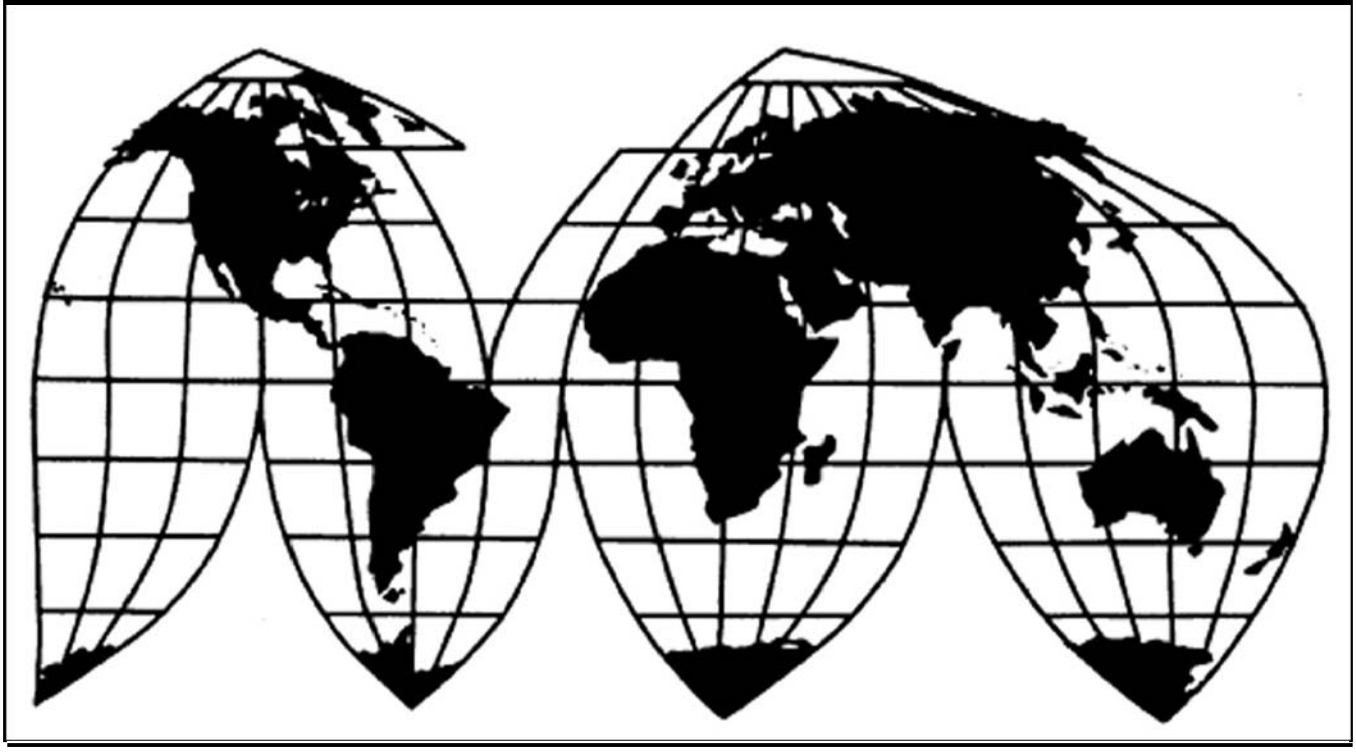
In the Matter of

Certain L-Lysine Feed Products, Their Methods Of Production And Genetic Constructs For Production

Investigation No. 337-TA-571

Publication 4113 **November 2009**

U.S. International Trade Commission



Washington, DC 20436

U.S. International Trade Commission

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U.S. International Trade Commission

Washington, DC 20436
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In the Matter of

Certain L-Lysine Feed Products, Their Methods Of Production And Genetic Constructs For Production

Investigation No. 337-TA-571

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UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C. 20436

In the Matter of **CERTAIN L-LYSINE FEED PRODUCTS, THEIR METHODS OF PRODUCTION AND GENETIC CONSTRUCTS FOR PRODUCTION**	**Investigation No. 337-TA-571**

NOTICE OF COMMISSION DETERMINATION (1) TO REVIEW AND NOT TAKE A POSITION ON CERTAIN ISSUES IN THE FINAL INITIAL DETERMINATION OF THE ADMINISTRATIVE LAW JUDGE AND (2) NOT TO REVIEW THE REMAINDER OF THE FINAL INITIAL DETERMINATION; TERMINATION OF THE INVESTIGATION

AGENCY: U.S. International Trade Commission.

ACTION: Notice.

SUMMARY: Notice is hereby given that the U.S. International Trade Commission has determined (1) to review and not take a position on certain issues in the final initial determination ("ID") of the presiding administrative law judge ("ALJ") and (2) not to review the remainder of the ID finding no violation of section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337 ("section 337"). This action terminates the investigation.

FOR FURTHER INFORMATION CONTACT: James Worth, Office of the General Counsel, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone (202) 205-3065. Copies of non-confidential documents filed in connection with this investigation are or will be available for inspection during official business hours (8:45 a.m. to 5:15 p.m.) in the Office of the Secretary, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone (202) 205-2000. General information concerning the Commission may also be obtained by accessing its Internet server at *http://www.usitc.gov*. The public record for this investigation may be viewed on the Commission's electronic docket (EDIS) at *http://edis.usitc.gov*. Hearing-impaired persons are advised that information on this matter can be obtained by contacting the Commission's TDD terminal on (202) 205-1810.

SUPPLEMENTARY INFORMATION: On May 31, 2006, the Commission instituted this investigation based upon a complaint filed on behalf of Ajinomoto Heartland LLC (Chicago, Illinois) ("Ajinomoto Heartland"). 71 *Fed. Reg.* 30958 (May 31, 2006). The complaint, as amended, alleged violations of section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337 ("section 337"), in the importation into the United States, the sale for importation, and the

sale within the United States after importation of certain L-lysine feed products and genetic constructs for production thereof by reason of infringement of claims 13, 15-19, and 21-22 of U.S. Patent No. 5,827,698 ("the '698 patent") and claims 1, 2, 15, and 22 of U.S. Patent No. 6,040, 160 ("the '160 patent").

The complaint named as respondents Global Bio-Chem Technology, Group Company Ltd. (Admiralty, Hong Kong), Changchun Dacheng Bio-Chem Engineering Development Co., Ltd., (Jilin Province, China), Changchun Baocheng Bio Development Co., Ltd. (Jilin Province, China), Changchun Dahe Bio Technology Development Co., Ltd. (Jilin Province, China), Bio-Chem Technology (HK) Ltd. (Admiralty, Hong Kong) (collectively, "GBT"). 71 *Fed. Reg.* 30958. On June 29, 2006, Ajinomoto Heartland further amended the complaint and notice of institution by adding its parent company, Ajinomoto, Inc. (Tokyo, Japan) as a complainant. 71 *Fed. Reg.* 43209 (July 31, 2006).

On October 15, 2007, the Commission determined not to review an order of the ALJ, granting Ajinomoto's motion to withdraw claims 1, 2, and 22 of the '160 patent and claims 13, 16-19, and 21-22 of the '698 patent.

On July 31, 2008, the ALJ issued his final ID, in which he found no violation of section 337 with regard to either the '160 or the '698 patents because he found that the asserted claims of both patents were invalid for failure to satisfy the best mode requirement of 35 U.S.C. § 112 ¶ 1 on two separate grounds and that both patents were unenforceable because of inequitable conduct. He found infringement of the asserted claims through importation of lysine made using the "old" strain of E. coli by GBT, but not the "new" strain, based upon the stipulation of the parties. The ALJ also found the existence of a domestic industry for the asserted claims, and found that the asserted claims were not invalid for obviousness or obviousness-type double patenting, and that the asserted patents were not unenforceable by reason of unclean hands.

On August 19, 2008, Ajinomoto petitioned for review of the ALJ's final ID regarding invalidity of the asserted claims for failure to meet the best mode requirement and unenforceability of the patents because of inequitable conduct. Neither GBT nor the Commission investigative attorney petitioned for review of any part of the ID.

Having examined the relevant portions of the record in this investigation, including the final ID, the petition for review, and the responses thereto, the Commission has determined (1) to review and take no position on (a) the ALJ's finding that claim 15 of the '160 patent is invalid for failure to meet the best mode requirement to the extent that finding is based on alleged fictitious data and (b) the ALJ's finding that the '160 patent is unenforceable for inequitable conduct and (2) not to review the remainder of the ID. Thus, the investigation is terminated with a finding of no violation of section 337.

This action is taken under the authority of section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), and in sections 210.42 - .46 of the Commission's Rules of Practice and Procedure (19 C.F.R. §§ 210.42 - .46).

By order of the Commission.

Marilyn R. Abbott
Secretary to the Commission

Issued: September 29, 2008

CERTAIN L-LYSINE FEED PRODUCTS, THEIR METHODS OF PRODUCTION AND GENETIC CONSTRUCTS FOR PRODUCTION **337-TA-571**

PUBLIC CERTIFICATE OF SERVICE

I, Marilyn R. Abbott, hereby certify that the attached **NOTICE OF COMMISSION DETERMINATION (1) TO REVIEW AND NOT TAKE A POSITION ON CERTAIN ISSUES IN THE FINAL INITIAL DETERMINATION OF THE ADMINISTRATIVE LAW JUDGE AND (2) NOT TO REVIEW THE REMAINDER OF THE FINAL INITIAL DETERMINATION; TERMINATION OF THE INVESTIGATION** has been served by hand upon the Commission Investigative Attorney Juan S. Cockburn, Esq., and the following parties as indicated, on September 29, 2008.

Marilyn R. Abbott, Secretary
U.S. International Trade Commission
500 E Street, SW
Washington, DC 20436

ON BEHALF OF COMPLAINANT AJINOMOTO HEARTLAND LLC AND AJINOMOTO, INC.:

Frank R. Samolis, Esq.
PATTON BOGGS LLP
2550 M Street, NW
Washington, DC 20037
P-202-457-6000

( ) Via Hand Delivery
( ) Via Overnight Mail
(X) Via First Class Mail
( ) Other: _____

ON BEHALF OF RESPONDENTS GLOBAL BIO-CHEM TECHNOLOGY GROUP COMPANY LIMITED, CHANGCHUN DACHENG BIO-CHEM ENGINEERING DEVELOPMENT CO., LTD., CHANGCHUN BAOCHENG BIO-CHEM DEVELOPMENT CO., LTD., CHANGCHUN DAHE BIO TECHNOLOGY DEVELOPMENT CO., LTD., AND BIO-CHEM TECHNOLOGY LIMITED:

Tom M. Schaumberg, Esq.
ADDUCI, MASTRIANI & SCHAUMBERG LLP
1200 Seventeenth Street, NW
Fifth Floor
Washington, DC 20036

( ) Via Hand Delivery
( ) Via Overnight Mail
(X) Via First Class Mail
( ) Other: _____

P-202-467-6300
F-202-466-2006

PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of	
CERTAIN L-LYSINE FEED PRODUCTS, THEIR METHODS OF PRODUCTION AND GENETIC CONSTRUCTS FOR PRODUCTION	**Inv. No. 337-TA-571**

INITIAL DETERMINATION ON VIOLATION OF SECTION 337 AND RECOMMENDED DETERMINATION ON REMEDY AND BOND

Administrative Law Judge Charles E. Bullock
(July 31, 2008)

Appearances:

For the Complainants Ajinomoto Co., Inc. and Ajinomoto Heartland LLC:

Joseph M. Malkin, Esq.; Nancy E. Harris, Esq.; Ruth Y. Kwon, Esq.; of Orrick, Herrington & Sutcliffe LLP from San Francisco, CA

Kurt T. Mulville, Esq.; Cynthia A. Lock, Esq.; Mark J. Shean, Esq.; Benjamin S. Lin, Esq.; of Orrick, Herrington & Sutcliffe LLP from Irvine, CA

Claire L. Merrin, Esq.; of Orrick, Herrington & Sutcliffe LLP from Washington, D.C.

Alex V. Chachkes, Esq.; of Orrick, Herrington & Sutcliffe LLP from New York, NY

Jeffrey A. Miller, Esq.; of Orrick, Herrington & Sutcliffe LLP from Menlo Park, CA

For the Respondents Global Bio-Chem Technology Group Company Limited, Changchun Dacheng Bio-Chem Engineering Development Co., Ltd., Changchun Boacheng Bio-Chem Development Co., Ltd., Changchun Dahe Bio Technology Development Co., Ltd. and Bio Chem Technology (HK) Limited:

Tom M. Schaumberg, Esq.; Sarah E. Hamblin, Esq.; Ian A. Taronji, Esq.; Gregory F. Geary, Esq.; of Adduci, Mastriani & Schaumberg, L.L.P. from Washington, DC

Claire Laporte, Esq.; DeAnn F. Smith, Esq.; Barbara A. Fiacco, Esq.; Jeremy Younkin, Esq.; Katherine J. Fick, Esq.; Marco J. Quina, Esq.; of Foley Hoag LLP from Boston, Massachusetts

Ruixue Ran, Esq.; of East Associates from Beijing, China

For the Commission Investigative Staff:

Lynn I. Levine, Esq., Director; Anne Goalwin, Esq., Supervising Attorney; Juan Cochburn, Esq., Investigative Attorney; of the Office of Unfair Import Investigations, U.S. International Trade Commission, from Washington, D.C.

TABLE OF CONTENTS

LIST OF ABBREVIATIONS

CDX	Complainants' demonstrative exhibit
CFF	Complainants' proposed findings of fact
CIB	Complainants' initial post-hearing brief
CORFF	Complainants' objections to Respondents' proposed findings of fact
COSFF	Complainants' objections to Staff's proposed findings of fact
CPX	Complainants' physical exhibit
CRB	Complainants' reply post-hearing brief
CX	Complainants' exhibit
Dep	Deposition
JX	Joint Exhibit
RDX	Respondents' demonstrative exhibit
RFF	Respondents' proposed findings of fact
RIB	Respondents' initial post-hearing brief
ROCFF	Respondents' objections to Complainants' proposed findings of fact
ROSFF	Respondents' objections to Staff's proposed findings of fact
RPX	Respondents' physical exhibit
RRB	Respondents' reply post-hearing brief
RX	Respondents' exhibit
SFF	Staff's proposed findings of fact
SIB	Staff's initial post-hearing brief
SOCFF	Staff's objections to Complainants' proposed findings of fact
SORFF	Staff's objections to Respondents' proposed findings of fact
SRB	Staff's reply post-hearing brief
Tr.	Transcript

CONTAINS CONFIDENTIAL BUSINESS INFORMATION

UNITED STATES INTERNATIONAL TRADE COMMISSION

Washington, D.C.

