Kowa Company, Ltd. et al. v. Aurobindo Pharma Limited et al.,
Civil Action No. 14-CV-2497 (PAC) (and related cases)

Exhibit 1 to Declaration of David H. Sherman, Ph.D., dated May 8, 2015, in support of Defendants' Joint Opening Claim Construction Brief

Curriculum Vitae

DAVID HOWARD SHERMAN
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Personal Data

Date of Birth: June 12, 1957 (Minneapolis, Minnesota)
Marital Status: Married, 30 August 1981 to Carey Welles Wexler, three children (Maja, Jonathan, Hannah)
Citizenship: USA

Education

B.A. in Chemistry (with Honors) from the University of California, Santa Cruz, CA: 1975 - 1978
Research Advisor: Professor Phil Crews

Ph.D. in Organic Chemistry from Columbia University, New York City, NY; 1978 - 1981
Research Advisor: Professor Gilbert Stork

Professional Appointments

1981 - 1982	Postdoctoral, Yale University, New Haven, CT (R.E. Handschumacher)
1982 - 1984	Postdoctoral, Massachusetts Institute of Technology, Cambridge, MA (H.N. Eisen)
1984 - 1987	Research Scientist, Biogen Research Corp., Cambridge, MA
1987 - 1990	Research Scientist, John Innes Institute, Norwich, U.K.
1990 - 1995	Assistant Professor, University of Minnesota, Department of Microbiology and BioTechnology Institute
1995 – 2000	Associate Professor, University of Minnesota, Department of Microbiology and BioTechnology Institute
1996 – 1998	Director, University of Minnesota, Center for Microbial Physiology and Metabolic Engineering
1997	(sabbatical) Senior Director, ChromaXome Corporation, San Diego, CA
1998 – 2001	Director, Microbiology, Immunology and Cancer Biology Graduate Program
1999 – 2007	Founder and Chief Technical Consultant, Acera Biosciences, Inc.
2000 – 2003	Director, UMN-NIGMS Biotechnology Training Program
2000 – 2003	Professor, University of Minnesota, Department of Microbiology and BioTechnology Institute

2003 – 2007	J. G. Searle Professor, University of Michigan, Department of Medicinal Chemistry
2004 – 2014	Director, Center for Chemical Genomics, Life Sciences Institute, University of Michigan
2003 – present	Professor, University of Michigan, Department of Chemistry
2003 – present	Professor, University of Michigan, Department of Microbiology & Immunology
2007 – present	Hans W. Vahlteich Professor, University of Michigan, Department of Medicinal Chemistry
2011 – present	Associate Dean for Research and Graduate Education (College of Pharmacy)

Honors and Awards

1978	American Chemical Society Award for Excellence in Undergraduate Research
1978	University of California, Santa Cruz, Honors in the Major (Chemistry)
1981	Pegram Award for Excellence in Graduate Research, Columbia University
1982 - 1984	National Institutes of Health Postdoctoral Fellowship
1984 - 1986	Myron A. Bantrell Postdoctoral Research Fellowship in Molecular Biology
1990 - 1992	Eli Lilly Life Sciences Award
1992 - 1995	Procter & Gamble University Exploratory Research Program
2003 - 2007	John Gideon Searle Jr. Professorship, University of Michigan
2005-	Co-chair, University of Miami Oceans and Human Health Center External Advisory Committee
2007-	Hans W. Vahlteich Professorship, University of Michigan
2008	Elected Fellow, American Association for the Advancement of Science
2009	A. C. Cope Scholar Award, American Chemical Society
2009	Charles Thom Award, Society for Industrial Microbiology
2015	American Society for Microbiology Distinguished Lecturer (2015-2017)

Research Experience and Interests

Undergraduate Research (U.C. Santa Cruz): A novel GC/MS method was developed for the identification and characterization of polysaccharide natural products from marine alga.

Graduate Research (Columbia University): A general method was developed for construction of trans-hydrindanone ring systems, and the total synthesis of 11-keto steroids using an intramolecular Diels-Alder approach.

Postdoctoral Research (Yale University): Studies of the immunosuppressive drug cyclosporin A were performed to determine its effects on thymocyte populations in mice.

Postdoctoral Research (MIT): Studies were conducted on non-H-2 class I molecules of the mouse major histocompatibility complex. Our work showed that specific subpopulations of T cells expressed structurally diverse molecules encoded in the Qa-2 locus.

Biogen Research Corporation (Cambridge, MA): A molecular genetic study was conducted on insulin-specific, class II MHC restricted T cell receptors in mice. Further biochemical and molecular genetic studies were conducted on Qa-2 encoded MHC molecules.

John Innes Institute (Norwich, U.K.): A molecular genetic analysis of type II polyketide synthase systems was conducted to explore the identity and mechanism of construction of complex secondary metabolites in *Streptomyces.*

University of Michigan (Ann Arbor, MI): Research interests include synthetic chemistry, bioorganic and biochemical studies of natural product biosynthetic pathways from marine and terrestrial microbes. Metabolic engineering and microbial genomic and proteomic technologies are being developed and utilized for analysis and production of novel biologically active molecules and liquid fuels.

Professional Memberships

1978 - Present	American Chemical Society
1982 - Present	American Association for the Advancement of Science
1987 - Present	American Society for Microbiology
2000 – Present	Society for Industrial Microbiology

Publications

1. Stork, Gilbert and David H. Sherman. 1982. "Efficient *de novo* construction of the indanpropionic acid precursor of 11-keto steroids. An improved internal Diels-Alder sequence," *J. Amer. Chem. Soc.* 104:3758-3759.

