan and R.C. Clowes, 1987 – Inter-and intramolecular transposition and transposition immunity in *Tn3* and *Tn2660*. *Mol. Gen. Genet.* 187:187-194.



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Chiang, S.D. and R.C. Clowes, 1982 – Recombination between two TnA transposon sequences oriented as inverse repeats is found less frequently than between direct repeats. *Mol. Gen. Genet.* 185:169-175.

Clowes, R.C., P.L. Holmans and S.D. Chiang, 1981 – Intramolecular transposition of a  $\beta$ -lactamase sequence and related genetic rearrangements. *Cold Spring Harb. Symp. Quant. Biol.* 45:167-171.

Chiang, S.D. and R.C. Clowes, 1981 – Differences in recombination between two transposon sequences oriented as direct and indirect repeats. In “*Molecular Biology, Pathogenicity and Ecology of Bacterial Plasmids*”. S.B. Levy, R.C. Clowes and E.L. Koenig (eds.), Plenum, New York, p. 591.

Chiang, S.D. and R.C. Clowes, 1980 – Intramolecular transposition and inversion in the plasmid R6K. *J. Bacteriol.* 142: 668-682.

Fan, P.C. and S.D. Chiang, 1971 – Recovery, distribution and development of *Schistosoma mansoni* in mice following unisexual intraperitoneal infection with suggestion of a possible route of migration of *Schistosomes* of man in mammalian hosts. *Chinese J. Microbiol.* 4: 182-189.

### **U.S. PATENTS**

- US5516679                   Chiang, S.D., S. Tonzi, W.V. Burnett – Penicillin V aminohydrolase gene from *Fusarium oxysporum*.
- US2002/0048781           Chiang, S.D. and J. Basch – Direct production of desacetylcephalosporin C.
- US6884608 B2             Basch, J.D., S.D. Chiang, S.W. Liu, A. Nayeem, Y. Sun and L. You – Compositions and methods of hydroxylating epothilones.
- US7172884 B2             Benigni, D., R. Stankavage, S.D. Chiang, H. Hou, B. Egan, D. Gu, D. Hou, L. Mintzmyer, T.P. Tully, B.L. Davis, I. Hagro, M. Mascari, G. Galvin, G. Stein, C. W. McConlogue and F.T. Comezoglu – Methods for preparation, isolation and purification of epothilone B and x-ray crystals of epothilone B.
- US2006/0270012 A1       Bowers, N., P. Skonezny, G. Stein, T. Francheschini, S.D. Chiang, W.L. Anderson, L. You and Z. Xing – Process for preparing (2R-3S)-1,2-Epoxy-e-(unprotected) amino-4-substituted butane and intermediates thereof.

### **PROFESSIONAL SOCIETIES**

American Chemical Society  
Society of Industrial Microbiology