In the Matter of	
CERTAIN L-LYSINE FEED PRODUCTS, THEIR METHODS OF PRODUCTION AND GENETIC CONSTRUCTS FOR PRODUCTION	**Inv. No. 337-TA-571**

INITIAL DETERMINATION ON VIOLATION OF SECTION 337 AND RECOMMENDED DETERMINATION ON REMEDY AND BOND

Administrative Law Judge Charles E. Bullock
(July 31, 2008)

Pursuant to the Notice of Investigation and Rule 210.42(a) of the Rules of Practice and Procedure of the United States International Trade Commission, this is the Administrative Law Judge's Initial Determination in the matter of certain L-lysine feed products, their methods of production and genetic constructs for production, Investigation No. 337-TA-571.

The Administrative Law Judge hereby determines that a violation of Section 337 of the Tariff Act of 1930, as amended, has not been found in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain L-lysine feed products in connection with claim 15 of U.S. Patent No. 6,040,160 and claim 15 of U.S. Patent No. 5,827,698. Furthermore, the Administrative Law Judge hereby determines that a domestic industry in the United States exists that practices U.S. Patent Nos. 6,040,160 and 5,827,698.

DISCUSSION

I. Introduction

A. Procedural History

This investigation was instituted by the Commission on May 24, 2006 and the notice of investigation was published in the Federal Regiscter on May 31, 2006.[1] The Administrative Law Judge set a twelve-month target date of May 31, 2007 for completion of this investigation by the Commission in Order No. 2.[2]

On June 29, 2006, Complainant Ajinomoto Heartland LLC filed a motion to amend the complaint to add its parent company, Ajinomoto Co., Inc. as a complainant, which was granted by initial determination in Order No. 5, issued on July 11, 2006.

On July 7, 2006, the parties filed a joint motion to extend the target date by sixty days, or until July 20, 2007, which was granted in Order No. 7, issued on July 11, 2006.

On December 4, 2006, Complainants and Respondents filed a motion to stay this investigation for a period of 90 days in order to allow the parties to conduct good faith settlement discussions, which was granted in Order No. 11, issued on December 7, 2006. Since the parties failed to reach a settlement during the stay, on April 30, 2007, the undersigned issued Order No. 12, an initial determination extending the target date to twenty-six months, or July 20, 2008.

On August 9, 2007, Complainants filed a motion for partial termination of the investigation pursuant to Commission Rule 210.21(a)(1). Specifically, Complainants moved to withdraw claims 1, 2, and 22 of the '160 patent and claim nos. 13, 16-19, and 21-22 of the '698 patent. That motion

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[1] *See* 71 Fed. Reg. 30958.
[2] *See* Order No. 2 (May 31, 2006).

was granted by initial determination in Order No. 17, issued on August 10, 2007.[3] Accordingly, the only remaining asserted claims are claim 15 of the '160 patent and claim 15 of the '698 patent.

On August 17, 2007, Respondents filed a motion for leave to amend response to the second amended complaint and amended notice of investigation to include additional affirmative defenses, which was granted by Order No. 20, issued on September 11, 2007. Based on the granting of the motion to include additional affirmative defenses, the order directed the parties to meet and confer and to propose a modified procedural schedule to the undersigned. In addition, the order noted that the undersigned would extend the target date by initial determination, if necessary. Having received the proposed modified procedural schedule, the undersigned issued Order No. 21 on September 25, 2007, an initial determination extending the target date to twenty-nine months, or October 31, 2008. On October 11, 2007, the undersigned issued Order No. 22, modifying the procedural schedule due to a conflict in the undersigned's schedule.

On November 9, 2007, Complainants filed a motion for leave to file the a Third Amended Complaint to allege a claim of trade secret misappropriation, which was denied by Order No. 25, issued on November 27, 2007.

The parties have stipulated to certain material facts.[4] Particular stipulated facts that are relevant to this Initial Determination are cited accordingly.

An evidentiary hearing on liability was conducted before the undersigned from March 11-14, 2008. In support of its case-in-chief and rebuttal case, Ajinomoto called the following witness:

- James Liao

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[3] *See* Commission Decision Not To Review An Initial Determination Terminating The Investigation In Part (Aug. 29, 2007).

[4] *See* JX-190C (February 19, 2008 stipulation); JX-191C (March 8, 2008 stipulation).

In support of its case-in-chief and rebuttal case, Respondents called the following witnesses:

- Kazue Kawamura
- Hiroyuki Kojima
- Yoshimi Kikuchi
- Kazuo Nakanishi
- Ronald L. Somerville
- Andrew Webb

In addition, various deposition testimony was received into evidence in lieu of direct witness statements or live testimony.[5]

After the hearing, post-hearing briefs and reply briefs, together with proposed findings of fact, conclusions of law and rebuttals to the same, were filed on April 4, 2008 and April 11, 2008, respectively.

B. The Parties

1. Complainants

Complainants in this investigation are Ajinomoto Heartland LLC, a United States corporation ("Heartland") and Ajinomoto Co., Inc. ("Ajinomoto Japan"), a Japanese corporation (collectively "Ajinomoto"). Heartland is a wholly-owned subsidiary of Ajinomoto Japan. Heartland is based in Chicago, Illinois, and has production facilities in Eddyville, Iowa. Ajinomoto Japan has its principal place of business in Tokyo, Japan.[6] Ajinomoto Japan is a worldwide leader in the areas of amino acid biosynthesis and commercial production.[7]

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[5] *See* CX-251C (Deposition of Dehui Wang); CX-252C (Deposition of Weigang Li); RX-51C (Deposition of Atsushi Sasamori); RX-52C (Deposition of Yoshinari Shiroshita); RX-53C (Deposition of Julian Maxwell).

[6] *See* Second Amended Complaint, ¶ 2.2.

[7] Amended Complaint, ¶¶ 2.1-2.8.

2. Respondents

Respondents in this investigation are Global Bio-Chem Technology Group Company Limited, Changchun Dacheng Bio-Chem Engineering Development Co., Ltd., Changchun Baocheng Bio-Chem Development Co., Ltd., Changchun Dahe Bio Technology Development Co., Ltd., and Bio-Chem Technology (HK) Limited (collectively "GBT"). Global Bio-Chem Technology Group Company Limited ("GBT Hong Kong"), is a Cayman Islands corporation with its principal place of business in Hong Kong. Changchun Dacheng Bio-Chem Engineering Development Co., Ltd. ("Dacheng Bio-Chem") is a Chinese company with a principal place of business in Jilin Province, China. Changchun Baocheng Bio-Chem Development Co., Ltd. ("Baocheng Bio-Chem") is a Chinese company with a principal place of business in Jilin Province, China.[8] Changchun Dahe Bio Technology Development Co., Ltd. ("Dahe Bio Technology") is a Chinese company with a principal place of business in Jilin Province, China. Complainants assert that the packaging of the accused products indicates that Dahe Bio Technology is the authorized manufacturer.[9] Bio-Chem Technology (HK) Limited ("Bio Chem Technology") assists GBT Hong Kong in the manufacture, production and distribution of L-lysine. Bills of lading for the accused products denote Bio Chem Technology as a "shipper."[10]

C. Overview of the Technology

At issue in this investigation are certain L-lysine feed products, their methods of production and genetic constructs for production. Both the '160 and '698 patents are related to the use of genetically engineered Escherichia bacteria that produce L-lysine ("lysine"). Lysine is an amino acid

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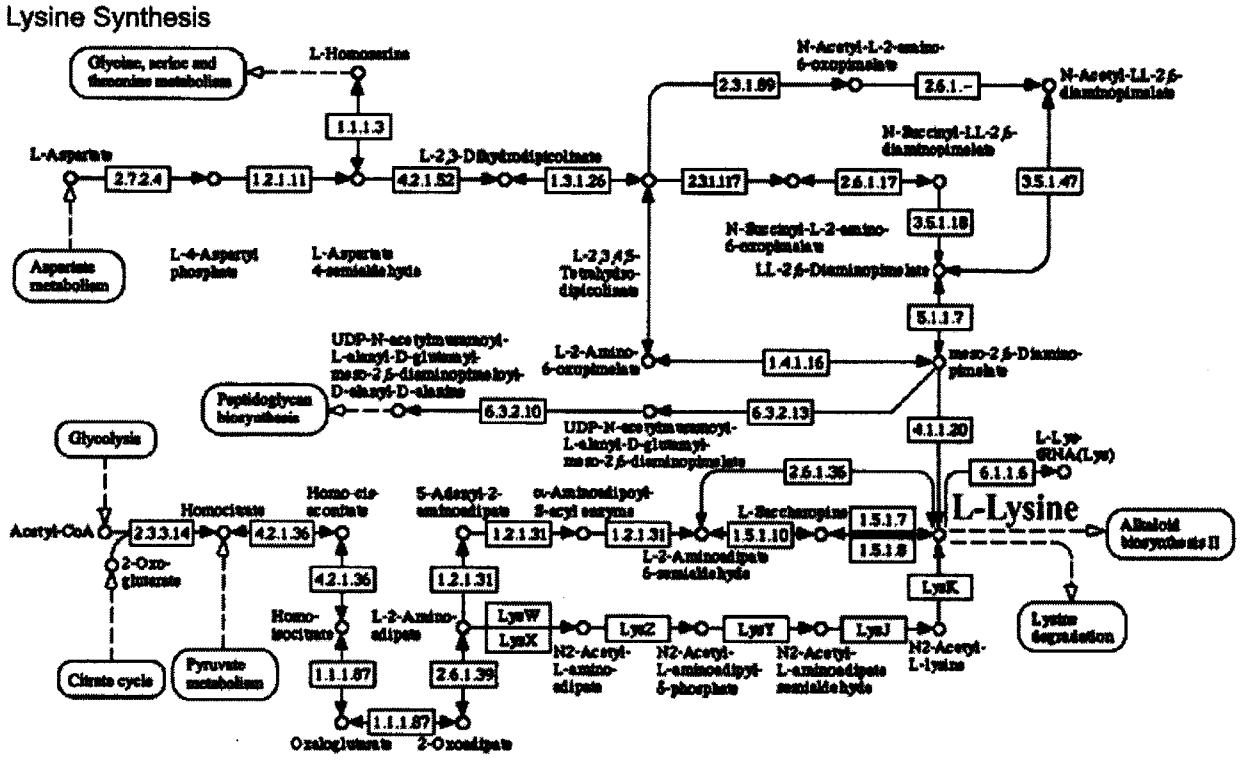
[8] *See* Amended Complaint, Ex. 3-6.
[9] Amended Complaint, ¶¶ 3.2-3.3, Ex. 3-5.
[10] Amended Complaint, ¶ 3.2, ¶ 3.10, Ex. 3-5, 10.

frequently added as a necessary dietary supplement in the feed of pigs and poultry. Animals fed high concentrations of grass or grain lack substantial amounts of lysine in their diet, and, because these animals cannot produce it themselves from other nutrients, lysine must be included as a dietary additive or supplement. Lysine and other amino acids can be produced by fermentation, *viz.*, by cultivating bacteria and collecting the desired fermentation product from the culture medium.

Wild-type E.coli[11] bacteria naturally convert sugars into lysine for their own internal use through a known biosynthetic pathway that involves a complicated sequence of intracellular chemical reactions. The biosynthetic pathway of L-lysine in wild-type strains of E.coli. is shown below:[12]

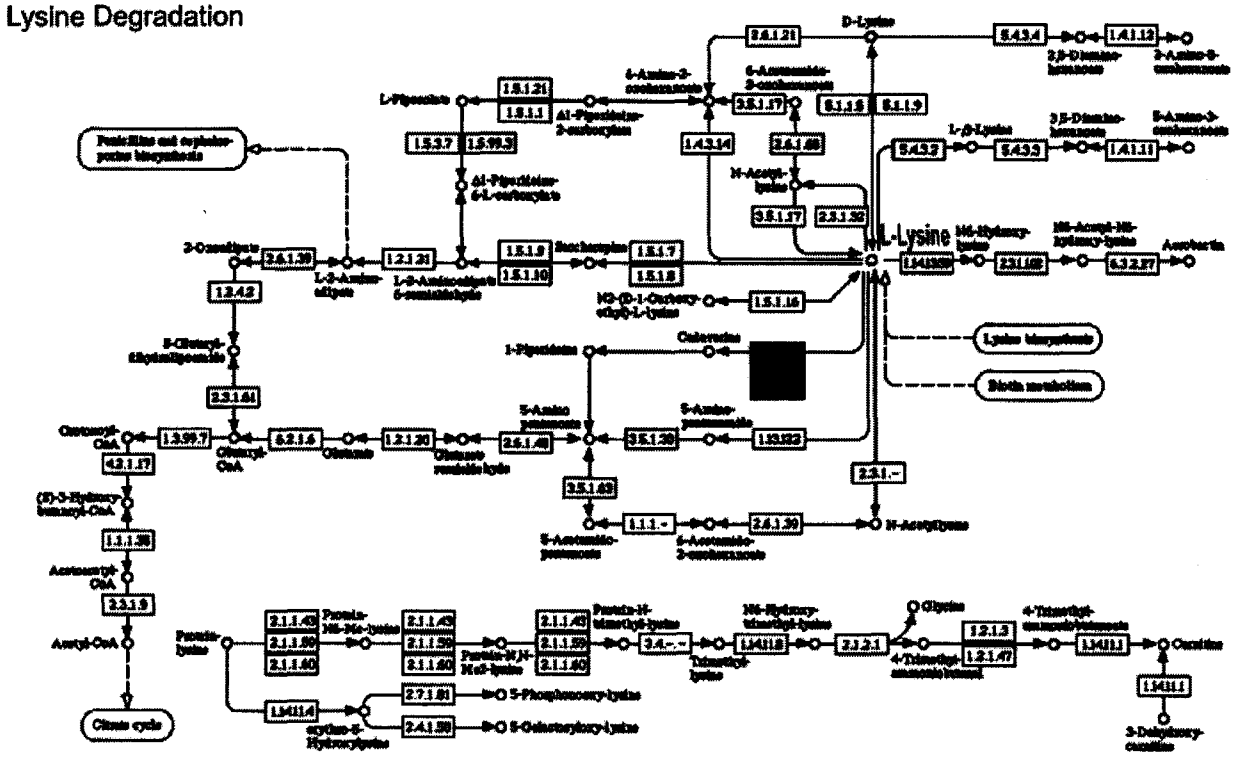


[11] Bacterial cells that have not undergone genetic engineering are known as "wild-type" cells.