2. Kranz, David M., David H. Sherman, Michael V. Sitkovsky, Mark S. Pasternack, and Herman N. Eisen. 1984. "Immunoprecipitation of cell surface structures of cloned cytotoxic T lymphocytes by clone-specific antisera," *Proc. Natl. Acad. Sci.* USA 81:573-577.

3. Sherman, David H. 1984. "Increasing sensitivity of luminescent enzyme immunoassay," *Trends in Biotechnology* **2**:1-2.

4. Sherman, David H., David M. Kranz, and Herman N. Eisen. 1984. "Expression of structurally diverse Qa-2 encoded molecules on the surface of cloned cytotoxic T lymphocytes," *Journal of Experimental Medicine* 160:1421-1430.

5. Devlin, James J., Georg Widera, Andrew L. Mellor, Karen Fahrner, David H. Sherman, Elisabeth H. Weiss, and Richard A. Flavell. 1985. "Evolution and expression of the transplantation antigen gene family," *Federation Proceedings* 44:2736-2740.

6. Sherman, David H., David M. Kranz, and Herman N. Eisen. 1985. "Qa-2 encoded molecules expressed on the surface of cloned cytotoxic T lymphocytes are structurally diverse," *The Cell Biology of the MHC,* H. Vogel and B. Pernis (eds.), Academic Press, Inc., New York.

7. Flavell, Richard A., Hamish Allen, Linda C. Burkly, David H. Sherman, Gerald L. Waneck, and Georg Widera. 1986. “Molecular biology of the H-2 complex," *Science* 223**:**437-443.

8. Sherman, David H., Paula S. Hochman, Robert Dick, Richard Tizard, K.L. Ramachandran, Richard A. Flavell, and Brigitte T. Huber. 1987. "A molecular analysis of antigen recognition by insulin specific T cell hybridomas from B6 wild type and bm12 mutant mice," *Molecular and Cellular Biology* **7**:1865-1872.

9. Waneck, Gerald L., David H. Sherman, Susan Calvin, Hamish Allen, and Richard A. Flavell. 1987. "Tissue-specific expression of a transfected Qa region gene ($Q7^b$) encoding the Qa-2 alloantigen," *Journal of Experimental Medicine* 165:1358-1370.

10. Sherman, David H., Gerald L. Waneck, and Richard A. Flavell. 1988. "Qa-2 antigen encoded by $Q7^b$ transfected R1.1 cells is biochemically indistinguishable from Qa-2 expressed on the surface of C57B1/10 mouse spleen cells," *Journal of Immunology* 140:138-142.

11. Waneck, Gerald L., David H. Sherman, Paul W. Kincade, Martin G. Low, and Richard A. Flavell. 1988. "Molecular mapping of sites in Qa-2 required for attachment of the phosphatidylinositol membrane anchor," *Proc. Natl. Acad. Sci.* USA 85:577-581.

12. Sherman, D.H., F. Malpartida, M.J. Bibb, H.M. Kieser, S.E. Hallam, J.A. Robinson, S. Bergh, M. Uhlen, T.J. 1988. "Cloning and analysis of genes for the biosynthesis of polyketide antibiotics in *Streptomyces* species," in Durand, G., Bobichon, L. and Florent, J. (eds.) *Proceedings of the 8th International Biotechnology Symposium, Paris.* Societe Francaise de Microbiology, Vol. 1, pp. 123-137.

13. Sherman, David H., Francisco Malpartida, Maureen J. Bibb, Helen M. Kieser, Mervyn J. Bibb, and David A. Hopwood. 1989. "Structure and deduced function of the granaticin-producing polyketide synthase gene cluster from *Streptomyces violaceoruber* Tu22," *EMBO Journal* 8:2717-2725.

14. Hopwood, David A. and David H. Sherman. 1990. "Molecular genetics of polyketides and its comparison to fatty acid biosynthesis," *Annual Review of Genetics* 24:37-66.

15. Hopwood, David A., David H. Sherman, Chaitan Khosla, Maureen J. Bibb, Thomas J. Simpson, Miguel A. Fernandez, Eduardo Martinez and Francisco Malpartida. 1990. "Hybrid pathways for the production of secondary metabolites," in Proceedings of the Sixth International Symposium on the Genetics of Industrial Microorganisms (GIM 90), Strassbourg, France .

16. Sherman, David H., M.J. Bibb, T.J. Simpson, D. Johnson, F. Malpartida, M. Fernandez-Moreno, E. Martinez, C.R. Hutchinson and D.A. Hopwood. 1991. "Molecular genetic analysis reveals a putative bifunctional polyketide cyclase/dehydrase gene from *Streptomyces coelicolor* and *Streptomyces violaceoruber*, and a cyclase/O-methyltransferase from *Streptomyces glaucesens," Tetrahedron*, 47**:**6029-6043.

17. Arrowsmith, T.J., F. Malpartida, D.H. Sherman, D.A. Hopwood, A. Birch, J.A. Robinson. 1992. "Characterization of *act*I-homologous DNA encoding polyketide synthase genes from the monensin producer *Streptomyces cinnamonensis*." *Mol. Gen. Genet.* 234:254-264.

18. Sherman, D.H., Eung-Soo Kim, M.J. Bibb, and D.A. Hopwood, 1992. "Functional replacement of polyketide synthase genes in *Streptomyces coelicolor* by heterologous genes from a different polyketide pathway," *J. Bacteriol.* 174:6184-6190.

19. Malmberg, Li-Hong, Sherman, D.H., Hu, Wei-Shou, 1993. "Analysis of rate-limiting reactions in cephalosporin biosynthesis," *Annals of the New York Academy of Sciences* 665:16-26.

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