[12] *See* CX-235C (Kojima WS) at ¶ 24.

This series of reactions regulates the synthesis of lysine such that the organism makes only enough for the organism's own metabolic demands. If sufficient lysine is present to meets the organism's needs, certain of the reactions necessary for the cell to produce lysine become subject to "feedback inhibition," *viz.*, the presence of the end product, lysine, inhibits the E.coli from producing more lysine. The '160 patent relates to an Escherichia bacteria with genetic mutations that desensitize the feedback inhibited enzymes so that they continue to catalyze the reactions necessary to produce lysine even when the amount of lysine needed by the cell is already available.

Wild-type E.coli also have an intracellular mechanism to break down or degrade lysine into other related compounds. This occurs through the known lysine degradation pathways shown below:[13]



[13] *Id.* at ¶25.

The enzymes that decompose lysine are referred to as lysine decarboxylases. The '698 patent is directed to one of the lysine decarboxylase genes, known as "ldc." The '698 patent teaches that this gene can be mutated to eliminate or reduce the decarboxylation of lysine so that the cell will not destroy the surplus lysine it produces.

D. The Patents at Issue

1. U.S. Patent No. 6,040,160 ("the '160 patent")

The '160 patent, titled "Method of Producing L-lysine by Fermentation," was originally filed on December 8, 1993 in Japan with Serial #5-308397. It was subsequently filed through the Patent Cooperation Treaty ("PCT") on November 28, 1994, bearing Serial PCT/JP94/01994, and was published June 15, 1995 as document W095/16042.[14] The application entered the national phase in the United States on June 9, 1997 as Serial #08/648,010 and issued as the '160 patent on March 21, 2000.[15] The named inventors are Hiroyuki Kojima, Yuri Ogawa, Kazue Kawamura and Konosuke Sano.[16] In their declaration, the inventors of the '160 patent attest that they are the original and sole inventors of the subject matter set forth in the specification of the PCT application, and claim the benefit of the original Japanese application filing date.[17] The patent was assigned to Ajinomoto Co., Inc., the current owner of the '160 patent.[18]

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[14] The inventors of the '160 patent made substantial revisions which greatly expanded the original Japanese application to create the PCT/US application. For example, all of the information in the specification subsequent to Example 6, including Figures 10-24, was added to the PCT/US application. RX-89(Webb WS) at ¶¶ 31-34; RFF 1.67 (no dispute). The added text primarily disclosed information concerning the "enhancement" of the dapB gene, which was not mentioned in the original filing. RX-89(Webb WS) at ¶ 34; RFF 1.68-1.69 (no dispute).

[15] *See* JX-1, cover page.

[16] *Id.*

[17] JX-112 at AAH L000595-597; CX-126.

[18] *See* JX-190C at ¶ 2.

The Japanese priority application for the '160 patent identifies mutations in two genes in the biosynthesis pathway of L-lysine. One of these pathways for the production of lysine uses an enzyme, dihydrodipicolinate synthase ("DDPS"), which is encoded by the dapA gene. DDPS catalyzes a reaction in the lysine biosynthesis pathway, but can be inhibited by the presence of lysine itself through feedback inhibition. As previously discussed, feedback inhibition refers to a process where an end-product of a reaction pathway, in this case lysine, inhibits an enzyme, in this case DDPS, involved in the pathway to regulate the production of the end product. Thus, as the amount of lysine inside the cell increases, lysine binds to the DDPS enzyme, decreasing the DDPS activity and regulating the overall lysine production pathway. Thus, feedback inhibition hinders the production of lysine.

The '160 patent has a total of 22 claims. The sole claim from the '160 patent at issue in this investigation is claim 15. Claim 15 covers a method of producing L-lysine by cultivating a microorganism of the genus Escherichia with the specified mutations in the dapA gene, producing and accumulating lysine in the culture and collecting the lysine from the culture.[19] Claim 15 is dependent on claim 3. Claim 3 describes the specific mutations to the dapA gene sequence at the 81st and/or 118th amino acid in the DDPS enzyme.[20]

2. U.S. Patent No. 5,827,698 ("the '698 patent")

The '698 patent, titled "Lysine Decarboxylase Gene and Method of Producing L-lysine," was originally filed on December 9, 1994 in Japan with Serial #6- 306386.[21] It was subsequently filed through the Patent Cooperation Treaty on December 5, 1995, bearing Serial #PCT/JP95/02481, and

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[19] *See e.g.*, JX-1 at 68:1-15.
[20] *See id.* at 61:43-62:17.
[21] *See* JX-2, cover page.

was published June 13, 1996 as document W096/17930. The application entered the national phase in the United States June 9, 1997, as the Serial #08/648,010 and issued as the '698 patent on October 27, 1998.[22] The named inventors are Yoshimi Kikuchi, Tomoko Suzuki and Hiroyuki Kojima.[23] The inventors of the '698 patent attest that they are the original and sole inventors of the subject matter set forth in the specification of the PCT application, PCT/JP95/02481, and claim the benefits of the original Japanese application, Japan 6-306386, filed December 9, 1994.[24] The patent was assigned to Ajinomoto Co., Inc., the current owner of the '698 patent.[25]

The '698 patent addresses an issue with using E. coli to produce lysine by targeting the lysine degradation pathway. Wild-type E.coli produce two enzymes called lysine decarboxylases that catalyze a reaction whereby lysine is decomposed into a by-product called cadaverine. Cadaverine has no nutritional value and contaminates the lysine collection process in the factory making it difficult and costly to separate and collect lysine from the liquid culture after removal from the fermentation tanks. While one gene that expresses a lysine decarboxylase, the *cad*A gene, was already known, the '698 patent discloses a second lysine decarboxylase gene, the ldc gene. The '698 patent discloses that by eliminating the wild-type ldc gene and introducing a mutated ldc gene with less or no lysine decarboxylase activity, the production of the lysine decarboxylase enzyme was reduced or eliminated and thus, lysine degradation was eliminated.

The '698 patent has a total of 22 claims. The sole claim at issue in the '698 patent is Claim 15. Claim 15 of the '698 patent depends from claim 13, which in turn depends from claim 3 of the

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[22] *Id.*
[23] *Id.*
[24] *See* JX-108 at AAHL000046-048.
[25] *See* JX-190C ¶ 1.

patent. Claim 15 covers a method of producing L-lysine using a microorganism of the species E.coli lacking the wild-type ldc gene, and having a mutated ldc gene to reduce or eliminate lysine decarboxylase expression that would otherwise degrade the lysine production.[26] Claim 15 also covers the production and accumulation of lysine in a culture and collecting the lysine from the culture.[27] Claim 3 describes the specific mutations to the ldc gene.[28]

E. The Products at Issue

The product at issue is L-lysine, an amino acid, produced by genetically modified Escherichia bacteria. Lysine is an essential amino acid frequently added as a necessary dietary supplement in the feed of pigs and poultry.[29] Animals fed high concentrations of grass or grain lack substantial amounts of lysine in their diet, and, because these animals cannot produce it themselves from other nutrients, lysine must be included as a dietary additive or supplement.[30]

II. Jurisdiction and Importation

Section 337 confers subject matter jurisdiction on the International Trade Commission to investigate, and if appropriate, to provide a remedy for, unfair acts and unfair methods of competition in the importation of articles into the United States. In order to have the power to decide a case, a court or agency must have both subject matter jurisdiction, and jurisdiction over either the parties or the property involved.[31]

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[26] *See* JX-2 at 31:19-37.

[27] *Id.*

[28] *Id.* at 31:19-38.

[29] *See* JX-190C at ¶ 3; CX-231C (Liao WS) at ¶ 42.

[30] *See* CX-231C (Liao WS) at ¶ 42.

[31] 19 U.S.C. § 1337; *also see Certain Steel Rod Treating Apparatus and Components Thereof*, Inv. No. 337-TA-97, Commission Memorandum Opinion, 215 U.S.P.Q. 229, 231 (1981) ("*Certain Steel Rod*").

A. Subject Matter Jurisdiction

The complaint alleges that GBT has violated Subsection 337(a)(1)(A) and (B) in the importation and sale of products that infringe the asserted patents. Ajinomoto and GBT stipulate that GBT imports into the United States the accused L-lysine products, and that its products made with its so-called "Old E.coli" are covered by asserted claim 15 of each of the '160 and '698 patents.[32] Specifically, Ajinomoto and GBT stipulate that GBT has imported into the United States, and continues to import into the United States, L-lysine feed products manufactured using the bacteria strain deposited with the ATCC under Accession #SD-5590, Accession #SD-5620 and Accession #SD-5717.[33] Ajinomoto and GBT also stipulate that after importation, such products have been sold to United States customers.[34] Thus, the undersigned finds the Commission has jurisdiction over this investigation under Section 337 of the Tariff Act of 1930.[35]

B. Personal Jurisdiction

GBT has responded to the Complaint and Notice of Investigation. They have participated in the investigation by, among other things, participating in discovery, participating in the hearing, and filing pre- and post-hearing briefs. Accordingly, GBT has submitted to the personal jurisdiction of the Commission.[36] The Commission has *in rem* jurisdiction over the products at issue by virtue of

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[32] *See* JX-190C at ¶¶ 9, 10, 13.

[33] JX-192C at ¶ 13.

[34] *Id.*

[35] *See* 19 U.S.C. § 1337(a)(l)(A)-(B); *Amgen, Inc. v. U.S. Int'l Trade Comm'n*, 902 F.2d 1532, 1536 (Fed. Cir. 1990) ("*Amgen*").

[36] *See Certain Miniature Hacksaws*, Inv. No. 337-TA-237, U.S.I.T.C. Pub. No. 1948, Initial Determination (unreviewed by Commission in relevant part) at 4, 1986 WL 379287 (U.S.I.T.C. October 15, 1986) ("*Certain Miniature Hacksaws*").

GBT's admission that the accused products have been imported into the United States.[37]

III. Relevant Law

A. Validity

A patent is presumed valid.[38] The party challenging a patent's validity has the burden of overcoming this presumption by clear and convincing evidence.[39] Since the claims of a patent measure the invention at issue, the claims must be interpreted and given the same meaning for purposes of both validity and infringement analyses. As with an infringement analysis, an analysis of invalidity involves two steps: the claim scope is first determined, and then the properly construed claim is compared with the prior art to determine whether the claimed invention is anticipated and/or rendered obvious.[40]

1. Anticipation, 35 U.S.C. §§ 102 (a), (b) and (e)

A patent may be found invalid as anticipated under 35 U.S.C. § 102(a) if "the invention was known or used by others in this country, or patented or described in a printed publication in this country, or patented or described in a printed publication in a foreign country, before the invention thereof by the applicant for patent."[41] A patent may be found invalid as anticipated under 35 U.S.C. § 102(b) if "the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the

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[37] *See Sealed Air Corp. v. United States Int'l Trade Comm'n.*, 645 F.2d 976,985 (C.C.P.A. 1981).

[38] 35 U.S.C. § 282; *Richardson-Vicks Inc. v. Upjohn Co.*, 122 F.3d 1476, 1480 (Fed. Cir. 1997) ("*Richardson-Vicks*").

[39] *Richardson-Vicks Inc., supra; Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044 (Fed. Cir.) ("*Uniroyal*"), *cert. denied*, 488 U.S. 825 (1988).

[40] *Amazon.com, Inc. v. Barnesandnoble.com, Inc.*, 239 F.3d 1343, 1351 (Fed. Cir. 2001) ("*Amazon.com*").

[41] 35 U.S.C. § 102(a).

application for patent in the United States."[42] Under 35 U.S.C. § 102(e), a patent is invalid as anticipated if "the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent."[43] Anticipation is a question of fact.[44]

Under the foregoing statutory provision, a claim is anticipated and therefore invalid when "the four corners of a single, prior art document describe[s] every element of the claimed invention, either expressly or inherently, such that a person of ordinary skill in the art could practice the invention without undue experimentation."[45] To be considered anticipatory, the prior art reference must be enabling and describe the applicant's claimed invention sufficiently to have placed it in possession of a person of ordinary skill in the field of the invention.[46] But, the degree of enabling detail contained in the reference does not have to exceed that contained in the patent at issue.[47]

Further, the disclosure in the prior art reference does not have to be express, but may anticipate by inherency where the inherency would be appreciated by one of ordinary skill in the art.[48] To be inherent, the feature must necessarily be present in the prior art.[49] Inherency may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given

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[42] 35 U.S.C. § 102(b).

[43] 35 U.S.C. § 102(e).

[44] *Texas Instruments, Inc. v. U.S. Int'l Trade Comm'n*, 988 F.2d 1165, 1177 (Fed. Cir. 1993) ("*Texas Instruments II*").

[45] *Advanced Display Sys., Inc. v. Kent State Univ.*, 212 F.3d 1272, 1282 (Fed. Cir. 2000), *cert. denied*, 532 U.S. 904 (2001) ("*Advanced Display Systems*").

[46] *Helifix Ltd. v. Blok-Lok, Ltd.*, 208 F.3d 1339, 1346 (Fed. Cir. 2000) ("*Helifix*"); *In re Paulsen,* 30 F.3d 1475, 1478 (Fed. Cir. 1994) ("*Paulsen*").

[47] *Paulsen*, 30 F.3d at 1481 n.9.

[48] *Glaxo Inc. v. Novopharm Ltd.*, 52 F.3d 1043, 1047 (Fed. Cir.), *cert. denied*, 516 U.S. 988 (1995) ("*Glaxo*").

[49] *See Finnigan Corp. v. U.S. Int'l Trade Comm'n*, 180 F.3d 1354, 1365-66 (Fed. Cir. 1999) ("*Finnigan*").

set of circumstances is not sufficient. If, however, the disclosure is sufficient to show that the natural result flowing from the operation as taught would result in the performance of the questioned function, it seems to be well settled that the disclosure should be regarded as sufficient. This modest flexibility in the rule that "anticipation" requires that every element of the claims appear in a single reference accommodates situations where the common knowledge of technologists is not recorded in the reference; that is, where technological facts are known to those in the field of the invention, albeit not known to judges.[50]

2. Obviousness, 35 U.S.C. § 103 (a)

Under 35 U.S.C. § 103(a), a patent is valid unless "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains."[51] The ultimate question of obviousness is a question of law, but "it is well understood that there are factual issues underlying the ultimate obviousness decision."[52]

Once claims have been properly construed, "[t]he second step in an obviousness inquiry is to determine whether the claimed invention would have been obvious as a legal matter, based on underlying factual inquiries including : (1) the scope and content of the prior art, (2) the level of ordinary skill in the art, (3) the differences between the claimed invention and the prior art ; and (4) secondary considerations of non-obviousness" (also known as "objective evidence").[53] Although the

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[50] *See Cont'l Can Co. v. Monsanto Co.*, 948 F.2d 1264, 1268-69 (Fed. Cir. 1991) ("*Continental Can* "); *Finnigan*, 180 F.2d at 1365.

[51] 35 U.S.C. § 103(a).

[52] *Richardson-Vicks Inc.*, 122 F.3d at 1479; *Wang Lab., Inc. v. Toshiba Corp.*, 993 F.2d 858, 863 (Fed. Cir. 1993) ("*Wang Laboratories*").

[53] *Smiths Indus. Med. Sys., Inc. v. Vital Signs, Inc.*, 183 F.3d 1347, 1354 (Fed. Cir. 1999) (continued...)

Federal Circuit case law also required that, in order to prove obviousness, the patent challenger must demonstrate, by clear and convincing evidence, that there is a "teaching, suggestion, or motivation to combine, the Supreme Court has rejected this "rigid approach" employed by the Federal Circuit in *KSR Int'l Co. v. Teleflex Inc.*:[54]

> When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability. For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill. Sakraida and Anderson's-Black Rock are illustrative–a court must ask whether the improvement is more than the predictable use of prior art elements according to their established function.
>
> Following these principles may be more difficult in other cases than it is here because the claimed subject matter may involve more than the simple substitution of one known element for another or the mere application of a known technique to a piece of prior art ready for the improvement. Often, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue. To facilitate review, this analysis should be made explicitly. *See In re Kahn*, 441 F.3d 977, 988 (CA Fed. 2006) ("[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusions of obviousness"). As our precedents make clear, however, the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.
>
> [. . .]
>
> The obviousness analysis cannot be confined by a formalistic conception of the words teaching, suggestion, and motivation, or by overemphasis on the importance of published articles and the explicit content of issued patents. The diversity of inventive

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[53](...continued)
("*Smiths Industries*"), citing *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966) ("*Graham*").

[54] *KSR Int'l Co. v. Teleflex Inc.*, 500 U.S. – (2007), 127 S.Ct. 1727, 1739 ("*KSR*").

> pursuits and of modern technology counsels against limiting the analysis in this way. In many fields it may be that there is little discussion of obvious techniques or combinations, and it often may be the case that market demand, rather than scientific literature, will drive design trends. Granting patent protection to an advance that would occur in the ordinary course without real innovation retards progress and may, in the case of patents combining previously known elements, deprive prior inventions of their value or utility.[55]

"Secondary considerations," also referred to as "objective evidence of non-obviousness," such as "commercial success, long felt but unsolved needs, failure of others, etc." may be used to understand the origin of the subject matter at issue, and may be relevant as indicia of obviousness or non-obviousness.[56] Secondary considerations may also include copying by others, prior art teaching away, and professional acclaim.[57]

Evidence of "objective indicia of non-obviousness," also known as "secondary considerations," must be considered in evaluating the obviousness of a claimed invention, but the existence of such evidence does not control the obviousness determination. A court must consider all of the evidence under the *Graham* factors before reaching a decision on obviousness.[58] In order to accord objective evidence substantial weight, its proponent must establish a nexus between the evidence and the merits of the claimed invention, and a *prima facie* case is generally made out "when the patentee shows both that there is commercial success, and that the thing (product or method) that

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[55] *KSR*, 500 U.S. at – ; 127 S.Ct. at 1740-41.

[56] *Graham*, 383 U.S. at 17-18.

[57] *See Perkin-Elmer Corp. v. Computervision Corp.*, 732 F.2d 888, 894 (Fed. Cir. 1984) ("*Perkin-Elmer*"), *cert. denied*, 469 U.S. 857 (1984); *Avia Group Int'l, Inc. v. L.A. Gear California*, 853 F.2d 1557, 1564 (Fed. Cir. 1988) ("*Avia*") (copying by others); *In re Hedges*, 783 F.2d 1038, 1041 (Fed. Cir. 1986) ("*Hedges*") (prior art teaching away; invention contrary to accepted wisdom); *Kloster Speedsteel AB v. Crucible Inc.*, 793 F.2d 1565 (Fed. ir. 1986) ("*Kloster*"), *cert. denied*, 479 U.S. 1034 (1987) (wide acceptance and recognition of the invention).

[58] *Richardson-Vicks Inc.*, 122 F.3d at 1483-84.

is commercially successful is the invention disclosed and claimed in the patent."[59] Once the patentee has made a *prima facie* case of nexus, the burden shifts to the challenger to show that the commercial success was caused by "extraneous factors other than the patented invention, such as advertising, superior workmanship, etc."[60]

3. Written Description/Enablement, 35 U.S.C. § 112, ¶ 1

Section 112, ¶ 1 of Title 35 requires that the specification describe the manner and process of making and using the invention "in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same."

The issue of whether a disclosure is enabling is a matter of law.[61] "To be enabling, the specification of a patent must teach those skilled in the art how to make and use the full scope of the claimed invention without 'undue experimentation.'"[62] "Patent protection is granted in return for an enabling disclosure of an invention, not for vague, intimations of general ideas that may or may not be workable."[63] Although a specification need not disclose minor details that are well known in the art, "[i]t is the specification, not the knowledge of one skilled in the art, that must supply the novel aspects of an invention in order to constitute adequate enablement," and in so doing the specification

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[59] *In re GPAC Inc.*, 57 F.3d 1573, 1580 (Fed. Cir. 1995) ("*GPAC*"); *Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1392 (Fed. Cir. 1988), *cert. denied*, 488 U.S. 956 (1988) ("*Demaco*"); *Certain Crystalline Cefadroxil Monohydrate*, Inv. No. 337-TA-293, Commission Opinion (March 15, 1990),15 U.S.P.Q.2d 1263, 1270 ("*Certain Crystalline*").

[60] *Id.* at 1393.

[61] *Applied Materials, Inc. v. Advanced Semiconductor Materials America, Inc.*, 98 F.3d 1563, 1575 (Fed. Cir. 1996) ("*Applied Materials*").

[62] *Genentech, Inc. v. Novo Nordisk, A/S*, 108 F.3d 1361, 1365 (Fed. Cir. 1997) ("*Genentech*").

[63] *Id.* at 1366.

cannot merely provide "only a starting point, a direction for further research."[64] On the other hand, "[i]t is not fatal if some experimentation is needed, for the patent document is not intended to be a production specification."[65] "Undue experimentation" is "a matter of degree" and "not merely quantitative, since a considerable amount of experimentation is permissible, if it is merely routine, or if the specification in question provides a reasonable amount of guidance with respect to the direction in which the experimentation should proceed ...."[66]

It is well-settled that in order to be enabling under Section 112, "the patent must contain a description sufficient to enable one skilled in the art to make and use the full scope of the claimed invention."[67] Section 112 requires that the scope of the claims must bear a reasonable correlation to the scope of enablement provided by the specification to such persons.[68]

4. Best Mode, 35 U.S.C. § 112, ¶ 1

Section 112, ¶ 1 of Title 35 of the United States Code sets out the best mode requirement, stating in relevant part that "[t]he specification shall contain . . . and shall set forth the best mode contemplated by the inventor of carrying out the invention."[69] The Court of Appeals for the Federal Circuit has held that "[t]he purpose of the best mode requirement is to ensure that the public, in exchange for the rights given the inventor under the patent laws, obtains from the inventor a full

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[64] *Id.*

[65] *Northern Telecom, Inc. v. Datapoint Corp.*, 908 F.2d 931, 941 (Fed. Cir. 1990) ("*Northern Telecom*").

[66] *PPG Industries, Inc. v. Guardian Industries Corp.*, 75 F.3d 1558, 1564 (Fed. Cir. 1996) ("*PPG Industries*").

[67] *United States v. Teletronics, Inc.*, 857 F.2d 778, 785 (Fed. Cir. 1988) ("*Teletronics*"); *see also Amgen, Inc. v. Chugai Pharmaceutical Co., Ltd.*, 927 F.2d 1200, 1213 (Fed. Cir. 1991) ("*Chugai*") (inventor's disclosure must be "sufficient to enable on skilled in the art to carry out the invention commensurate with the scope of his claims").

[68] *Application of Fischer*, 427 F.2d 833, 839 (C.C.P.A. 1970) ("*Fischer*").

[69] 35 U.S.C. § 112 ¶ 1.

disclosure of the preferred embodiment of the invention."[70] The determination of whether the best mode requirement is satisfied is a question of fact, which must be proven by clear and convincing evidence.[71]

In determining compliance with the best mode requirement, two inquires are undertaken. The first inquiry is whether, at the time of filing the patent application, the inventor considered a particular mode of practicing the invention superior to all other modes.[72] This first inquiry is subjective and focuses on the inventor's state of mind at the time the patent application was filed. The second inquiry is whether the inventor's disclosure is adequate to enable one of ordinary skill in the art to practice the best mode of the invention. This second inquiry is objective and depends on the scope of the claimed invention and the level of skill in the relevant art.

The "contours of the best mode requirement are defined by the scope of the "claimed invention" and thus, the first task in any best mode analysis is to define the invention.[73] "The definition of the invention, like the interpretation of the patent claims, is a legal exercise, wherein the ordinary principles of claim construction apply."[74] Once the invention is defined, the best mode inquiry moves to determining whether a best mode of carrying out that invention was held by the

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[70] *Dana Corp. v. IPC Ltd. Partnership*, 860 F.2d 415, 418 (Fed. Cir. 1988), *cert. denied*, 490 U.S. 1067 (1989) ("*Dana Corp.*").

[71] *Transco Products Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 559-60 (Fed. Cir. 1994) ("*Transco*").

[72] *See Liquid Dynamics Corp. v. Vaughan Co., Inc.*, 449 F.3d 1209, 1223 (Fed.Cir. 2006); *see also Spectra-Physics, Inc. v. Coherent, Inc.*, 827 F.2d 1524, 1535 (Fed. Cir. 1987) (The specificity of disclosure necessary to meet the best mode requirement is determined "by the knowledge of facts within the possession of the inventor at the time of filing of the application.") ("*Spectra-Physics*").

[73] *Northern Telecom Ltd. v. Samsung Electronics Co., Ltd.*, 215 F.3d 1281, 1286-87 (Fed. Cir. 2000).

[74] *Id.*

inventor. If so, that best mode must be disclosed. In *Pfizer, Inc. v. Teva Pharmaceuticals USA, Inc.*, 518 F.3d 1353 (Fed. Cir. 2008), the Federal Circuit summarized its best mode jurisprudence as follows:

> We held that the best mode requirement does demand disclosure of an inventor's preferred embodiment of the claimed invention. However, it is not limited to that. We have recognized that best mode requires inventors to disclose aspects of making or using the claimed invention [when] the undisclosed matter materially affects the properties of the claimed invention.[75]

B. Inequitable Conduct

A patent is unenforceable on grounds of "inequitable conduct" if the patentee withheld material information from the PTO with intent to mislead or deceive the PTO into allowing the claims.[76] Both materiality and intent must be proven by clear and convincing evidence.[77] When inequitable conduct occurs in relation to one or more claims of a patent, the entire patent is unenforceable.[78]

According to the rules of the PTO, the duty to disclose information "exists with respect to each pending claim until the claim is canceled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is canceled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which

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[75] *Pfizer*, 518 F.3d at 1364 (internal quotations and citations omitted).

[76] *LaBounty Mfr., Inc. v. U.S. Int'l Trade Comm'n*, 958 F.2d 1066, 1070-1074 (Fed. Cir. 1992) ("*LaBounty*").

[77] *Id.*; *Kingsdown Med. Consultants, Ltd. v. Hollister, Inc.*, 863 F.2d 867, 872 (Fed. Cir. 1988), *cert. denied*, 490 U.S. 1067 (1989) ("*Kingsdown*"); *Certain Salinomycin Biomass and Preparations Containing Same*, Inv. No. 337-TA-370, Unreviewed Initial Determination at 76, 1995 WL 1049822 (U.S.I.T.C. November 6, 1995), *aff'd sub nom. Kaken Pharmaceutical Co., Ltd. v. U.S. Int'l Trade Comm'n*, 111 F.3d 143 (Fed. Cir. 1997) (Table) (nonprecedential) ("*Salinomycin*").

[78] *Kingsdown*, 863 F.2d at 874.

is not material to the patentability of any existing claim."[79]

Generally, when withheld information is highly material, a lower showing of deceptive intent will be sufficient to establish inequitable conduct.[80] Moreover, "[d]irect proof of wrongful intent is rarely available but may be inferred from clear and convincing evidence of the surrounding circumstances."[81] The conduct at issue must be viewed in light of all the evidence, including evidence of good faith.[82]

"Information is material where there is a substantial likelihood that a reasonable examiner would consider it important in deciding whether to allow the application to issue as a patent."[83] A patent applicant, however, has no obligation to disclose a reference that is cumulative or less pertinent than those already before the examiner.[84] Under the rules of the PTO, information is material when it is not cumulative to information of record and it either (i) "establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim"; or (ii) "it refutes, or is inconsistent with, a position the applicant takes" in either opposing the PTO's argument of unpatentability or asserting the applicant's own argument of patentability.[85] Close cases, however, "should be resolved by disclosure, not unilaterally by applicant."[86]

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[79] 37 C.F.R. § 1.56(a).

[80] *American Hoist & Derrick Co. v. Sowa & Sons, Inc.*, 725 F.2d 1350, 1363 (Fed. Cir.), *cert. denied*, 469 U.S. 821 (1984) ("*American Hoist*").

[81] *LaBounty*, 958 F.2d at 1076; *Salinomycin*, ID at 77.

[82] *Kingsdown*, 863 F.2d at 876; *Salinomycin*, ID at 77.

[83] *LaBounty*, 958 F.2d at 1074; *Salinomycin*, ID at 77.

[84] *Halliburton Co. v. Schlumberger Tech. Corp.*, 925 F.2d 1435, 1439-40 (Fed. Cir. 1991) ("*Halliburton*").

[85] 37 C.F.R. § 1.56(b).

[86] *Abbott Laboratories v. TorPharm, Inc.*, 300 F.3d 1367, 1379 (Fed. Cir. 2002) ("*TorPharm*") *quoting LaBounty,* 958 F.2d at 1076.

C. Unclean Hands

The unclean hands doctrine provides that a court's equitable power "can never be exerted on behalf of one who has acted fraudulently, or who by deceit or any unfair means has gained an advantage."[87] Courts will only apply the doctrine when it has been shown that the inequitable conduct bears "an immediate and necessary relation to the equity" that the patent holder seeks in litigation.[88] Unclean hands must be proven by clear and convincing evidence.[89]

IV. The '160 Patent

A. Claim Construction

1. Asserted Claims

Claim 15 is the only asserted claim of the '160 patent. Claim 15 of the '160 patent depends from independent claim 3. Claim 15 reads as follows:

> 15. A method of producing L-lysine, comprising:
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> cultivating the bacterium of claim 3 in a suitable culture medium, producing and accumulating L-lysine in the culture thereof, and collecting L-lysine from the culture.[90]

Independent claim 3 reads as follows:

> 3. A bacterium belonging the genus Escherichia which is transformed with a DNA coding for a dihydrodipicolinate synthase originating from a bacterium belonging to the genus Escherichia and having mutation to desensitize feedback

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[87] *Keystone Driller Co. v. General Excavator Co.*, 290 U.S. 240, 245 (1933).

[88] *Certain Home Vacuum Packaging Products*, 337-TA-496, 2004 WL 1082507, Notice at 88-89 (March 2004); *see also Precision Instrument Mfg., Co. v. Automotive Maint. Mach. Co.*, 324 U.S. 806, 815 (1945).

[89] *In re Omeprazole Patent Litigation*, 483 F.3d 1364, 1374 (Fed. Cir. 2007) ("Andrx bears the burden of proving by clear and convincing evidence that Astra acted with unclean hands."). Notably, GBT incorrectly asserts in its post-hearing brief that the standard is preponderance of the evidence. *See* RIB at 69.

[90] JX-1 at 68:1-5.

inhibition by L-lysine, wherein the mutation is selected from the group consisting of

(a) a mutation to replace the alanine residue at the 81st position as counted from the N-terminal in the amino acid sequence of the dihydrodipicolinate synthase of SEQ ID NO: 4 with another amino acid residue,

(b) a mutation to replace the histidine residue at the 118th position as counted from the N-terminal in the amino acid sequence of the dihydrodipicolinate synthase of SEQ ID NO: 4 with another amino acid residue, and

(c) a mutation to replace the alanine residue at the 81st position as counted from the N-terminal in the amino acid sequence of the dihydrodipicolinate synthase of SEQ ID NO: 4 with another amino acid residue and replace the histidine residue at the 118th position as counted from the N-terminal in the amino acid sequence of the dihydrodipicolinate synthase of SEQ ID NO: 4 with another amino acid residue,

(d) a mutation to replace the alanine residue corresponding to the 81st position as counted from the N-terminal in the amino acid sequence of the dihydrodipicolinate synthase of SEQ ID NO: 4 with another amino acid residue,

(e) a mutation to replace the histidine residue corresponding to the 118th position as counted from the N-terminal in the amino acid sequence of the dihydrodipicolinate synthase of SEQ ID NO: 4 with another amino acid residue, and

(f) a mutation to replace the alanine residue corresponding to the 81st position as counted from the N-terminal in the amino acid sequence of the dihydrodipicolinate synthase of SEQ ID NO: 4 with another amino acid residue and replace the histidine residue corresponding to the 118th position as counted from the N-terminal in the amino acid sequence of the dihydrodipicolinate synthase of SEQ ID NO: 4 with another amino acid residue.[91]

[91] JX-1 at 61:43-62:18.

2. Disputed Claim Limitations

There are no disputed claim limitations *per se*. However, GBT and the Staff argue that the '160 patent at issue is invalid for failing to satisfy the best mode requirement of 35 U.S.C. § 112. As previously stated, the contours of the best mode analysis are defined by the scope of the claimed invention, which in turn is determined by applying the ordinary principles of claim construction. Thus, in this regard, the parties do dispute how the scope of the claimed invention is construed. However, this dispute is more appropriately resolved, *infra*, when analyzing GBT and the Staff's best mode argument.[92]

B. Infringement

Ajinomoto and GBT stipulate that GBT's manufacture of L-lysine feed products using the Old Escherichia bacterium strain deposited with the ATCC under Accession #SD-5590 infringes claim 15 of the '160 patent.[93] Ajinomoto and GBT also stipulate that GBT's manufacture of L-lysine products using the Corynebacterium strain deposited with the ATCC under Accession #SD-5620 does not infringe Claim 15 of the '160 patent.[94] Additionally, Ajinomoto and GBT stipulate that GBT's manufacture of L-lysine products using the New Escherichia bacterium strain deposited with the ATCC under Accession #SD-5717 does not infringe Claim 15 of the '160 patent.[95] Based on the stipulation, the undersigned finds that: (1) GBT's manufacture of L-lysine feed products using the Old Escherichia bacterium strain deposited with the ATCC under Accession #SD-5590 infringes

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[92] Ajinomoto and GBT accuse each other of impermissibly trying to read into claim 15 of the '160 patent a large scale production limitation. However, both parties admit that no such limitation exists. Thus, there does not appear to be a dispute on this point. *See* CIB at 14-16; RIB at 11.

[93] JX-190C at ¶ 9.

[94] *Id.* at ¶ 11.

[95] *Id.* at ¶ 12.

claim 15 of the '160 patent; (2) GBT's manufacture of L-lysine products using the Corynebacterium strain deposited with the ATCC under Accession #SD-5620 does not infringe Claim 15 of the '160 patent; and (3) GBT's manufacture of L-lysine products using the New Escherichia bacterium strain deposited with the ATCC under Accession #SD-5717 does not infringe Claim 15 of the '160 patent.

C. Domestic Industry - Technical Prong

Ajinomoto and GBT stipulate that Heartland uses the method of Claim 15 of the '160 patent to make L-lysine products.[96] Based on the stipulation, the undersigned finds that Ajinomoto practices claim 15 of the '160 patent. Accordingly, the undersigned finds that Ajinomoto satisfies the technical prong of the domestic industry requirement of Section 337 with regard to the asserted '160 patent.

D. Validity

1. Ordinary Skill in the Art

Ajinomoto asserts that one of ordinary skill in the art as of the time of the invention would have an advanced degree in chemical or agricultural engineering or microbiology with specialization in metabolic engineering, or a related field, or at least several years of concentrated study or work in the field of bacteriology and strain development in connection with fermentation techniques.[97] GBT asserts that one of ordinary skill in the art is a person with at least a master's level degree in some kind of biological science, probably focused around molecular biology, genetics, microbiology and has practical experience, that is, hands-on experience in a research lab that was performing recombinant DNA work.[98] GBT also asserts that individuals trained to the Bachelor's level could also be skilled in the art, but only after on-the-job training under the direct supervision of a Ph.D.-level

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[96] *Id.* at ¶ 5.
[97] CX-231C (Liao WS) at ¶ 50.
[98] RX-89C (Webb WS) at ¶ 292.

scientist.[99] Staff asserts that one of ordinary skill in the art is a person with an advanced degree in Biology, Biochemistry, Genetics, Genomics, Microbiology, Molecular Biology, Agricultural Engineering, Metabolic Engineering with 3-5 years of experience in a laboratory specializing in genetic engineering. The Staff also asserts that individuals trained to the Bachelor's level could also be skilled in the art, but only after on-the-job training under the direct supervision of a Ph.D.-level scientist.[100] The undersigned agrees with the Staff that a person of ordinary skill in the art to which the '160 patent pertains would have an advanced degree in Biology, Biochemistry, Genetics, Genomics, Microbiology, Molecular Biology, Agricultural Engineering, Metabolic Engineering with 3-5 years of experience in a laboratory specializing in genetic engineering. The undersigned also agrees with the Staff that persons with a Bachelor's degree could also be skilled in the art, but only after on-the-job training under the direct supervision of a Ph.D.-level scientist.

2. Best Mode

The first task in the best mode analysis is to define the invention claimed in the '160 patent. Ajinomoto argues that the inventors of the '160 patent fully disclosed the invention and the best mode of carrying it out by disclosing the best mode of making the specific mutations to the dapA gene to encode a DDPS enzyme desensitized to feedback inhibition by lysine.[101] Ajinomoto argues that where the claims contain limitations that do not distinguish the claimed invention from the prior art, those limitations are irrelevant to the best mode analysis.[102] Thus, while Ajinomoto acknowledges that independent claim 3, on which asserted claim 15 depends, refers to a "bacterium," Ajinomoto argues

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[99] RX-88C (Somerville WS) at ¶ 31.

[100] SFF 317 (citing Somerville, Tr. at 884-86; RX-88C (Somerville WS) at ¶ 31; CX-231 (Liao WS) at ¶ 50).

[101] CIB at 9.

[102] *Id.*

that because the claim limitation of a "bacterium" does not distinguish the invention of the '160 patent from the prior art, the best mode analysis should focus on the novel elements of the claims, viz. the specific genetic modifications to the dapA gene.[103] Specifically, Ajinomoto argues that "it is irrelevant that the claims-at-issue are directed to a method of producing lysine, because the 'best mode' analysis focuses only on the novel mutations."[104] According to Ajinomoto, the inventors did not claim a novel bacterium. Instead, it is asserted that the inventors claimed any bacterium of the genus Escherichia that contains the specific mutations to the dapA gene. In support of its argument, Ajinomoto relies on several cases: *Christianson v. Colt Indus. Operating Corp.*, 822 F.2d 1544 (Fed. Cir. 1987) ("*Christianson*"); *Monon Corp. v. Stoughton Trailers, Inc.*, 1999 WL 33510001 (N.D. Ill., Sept. 27, 1999) ("*Monon*"); and *Spalding & Evenflo Cos. v. Acushnet Co.*, 718 F.Supp. 1023 (D. Mass. 1989)("*Spalding*"). Ajinomoto asserts that in each of these cases, the court performed the best mode analysis on the part of the claimed invention that defined its novelty and asked whether the inventors disclosed the best mode as to that part.[105] Ajinomoto argues that the same analysis should be applied in this investigation in finding that the scope of the best mode inquiry is only the novel gene mutations claimed in the '160 patent.[106]

GBT argues that the claims of the '160 patent are drawn to lysine production using a microorganism.[107] Specifically, GBT argues that claim 3, on which asserted claim 15 depends, explicitly recites the limitation "bacterium belonging to the genus *Escherichia*."[108] According to

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[103] *Id.* at 10.
[104] *Id.* at 17.
[105] CIB at 14.
[106] *Id.*
[107] RIB at 12.
[108] *Id.*

GBT, the "bacterium" is the host. GBT argues that Ajinomoto's proposed construction of the claimed invention as being limited to the dapA gene should be rejected because it reads limitations out of the claims.[109]

The Staff argues that the scope of the claimed invention of the '160 patent includes the bacterium (*i.e.*, host), the specific mutation, the medium and whatever else is required to produce Lysine using a fermentation process and collecting it after it has been produced.[110] Specifically, the Staff argues that claim 3, on which asserted claim 15 depends, expressly requires a Escherichia bacteria having the following mutation(s): a replacement of the alanine residue that is normally the 81st amino acid within the wild-type amino acid sequence of SEQ ID NO: 4; and/or replacement of the histidine residue that is normally the 118th amino acid within the wild-type amino acid sequence of SEQ ID NO: 4.[111] According to the Staff, the claimed mutation(s) are to the dapA gene, which regulates production of DDPS.[112] The Staff argues that asserted claim 15 expressly encompasses production of lysine produced by E. coli bacteria having the above described mutation(s) in a liquid fermentation medium.[113]

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[109] *Id.*

[110] SIB at 18.

[111] SIB at 17.

[112] *Id.*

[113] *Id.* Both GBT and the Staff assert that Ajinomoto failed to include in its pre-hearing brief its argument that only the novel elements of a claim are subject to the best mode requirement and thus, GBT and the Staff argue that pursuant to Ground Rule 8.2, Ajinomoto has waived any such argument. *See* RRB at 2-3; SRB at 2 n.3. Ajinomoto asserts consistently in its pre-hearing brief that the claimed invention is limited to the mutation to the dapA gene and does not include the host bacterium. *See* CPHB at 20-22. The undersigned finds Ajinomoto's argument in its post-hearing brief that only the novel elements of a claim are subject to the best mode requirement and thus the bacterium in claim 15 of the '160 patent should not fall within the contours of the best mode analysis sufficiently implicated by Ajinomoto's assertion in its pre-hearing brief that the claimed invention is limited to the mutation to avoid running afoul of Ground Rule 8.2. Accordingly, the undersigned

(continued...)

"The definition of the invention, like the interpretation of the patent claims, is a legal exercise, wherein the ordinary principles of claim construction apply."[114] Looking first to the claims of the '160 patent, the undersigned finds that the preamble language of asserted claim 15 clearly and unambiguously sets forth the utility of the claimed invention, namely "producing L-lysine."[115] As set forth in claim 15, the production of L-lysine includes at least the following three steps: (1) cultivating the bacterium of claim 3 in a suitable culture medium (*i.e.*, A bacterium belonging to the genus Escherichia having a mutation to the dapA gene to desensitize feedback inhibition by L-lysine.); (2) producing and accumulating L-lysine in the culture thereof; and (3) collecting L-lysine from the culture.[116] Thus, according to the plain language of claim 15, the claimed invention includes the overall production of L-lysine, as well as, the cultivation of an Escherichia bacterium with the specific mutation to the dapA gene, and the accumulation and collection of the L-lysine.

Having examined the claims, the specification is consulted. The specification confirms that the invention of the '160 patent is not simply directed to the mutation to the dapA gene, but to a bacterium belonging to the genus Escherchia having the mutation to the dapA gene and an improved method for producing L-lysine using said bacterium. For example, the specification states that "[t]he present invention has been made taking the aforementioned viewpoints into consideration, an object of which is to obtain DDPS and AKIII originating from bacteria belonging to the genus Escherichia

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[113](...continued)
finds Ajinomoto's argument was not waived.

[114] *Northern Telecom*, 215 F.3d at 1286-87; *see also Engel Indus., Inc. v. Lockformer Co.*, 946 F.2d 1528, 1531 (Fed. Cir. 1991)("The best mode inquiry is directed to what the applicant regards as the invention, which in turn is measured by the claims.").

[115] *See Northern Telecom*, 215 F.3d at 1287 n.1 ("Preamble language in a claim may provide an indication of how the inventor intended to 'carry out' his invention.").

[116] *See* JX-1 at 61:43-62:37, 68:1-5.

with sufficiently desensitized feedback inhibition by L-lysine, and provide a method of producing L-lysine by fermentation which is more improved than those in the prior art."[117] The Federal Circuit has recognized that the use of the phrase "present invention" puts the public on notice as to the scope of the invention as a whole.[118]

Thus, based on the plain language of the claims, as supported by the specification, the undersigned finds the claimed invention of claim 15 of the '160 patent to encompass the overall production of L-lysine, including the cultivation of an Escherichia bacterium with the specific mutation(s) to the dapA gene, and the accumulation and collection of the L-lysine.

Ajinomoto does not dispute that claim 15 of the '160 patent expressly encompasses production of lysine from a bacteria of the genus Escherichia having the specific mutations to the dapA gene in a liquid fermentation medium.[119] Instead, Ajinomoto argues that only the novel aspects of a claimed invention, which in this instance Ajinomoto asserts is the mutation to the dapA gene, are subject to the best mode requirement of section 112. Ajinomoto finds support for its argument in the following cases: (1) *Christianson*; (2) *Monon*; and (3) *Spalding*.

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[117] *See* JX-1 at 2:56-62; *see also id.* at 1:1-2 ("METHOD OF PRODUCING L-LYSINE BY FERMENTATION"), 3:36-50 ("The present invention further lies in a bacterium belonging to the genus Escherichia . . ."), 4:66-5:4 ("The present invention further provides a method of producing L-lysine comprising the steps of cultivating any of the bacterium belonging to the genus Escherichia described above in an appropriate medium, producing and accumulating L-lysine in a culture thereof, and collecting L-lysine from the culture.").

[118] *See, e.g., Honeywell Int'l Inc. v. ITT Indus., Inc.*, 452 F.3d 1312, 1318 (Fed. Cir. 2006); *Alloc, Inc. v. US. Int'l Trade Comm'n*, 342 F.3d 1361, 1378 (Fed. Cir. 2003).

[119] *See* SFF81 (no dispute); SFF84 (no dispute); CFF4.14 ("Thus, the invention claimed by Claim 15 of the '160 Patent is the culture, production and collection of lysine from an Escherichia organism having one or both of two specific mutations of the dapA gene that reduce or eliminate feedback inhibition of the DPPS enzyme."); CFF5.3 ("Claim 3 describes the bacterium with reference to two specific mutations that alter the amino acid sequence in an enzyme (DDPS) encoded by the dapA gene."); *see also* CIB at 12 ("[T]hey claimed a bacterium . . . that contains the specific mutation to the dapA gene.").

As discussed in more detail below, the undersigned does not find that either *Christianson* or *Monon* supports Ajinomoto's argument. While *Spalding* on the other hand "arguably" does support Ajinomoto's position, the undersigned finds the reasoning of the district court in Spalding to be contrary to the best mode jurisprudence of the U.S. Court of Appeals for the Federal Circuit and consequently finds the case unpersuasive. The fact is, the undersigned has been unable to locate any Federal Circuit case where the Court ignored an express claim limitation in determining whether the best mode requirement was satisfied.

Christianson involved patents directed to various parts of a rifle. Christianson argued that Colt violated the best mode requirement of section 112 by failing to disclose the dimensions and tolerances necessary to mass produce an M-16 rifle. The district court agreed. The Federal Circuit reversed. In holding that Colt did not violate the best mode requirement, the Federal Circuit stated:

> In this case, interchangeability with M-16 parts appears nowhere as a limitation in any claim, and as Christianson concedes, the patents make no reference whatever to the M-16 rifle. Thus the best mode for making and using and carrying out the *claimed inventions* does not entail or involve either the M-16 rifle or interchangeability. The "best mode" for making and using the claimed parts relates to their use in a rifle, any rifle. There is nothing anywhere in the present record indicating that any of the patents fail to meet that requirement.[120]

In contrast with *Christianson*, asserted claim 15 of the '160 patent expressly includes a bacterium with the specific mutation to the dapA gene. Thus, unlike the unclaimed M-16 rifle in *Christianson*, the bacterium in claim 15 is expressly claimed and thus within the contours of the best mode analysis.

Monon involved a patent which disclosed a design for the sidewalls that extend the length of an over-the-road trailer (a.k.a., "eighteen wheeler").[121] Claim 1 of the patent at issue in *Monon* states:

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[120] *Christianson*, 822, F.2d at 1563 (emphasis in original).
[121] *Monon*, 1999 WL at *1-*2.

> A trailer body construction comprising . . . a plurality of similar, generally flat rectilinear side panels of lightweight metallic material . . . and a plurality of joining panels of second lightweight metallic material situated only on one surface of each sidewall for joining, and strengthening respective adjacent pairs of said side walls . . . and a plurality of fasteners for coupling said joining panels to respective adjacent pairs of said side panels to both join and strengthen said side panel.[122]

Respondent Stroughton argued that Monon violated the best mode requirement by failing to disclose both its best known joining panel design (one that apparently was lighter in weight than the one disclosed in the patent) and its design for sealing the side panels.[123] The district court disagreed. The district court found the elements Stroughton alleged violated the best mode requirement were not claimed in the patent at issue. Specifically, in finding that Monon did not violate the best mode requirement, the district court stated:

> The focus of the best mode requirement is on the claimed invention. Nowhere in the claims is it stated that the invention is to be leakage-proof, nor do the claims state that the invention has to be lightweight. As stated above, the claimed invention relates to a trailer that maintains desired structural sidewall strength with a minimized interior width.[124]

In contrast to the unclaimed elements in *Monon*, asserted claim 15 of the '160 patent expressly includes a bacterium with the specific mutation to the dapA gene. Because the bacterium is expressly claimed, it is within the contours of the best mode analysis. To hold otherwise would be to impermissibly read a limitation out of a claim.

Spalding involves a patent with the following asserted claim:

> a golf ball comprising a core and a cover, wherein said cover comprises . . . from about 10 to about 90 percent of an ionic copolymer of an olefin having from 2 to 5 carbon atoms and a zinc salt of an unsaturated monocarboxylic acid containing from

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[122] *Id.* at *18.
[123] *Id.* at *19.
[124] *Id.* (internal citation omitted).

3 to 8 carbon atoms.[125]

Respondent Acushnet argued that the patent was invalid for failing to comply with the best mode requirement by: (1) failing to set forth the core material which was used in the Spalding two-piece Top Flite ball upon which ball the cover material of blended ionic copolymers gave the greatest advantage; and (2) failing to disclose the processing conditions required to produce the best exemplar of Spalding's two-piece golf ball.[126] In addressing Acushnet's argument, the district court stated that "[t]he invention is not the golf ball but '[a] golf ball comprising a core and a cover.'" Although the district court correctly noted that the asserted claim included limitations directed to both a core and a cover, confusingly, the district court found that the claimed invention was only the golf ball cover. In so finding, the district court stated:

> The law requires that the inventor disclose the best mode for making the claimed part of the invention, not every other part of the product to which the claimed part is attached. The specification of the Molitor patent points out in 22 places that the cover is the invention, beginning with the title "Golf Ball Cover Composition Comprising A Mixture of Ionomer Resins." Prior art claims read on golf balls and two piece golf balls. Nowhere in the claims of the Molitor patent is it stated that the Molitor invention purports to be a two-piece golf ball.

Contrary to the district court's statement, Federal Circuit best mode jurisprudence is quite clear that the scope of the best mode analysis is defined by the claimed invention, not the claimed part of the invention as stated by the district court. Moreover, while the district court stated that nowhere in the claims of the patent does it state that the invention purports to be a two-piece golf ball, the claim language is explicitly drawn to both a core and a cover. The Federal Circuit has stated that "[t]he definition of the invention, like the interpretation of the patent claims, is a legal exercise, wherein the

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[125] *Spalding*, 718 F.Supp at 1027.
[126] *Id.* at 1048-49.

ordinary principles of claim construction apply."[127] Here the district court failed to apply the ordinary principles of claim construction by ignoring the express claim language directed to the core. Accordingly, the undersigned finds *Spalding* unpersuasive.

Having defined the invention of claim 15 of the '160 patent, the undersigned turns to GBT's specific arguments supporting its contention that there has been a violation of the best mode requirement with regard to claim 15 of the '160 patent. GBT makes two separate arguments: (1) that the Ajinomoto inventors failed to disclose their preferred host strain; and (2) that the disclosed best mode was fictitious.[128] Each argument will be addressed in turn below.

a. The Ajinomoto inventors failed to disclose their preferred host strain

GBT and the Staff argue that in December 1993, the inventors believed that the EA-70 was the best host strain for practicing claim 15.[129] In support of their argument, GBT and the Staff primarily rely on contemporaneous statements made by the inventors in their lab notebooks and in various monthly reports and research reports.[130] GBT asserts that inventors' testimony at the hearing repudiated much of their testimony given during their depositions earlier in the investigation.[131] GBT argues that the inventors' "new opinions" are less credible than the documentary record and deposition testimony and accordingly should be rejected.[132] While GBT and the Staff acknowledge that the documentary evidence does mention that the AE-70 strain had some flaws, GBT and the Staff argue that, notwithstanding its flaws, the documentary evidence repeatedly refers to AE-70 as the

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[127] *Northern Telecom*, 215 F.3d at 1286-87.
[128] RIB at 16, 28.
[129] RIB at 16; SIB at 27.
[130] RIB at 19-20; SIB at 27-33.
[131] RIB at 22.
[132] *Id.*

"best," "highest," and "superior."[133] GBT also notes that at times, AE-70 was simply referred to as "the" or the "sole" lysine-producing strain.[134] Additionally, GBT and the Staff argue that in some of the documentary evidence, the inventors made explicit comparisons between AE-70 and other strains and stated that AE-70 was better.[135] Further, GBT and the Staff note that even after the December 1993 effective filing date of claim 15 of the '160 patent, Ajinomoto continued to work with the AE-70 strain.[136]

Ajinomoto argues that when the Japanese application was filed on December 8, 1993, the inventors disclosed what they believed to be the best strains for showing that their invention worked, *viz.*, the B-3996 and W3110(tyrA) strains.[137] With regard to AE-70, Ajinomoto argues that as of the December 8, 1993 filing date of the Japanese priority application, Dr. Kojima and his colleagues knew AE-70 was a flawed strain that was unsuitable for Ajinomoto purposes.[138] Ajinomoto asserts that AE-70 was [

][139] Ajinomoto argues that GBT and the Staff "cherrypicks" Ajinomoto's internal documents for statements in the English translations characterizing AE-70 as "best" in terms of its accumulation.[140] Ajinomoto argues that GBT and the Staff's reliance on accumulation of lysine to argue that the inventors subjectively considered AE-70 the "best" host strain is improper, because the inventors considered other metrics important in

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[133] RIB at 17; SIB at 12-15.
[134] RIB at 17.
[135] RIB at 20-21; SIB at 32-33.
[136] RIB at 18; SIB at 30.
[137] CIB at 21.
[138] *Id.*
[139] *Id.*
[140] *Id.* at 8, 24.

choosing a host strain.[141] Ajinomoto also argues that the disclosed strains better demonstrated the effect of the amplification of specific genes, which Dr. Kojima believed was the essence of the '160 patent.[142] Additionally, Ajinomoto argues that the relative effect of the patented mutations was greater in the disclosed strains then in AE-70.[143] Further, Ajinomoto notes that AE-70 was discarded a few months after the December 1993 filing.[144]

As discussed in detail below, the undersigned finds that the documentary evidence of record shows clearly and convincingly that the inventors subjectively considered the AE-70 strain the best host strain for practicing claim 15 of the '160 patent as of the effective filing date of December 1993. While AE-70 was not perfect, the evidence shows that AE-70 still fared better in practically all respects to the other host strains that the Ajinomoto inventors were working with at the time. Moreover, the evidence shows that the inventors still believed AE-70 to be their best host strain, even in light of its flaws. Section 112 best mode requirement calls for disclosure of the inventors' preferred embodiment. Here the evidence clearly shows that the inventors had a preference for AE-70 above all others as of December 1993.

The Ajinomoto Lysine Project began in 1990.[145] The project team at the time of its inception included Dr. Konosuke Sano ("Sano"), Dr. Hiroyuki Kojima ("Kojima"), Ms. Kazue Kawamura ("Kawamura"), and Ms. Yuri Ogawa ("Ogawa").[146] During the course of the Lysine Project, other Ajinomoto researchers participated in the project, including Yoshimi Kikuchi, Tomoko Suzuki,

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[141] *Id.* at 25-27.
[142] *Id.* at 22.
[143] *Id.* at 22-23.
[144] *Id.* at 21.
[145] RFF 1.134 (no dispute).
[146] SFF 112 (no dispute).

Kazuo Nakanishi, Junichiro Kojima ("J. Kojima"), and Yasushi Nishimura.[147] Sano and Kojima worked primarily on determining what genetic mutations would have to be made in order to optimize the E.coli bacteria for Lysine production.[148] Ogawa and Kawamura were principally focused on developing culturing techniques and searching for host strains for the genetic modifications Sano and Kojima were hoping to discover.[149] Kojima left the Lysine Project in March 1992 to work on another project and returned to the Lysine Project in April 1993.[150] At the beginning of the project Sano was the Project Leader.[151] After returning to the Lysine Project in April 1993, Kojima became Project Leader.[152]

The researchers assigned to Ajinomoto's Lysine Project created two different types of reports, a monthly report and a research report. Monthly reports included single page reports authored by each of the researchers.[153] Research reports were prepared only after milestones were reached.[154]

As previously stated, the Lysine Project began in 1990. In the October 1990 monthly report, Kawamura reported that she had performed preliminary experimentation on the following strains to determine which strains the project should go forward with: [

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In the December 1990 monthly report, Kawamura reported the results of her continued preliminary

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147 RFF 1.139 (no dispute).
148 SFF 113 (no dispute).
149 SFF 114 (no dispute).
150 SFF 115 (no dispute).
151 RFF 1.141 (no dispute).
152 RFF 1.149 (no dispute).
153 Kojima, Tr. at 387.
154 *Id.* at 398-99.
155 SFF 130 (no dispute); *see also* JX-11CT at AHL430884.

experimentation on the above enumerated strains. Additionally, Kawamura stated that she had obtained [ ] Of those 150, the top three lysine producers were No. 70 at [ ] No. 11 at [ ] and No. 61 at [ ][156]

In December 1990, Kawamura derived AE-70 [ ][157] Although the AE-70 strain did not yet include the specific mutations to the dapA gene claimed in the '160 patent, in the May 1992 monthly report, Kawamura reported that the AE-70 strain was the "best Lys producer strain . . . so far."[158] In the same monthly report, Kawamura, Ogawa and Sano, reported that AE-70 was a "very important" intermediate strain for development.[159] Because of its importance, the researchers initiated investigation of the [ ] of this strain.[160]

In June 1992, Kawamura investigated the [ ] of the AE-70 strain. In the June 1992 monthly report, Kawamura reported that the AE-70 strain, which Kawamura again characterized as the "best Lys-producing bacterium,"was[ ] conditions tested.[161] Kawamura also reported that the lysine yield for AE-70 was [ ][162] In the same report, Kawamura, Ogawa and Sano, concluded that the [ ] of the AE-70 strain was tolerable.[163] Additionally, Kawamura reported that she had derived from the [ ] two new

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[156] SFF 133 (no dispute); *see also* JX-12CT at AHL430878. Kawamura also reported that according to TLC one strain derived from W3110 allegedly had lysine producing activity. However, Kawamura noted that a lys peak was not detected with liquid chromatography and therefore the TLC spot was not from lysine. *Id.*

[157] RFF 2.58 (no dispute).

[158] JX-83CT at AHL430804.

[159] *Id.* at AHL430803.

[160] *Id.*

[161] JX-84CT at AHL430801.

[162] *Id.*

[163] *Id.* at AHL430800.

strains: BA-329 and BA-339.[164] According to the June 1992 monthly report, the lysine yield from the AE-70 strain [ ] was greater than the yield from the two new strains [ ] and [ ] respectively).[165]

In the July 1992 monthly report, Kawamura reported that "[t]he best lysine producer E.coli strain is AE-70, the strain developed from [ ]"[166] Kawamura also reported that "[t]he second best strain is BA329 developed from [ ]"[167] According to Kawamura, the AE-70 strain showed some [ ][168] In contrast, Kawamura reported that "in BA329, a marked [ ]"[169] Both Kawamura and Sano noted in the July 1992 monthly report that there was a loss of [ ] in AE-70, but reported that the degree of loss was still acceptable to consider the study results useful.[170] On the other hand, with regard to strains BA329 and BA339, Kawamura and Sano reported that the productivity of those strains declined from [ ] to [ ] and from [ ] to almost[ ] respectively.[171] Thus, the decrease in productivity in the AE-70 strain was less than the decrease observed in the competing BA329 and BA339 strains.[172]

In the August 1992 monthly report, Kawamura reported the results of her research on the [ ] in the AE-70 strain and found that the AE-70 strain showed good

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[164] *Id.* at AHL430801.
[165] *Id.*
[166] JX-85CT at AHL430799.
[167] *Id.*
[168] *Id.*
[169] *Id.*
[170] *Id.* at AHL430798.
[171] *Id.*
[172] *See* JX-85CT.

[ ] in both of the tests she ran.[173] In the same report, Kawamura and Sano concluded that AE-70 was "[ ]"[174]

In the September 1992 monthly report, Kawamura reported the results she obtained when she recultured certain AE-70 transformants with genes for lysine biosynthesis.[175] Kawamura also reported that the genes for lysine biosynthesis had been introduced into the BA329 strain.[176] Specifically, Kawamura noted that the same four types of clones [ ] that showed [ ] were introduced into the BA329 strain.[177] Kawamura reported that the introduction of the dapA24 gene, which increased lysine yield the most in AE-70, was rather inhibitory in the BA329 strain.[178] According to Kawamura, "[m]ore cadaverine and less Lys were produced compared to AE-70."[179] This led Kawamura and Sano to conclude that BA329 was "inferior" to AE-70.[180] Accordingly, Kawamura and Sano decided to [ ] the strain from which BA329 was derived.[181]

In the October 1992 monthly report, Kawamura and Sano reported their decision to focus on the current AE-70 strain. Kawamura and Sano also reaffirmed that[ ][182] Additionally, Kawamura and Sano reported plans to produce further changes and improve characteristics of the AE-70 strain, and to

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[173] JX-86CT at AHL430797.
[174] *Id.* at AHL430796.
[175] JX-87CT at AHL430795.
[176] *Id.*
[177] *Id.*; *see also id.* at AHL430794 (Kawamura and Sano stated that the four clones "increased productivity greatly in AE-70.").
[178] *Id.* at AHL430795.
[179] *Id.*
[180] *Id.* at AHL430794.
[181] *Id.*
[182] JX-89CT at AHL430793.

cultivate an [ ][183]

In the November 1992 monthly report, Kawamura and Sano reported that they had "discovered clones among lysC* and dapA* clones that increased the lysine productivity of AE-70, but [ ]"[184] The inventors noted that next month they would again pursue efforts including use of competent cells properly prepared and strains with [ ][185] Kawamura and Sano also reported that they planned to grow [ ][186]

In the December 1992 monthly report, Kawamura reported on her efforts to investigate why AE-70 had previously shown [ ][187] Kawamura surmised based on her investigation that the reduction in lysine production was caused by a [ ][188] In the same report both Kawamura and Sano reported that "[t]he strongest existing lysine bacteria, AE-70, has recently undergone a drastic titer reduction, . . . but, as seen on the attachment, when [AEC] was actually used, [] vast improvement was observed, [ ]"[189] Kawamura also reported in December that she reintroduced the [ ][191] According to Kawamura, the results of the introduction were remarkable, attaining a maximum yield of [ ] and an average yield of [ ][192] Sano confirmed these results in the same report, stating "[t]he result is absolute best: we achieved max

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[183] *Id.*
[184] JX-90CT at AHL430791.
[185] *Id.*
[186] *Id.*
[187] JX-91CT at AHL430790.
[188] *Id.*
[189] *Id.* at AHL430789 (emphasis in original).
[190] AE-70f was the strain obtained by reselecting AE-70 wth AEC. RFF 2.105 (no dispute).
[191] *Id.* at AHL430790.
[192] *Id.*

[____]"[193] Kawamura did note that there were numerous reductions in titer during re-cultivation, but that there were four strains that had favorable results.[194] On this point Sano reported that "[u]pon re-cultivating the transformant, . . . [ ] was the result. As the other clones were also [ ] or higher, at 100% survival titer, the results were acceptable."[195]

In the January 1993 monthly report, Kawamura reported that the plasmid carrying the dapA*24 mutation was [

]"[196] The resulting mutant was referred to as pMWdapA*24 and is the same dapA mutant described in the '160 patent at issue in this investigation.[197] Kawamura reported that the AE-70 strain with the pMWdapA*24 mutant had a maximum yield of [ ] as compared to the AE-70 strain without the mutant, which had a yield of [ ]"[198] Kawamura reported that the strain that achieved the maximum yield of [ ] produced [ ] lysine in a 48 hour period with residual sugar.[199] Sano confirmed these results in the same report and additionally noted that "[i]f the productivity is [ ] then we will use it as the base strain for future experiments, such as for gene combination."[200]

In the February 1993 monthly report, Kawamura reported on the [ ] she performed on the transformant strain of AE-70/pMWdapA*24 discussed in the January 1993 monthly

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[193] *Id.* at AHL430789 (emphasis in original).
[194] *Id.* at AHL430790.
[195] *Id.* at AHL430789.
[196] JX-92CT at AHL430788; *see also* RFF 2.109 (no dispute).
[197] RFF 2.110 (no dispute).
[198] JX-92CT at AHL430788.
[199] *Id.*
[200] *Id.* at AHL430787.

report.[201] Kawamrua reported that the test showed an almost [ ] reduction in yield than that previously cultivated with a maximum yield of [ ] and an average yield of [ ][202] The plasmids, however, [ ][203] In the same report, Sano confirmed that [ ] were approximately [ ] with an average yield of [ ] and a maximum yield of [ ][204] Sano also confirmed that the plasma retention rate was almost 100%.[205] Sano also noted that [ ] significantly rose.[206]

In the March 1993 monthly report, Kawamura reported on efforts to optimize the culturing conditions of AE-70 as well as the results of introducing both the dapA* mutant and lysC* mutant to the AE-70 strain.[207] Kawamura noted in the report that AE-70 was currently the only lysine producing strain.[208] Kawamura also reiterated that the introduction of dapA* [ ](*i.e.*, pMWdapA*24) to AE-70 enhanced lysine production capability by 2-fold.[209] In the same report, Sano noted that lysine production by AE-70, including recombinant strains, was somewhat [ ][210] Sano hypothesized that the reason for the[ ] was due to inappropriate culturing conditions.[211] Sano reported the results of efforts to optimize the culturing conditions, stating:

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[201] JX-93CT at AHL430786.
[202] *Id.*
[203] *Id.*
[204] *Id.* at AHL430785.
[205] *Id.*
[206] *Id.*
[207] JX-94CT at AHL430784.
[208] *Id.*
[209] *Id.*
[210] *Id.* at AHL430783.
[211] *Id.*

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Sano also reported on the results obtained when both the dapA* mutant and lysC* mutant were introduced into the AE-70 strain.213 According to Sano there was a slight improvement, from a yield of [ ] with the [ ] to a yield of [ ] with the [ ]214 Sano also noted that [ ] showed complete [ ] of the pMWdapA*24 mutant while the plysC*43 mutant showed[ ]215

Research Report No. 4 reports on research performed between April 1992 and March 1993. Kawamura and Sano were co-authors of the report, and Kawamura presented the report internally.216 The Ajinomoto researchers noted in the report that the "AE-70 strain was superior in lysine production capacity" and showed good [ ] under certain conditions.217 The researchers also noted in the research report that they had derived strains from [ ] but that "a strain superior to the AE-70 strain was not obtained."218

Research Report No. 5 covered research performed between April 1992 and March 1993.219 In the report, Sano and Kawamura noted that when the mutant dapA gene was loaded onto a [ ] that was introduced into AE-70, "there was an effect on the lysine productivity, but it was [ ]"220 In addition to reporting on transformation of AE-70 with a [ ] mutant dapA

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212 *Id.*
213 *Id.*
214 *Id.*
215 *Id.*
216 RFF 2.135 (no dispute).
217 JX-127CT at AHL435972, AHL435993.
218 *Id.* at AHL435974.
219 RFF 2.144 (no dispute).
220 JX-95CT at AHL003062.

plasmid, Sano and Kawamura also reported on the transformation of AE-70 with [ ] mutant dapA plasmids.[221] The results of the reproducibility tests set forth in the fifth research report showed that yields of the AE-70 strains ranged from [ ] in the first tests and ranged from [ ] during the retest.[222]

In the April 1993 monthly report, Ogawa reported that AE-70 used as an E.coli lysine producing host yields [ ] lysine relative to [ ][223] Ogawa also reported that introduction of the mutant dapA by plasmid increased production to approximately [ ][224] In the same report, Kawamura noted that the AE-70 strain derived from [ ] was the best microbe for E.coli lysine production.[225] Kawamura also reported that an AEC-resistant strain had been collected from [ ] (*i.e.*, BA329), but noted that lysine decomposition was observed.[226] Additionally, Kawamura reported that there was a plan to elaborate the mutation and derive a better lysine producing microbe, and to re-obtain and evaluate several AEC-resistant strains from [ ][227]

In the May 1993 monthly report, Ogawa reported that she had prepared a variety of types of dapA plasmids.[228] Ogawa reported that next month, "these plasmids will be introduced to AE-70, the current host for E.coli lysine-producing microbe."[229] In the same report, Kawamura noted that because the best E.coli lysine producing microbe obtained (*i.e.*, AE-70) was a threonine-producing strain with AEC resistance, the decision was made "[ ]

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[221] RFF 2.150 (no dispute).
[222] JX-95 at AHL003066.
[223] JX-38CT at AHL430781.
[224] *Id.*
[225] *Id.* at AHL430782.
[226] *Id.*
[227] *Id.*; *see also id.* at AHL430779.
[228] JX-39CT at AHL430777.
[229] *Id.*

[ ] to obtain [an] even better Lys-producing microbe, and clarify the mutation of the AEC-resistant strain."[230]

In the June 1993 monthly report, Ogawa reported the effects of the introduction of sixteen various dapA plasmids on the "E.coli lysine-producing microbe host AE-70."[231] Ogawa reported that among vectors with [ ] there were discrepancies in production, but that among vectors with [ ] reproducible results were obtained for eight varieties.[232] Ogawa also reported that even among wild types, the effect of the introduction of the dapA plasmids corresponded to the number of copies and that in the inhibition-release type, results were further improved.[233] According to Ogawa, lysine production from the AE-70 strains with the RSF24P and pMW24P plasmids was the highest with a yield that was approximately 2.5 times that of AE-70 without the addition of a dapA plasmid.[234] In the same report, Kawamura reported on her efforts to breed a lysine producing microbe from an AEC resistant [ ] strain.[235] The report states that lysine production capability was investigated in 500 AEC resistant strains derived from [ ][236] Kawamura reported that the highest lysine accumulation was [ ] which was still not the desired accumulation, and thus derivation of an AEC resistant strain was abandoned.[237]

In the July 1993 monthly report, Ogawa reported that culturing showed that the lysine

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[230] *Id.* at AHL430778.
[231] JX-40CT at AHL430773.
[232] *Id.*
[233] *Id.*
[234] *Id.*
[235] *Id.* at AHL430774.
[236] *Id.*
[237] *Id.*

producing capabilities of AE-70 were lower than that previously obtained.[238] Ogawa surmised that the [ ] was due to the fact that the bacteria required [ ] and thus it was determined to eliminate this using P1 phage.[239] After obtaining 24 strains that did not require [ ] and that were AEC resistant, new testing was done.[240] The results of the testing showed that only one strain fully recovered, AE-70[ ] and that its growth and lysine producing ability [ ] were the same as AE-70.[241] According to Ogawa, that strain was to be used as the lysine producing bacterium host beginning next month.[242] In the same report, Kawamura reported on the results of the introduction of the pMWdapA*24 plasmid into the AEC resistant strains of [ ] obtained last month.[243] Kawamura reported that an increase in lysine production was seen in virtually all of the strains, but that the increase in production did not reach the level "attained with the dap introduced strains in the current lys-producing bacterium AE-70 [ ]"[244] Noting that "AE-70 is the bacterium having the highest lys production of the AEC resistant bacteria obtained thus far," Kawamura also reported on her efforts to [ ][245] Based on the results obtained, Kawamura concluded that there was at least one AE-70 mutation other than the AEC resistance mutation, and that this unknown mutation appeared to be essential to high lysine production.[246] On this point, Kojima wrote in the same report that "AEC resistance mutation was introduced to both [ ] and

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[238] JX-41CT at AHL430766.
[239] *Id.*
[240] *Id.*
[241] *Id.*
[242] *Id.*
[243] *Id.* at AHL430768.
[244] *Id.*
[245] *Id.*
[246] *Id.*

[ ] but Lys producing capability was between [ ] and [ ] which was considerably lower than AE-70."[247]

In the August 1993 monthly report, Ogawa reiterated that in order to resolve issues of [ ] with AE-70, the [ ] requirement was eliminated from the strain.[248] This new strain was designated AE-70[ ] Ogawa reported on the results of tests comparing AE-70[ ] with AE-70, ultimately concluding that AE-70 would continue to be used as the host.[249] In the same report, Kawamura reported on her work with the [ ] strain.[250] Kawamura reported that [ ] and then the dapA plasmid was introduced.[251] Kawamura reported that [ ] resulted in a [ ] probably due to a [ ][252] Kojima also noted in the same report that work was being performed to try and solve AEC-resistant mutation issues with AE-70.[253]

In the September 1993 monthly report, Kojima reported on efforts to investigate the mutation points of AE-70.[254] Kojima reported that screening for strains using lys-auxotrophy bacteria (E.coli) as an index was unsuccessful and that screening would be rerun using AEC resistance as an index.[255] In the same report, Ogawa reported on work with the AE-70 strain transformed with the dapA* and lysC* plasmids.[256] Ogawa reported that [ ] rose approximately [ ]

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[247] *Id.* at AHL430765.
[248] JX-42CT at AHL430761.
[249] *Id.*
[250] *Id.* at AHL430762.
[251] *Id.*
[252] *Id.*
[253] *Id.* at AHL430759.
[254] JX-209C at AHL430754.
[255] *Id.*
[256] *Id.* at AHL430755.

due to the dapA and lysC enhancement.[257] Also in the same report, Kawamura reported on the results of introducing dapA and lysC into AEC-resistant strains of [ ][258] According to Kawamura [ ] showed no effect on Lys production.[259] Kawamura also reported on efforts to introduce dapA and lysC into AEC-resistant strains of [ ][260] Kawamura noted that when compared to dapA alone, the introduction of both dapA and lysC led to better results with a maximum of [ ] Lys and [ ] Thr seen after colony separation.[261] In a separate monthly report from September 1993, Kikuchi noted that "[c]urrently, strain [ ] and strain [ ]Thr-producing bacteria are used as hosts for GE-E.coli Lys-producing bacteria. Therefore, as a different approach, it has been thought to construct Lys-producing bacteria hosts with strains other than Thr-producing bacteria."[262] To test this new approach, various strains were created from wild-type W3110, including a W3110 (*tyr*A) strain and a W3110(*tyr*A,*tyr*R) strain.[263] The testing showed that the *tyr*R and *tyr*A deficient strain of W3110 transformed with the RSFD80 plasmid produced the highest results with [ ] lysine and a yield of [ ][264]

In the October 1993 monthly report, Kojima reported that he had decided to submit the dapA* and dapA* + lysC* in one patent application and was in the process of preparing the specification and bacterial strain for deposit.[265] Kojima also reported that "[w]hen [ ] into AE-70, yield did not change, but growth became [ ]

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[257] *Id.*
[258] *Id.* at AHL430756.
[259] *Id.*
[260] *Id.*
[261] *Id.*
[262] JX-21CT at AHL430737.
[263] *Id.*
[264] *Id.*
[265] JX-44CT at AHL430747.

times during B.O.). Will introduce RSFD80 (dapA* + lysC*) and further cultivate (Continued by Nishimura)."[266] In the same report, Kikuchi summarized his efforts to breed a lysine producing bacterial host from strain W3110.[267] Also in the same report, Ogawa reported on her efforts to improve growth characteristics.[268] Specifically, Ogawa reported that for strain RSFD80/AE-70, growth worsened under current culture conditions, with a residual glucose of 1/5 with 48-hour flask cultivation, and a tendency for OD to drop in the latter half of cultivation.[269] Ogawa hypothesized that the drop in OD was due to a lack in substances needed for growth and thus performed six types of additional cultivation for the three types of required amino acids [ ] as well as [ ][270] According to Ogawa, the results showed an improvement in growth with the addition of [ ] with a residual glucose of [ ][271] However, although yield dropped with addition of [ ] and yield both improved about [ ][272] Ogawa noted that he planned to continue his efforts to [ ] by modifying the media.[273] In a separate report from October 1993, researcher Nishimura reported the results of tests on AE-70 with [ ] ("AE-70L").[274] Nishimura reported that strain AE-70L/RSFD80 showed an accumulation of [ ] and a [ ] yield, which was [ ] better than the yield achieved with AE-70/RSFD80.[275] Nishimura also reported that AE-70L/RSFD80 consumed [ ] of the initial sugar after a 46-hour culture and

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[266] *Id.*
[267] *Id.* at AHL430748.
[268] *Id.*
[269] *Id.*
[270] *Id.*
[271] *Id.*
[272] *Id.*
[273] *Id.*
[274] JX-198CT at AHL500025.
[275] *Id.*

also increased the sugar consumption rate compared with AE-70/RSFD80 that left [ ] of sugar.[276]

In Research Report No. 6, which covers April 1993 - October 1993, Ogawa reported that the host bacteria with the highest yield was AE-70 (AJ12609) with a yield of [ ][277] However, when dapA, and lysC genes were introduced to AE-70 using plasmids, Ogawa reported that yield improved more than twice.[278] While yield improved more than twice, Ogawa reported that the lysine production ability of the strain was [ ] and thus it was necessary to devise an optimization of the [ ] of both genes and [ ][279]

In the November 1993 monthly report, Kojima noted that the dapA* and dapA* + lysC* patent application was being prepared and that he planned to apply for the patent in December at the latest.[280] In the same report, Ogawa reported that he had performed lysine added cultivation to examine whether RSFD80/AE-70 maintains its ability to produce lysine under [ ] conditions.[281] Ogawa observed that yield was the same as with the control group when [ ] was added, but when [ ] were added "slight drops were observed [ ]"[282] Ogawa hypothesized that the slight drop was due to an increase in [ ][283] In a separate report from November 1993, Nishimura reported that he obtained a yield of [ ] when the RSFD80 plasmid was introduced into the [

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[276] *Id.*
[277] JX-45 at AHL003086.
[278] *Id.*
[279] *Id.*
[280] JX-121 at AHL430741.
[281] *Id.* at AHL430742.
[282] *Id.*
[283] *Id.*

] strain.[284] In yet another separate report from November 1993, J. Kojima reported that he had cultured AE-70/RSFD80 in an S-jar, but found that [ ] suddenly declined and growth stopped in about 12 hours.[285] J.Kojima noted, however, that the likely cause was simply an insufficient amount of nutrients in the S-jar.[286] More particularly, J.Kojima hypothesized that the cause was a lack of [ ][287]

Research Report No. 9, presented by Kawamura covered research performed between April 1993 and March 1994.[288] In the report, the researchers reitterate that "[i]n the process of breeding lysine producing bacteria, it goes without saying that an excellent host is necessary."[289] Kojima and Kawamura also wrote that AE-70 had "the highest yield among the bacterial strains obtained until present."[290]

The December 1993 monthly report is dated December 22, 1993, which is after the December 8, 1993 filing date of the Japanese priority patent application.[291] While undoubtedly the research that is reported in this monthly report occurred before its December 22, 1993 date, it is entirely unclear what specific research was conducted, and thus known to the inventors, prior to December 8, 1993. Moreover, December 8, 1993 is the date the patent application was filed, which implies that the application was written sometime earlier. In fact, in both the monthly reports for October 1993 and November 1993, Kojima explicitly notes that he was preparing the patent applications during that

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[284] JX-199CT at AHL500024.
[285] JX-200CT at AHL500035.
[286] *Id.*
[287] *Id.*
[288] RFF 2.218 (no dispute).
[289] JX-96CT at AHL436045.
[290] *Id.*
[291] *See* JX-60CT.

time. Thus, the undersigned gives little weight to the research results reported in the December 1993 monthly report in determining the inventors' subjective preference as of the filing date of the Japanese priority patent on December 8, 1993.

As detailed above in the monthly and research reports, the documentary evidence of record clearly shows that from the outset of the Lysine Project in 1990 to the filing of the Japanese priority patent application in December 1993, the inventors and researchers on the project had a preference for AE-70 as the host strain. While the undersigned is mindful that the focus of the best mode analysis is on the inventors' subjective intent at the time of filing, the inventors' views regarding AE-70 during the period from October 1990 through the filing of the Japanese priority patent application in December 1993 are undoubtedly relevant to that determination. Here the remarks made in the monthly and research reports show a pattern of preference favoring AE-70 over the other strains the researchers were examining. Throughout the relevant period, AE-70 was consistently referred to in the reports as the "best" lysine producing strain. The inventors' use of the word "best" to describe AE-70 inherently connotes a subjective preference for that host strain. Additionally, in at least two instances where the AE-70 strain was compared to a B-3996 strain, the inventors explicitly referred to the B-3996 strain as "second best" and "inferior to AE-70," thereby affirming their preference of AE-70 over B-3996.[292] That is not to say that AE-70 was perfect. To the contrary, the documentary evidence shows that the researchers had issues with AE-70, as they did with all of the strains they were working with. However, as opposed to the other strains the researchers were investigating, the documentary evidence shows that in practically every instance, AE-70 was the better performer; *vis.*,

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[292] *See* JX-85CT at AHL430799; JX-87CT at AHL430794; *see also* JX-127CT at AHL435972; JX-41CT at AHL430768.

more stable, better accumulation, higher yield. With regard to accumulation in particular, the documentary evidence shows that AE-70 was the best lysine producing host strain the researchers had created. Specifically, in October 1993 the researchers reported that they had transformed AE-70L [ ] with the RSFD80 plasmid (plasmid having both mutated dapA and lysC) and had achieved [ ] lysine. Notably, grams per liter is the only measurement of lysine production used in Tables 5-7 of the specification of the '160 patent to illustrate the invention of claim 15.[293] In contrast to the [ ] lysine produced using AE-70L/RSFD80, the highest producing lysine strain disclosed in Tables 5-7 was W3110/RSFD80, which produced only [ ]

As previously discussed, Ajinomoto argues that the inventors did not have a subjective preference for the AE-70 strain. In support, Ajinomoto relies on Kojima's testimony explaining why he did not consider the AE-70 host strain to be the best host strain at the time of the priority application. However, with regard to Kojima's testimony on this point, the undersigned notes that Kojima testified as follows:

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[293] Under the heading "Best Mode For Carrying Out The Invention" in the specification of the '160 patent, the inventors disclose a number of examples. Only Examples 1-5, which include Tables 5-7, are pertinent to the best mode analysis of claim 15 of the '160 patent. The other examples and tables in this section were added later in time in the PCT application and relate to the subject matter of other non-asserted claims. *See* CRRFF 1.66-1.

With regard to the fact that grams per liter is the only measurement of lysine production used in Tables 5-7, the undersigned notes that that during prosecution the applicants relied upon the information set forth in Tables 1, 5, 6 and 10 of the specification in support of their arguments for patentability. *See*, *e.g.*, JX-112 at AAHL001440 (Table 10), AAHL001441 (Tables 5-6), AAHLOO1502 (Table 1). In fact, the applicants relied upon the "high" yield in an effort to overcome a rejection. *Id.* at AAHLOO1503 ("The L-lysine concentration (0.18mM = 0.026g/L, pBT5 17) produced in the culture supernatants as disclosed in Table 1 of the reference *is much lower as compared to the lysine concentrations* produced by the transformed bacteria as disclosed in the present specification, for example, 9.17 g/L (see Table 10 at page 88 of the present specification). These high levels of L-lysine production by the transformed Escherichia bacteria would not be expected from Falco *et al.*") (emphasis added).

> Q. Dr. Kojima, isn't it true that you don't recall why you did not disclose the results that you and your team members obtained with AE-70 in the '160 patent?
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> A. With regards to this matter, I have looked at many monthly reports and researcher reports, and I have had a conversation with very many people. And at this point in time, I just cannot differentiate in my mind as to what I was thinking back then, and what opinion and understanding I have come to hold . . . concerning this issue.[294]

Kojima's admission that he could not differentiate between his present opinion regarding the reason AE-70 was not disclosed and his opinion at the time of filing the Japanese priority patent application renders his opinion testimony unreliable, because the best mode inquiry is focused on an inventor's subjective preference at the time of filing and not any later formed opinion. This includes Kojima's testimony explaining his subjective preference for the various host strains disclosed in the '160 patent and his testimony regarding why he felt the AE-70 strain was not the best mode for carrying out the invention. In these matters the undersigned gives no weight to Kojima's testimony at the hearing.

Ajinomoto relies in support of its contention that the inventors did not have a subjective preference for the AE-70 strain on testimony, primarily from Kojima, that the inventors had issues with AE-70 relating to its [

][295] Examples of Ajinomoto's treatment of the evidence regarding AE-70's alleged deficiencies are set forth below.

With regard to [ ] Ajinomoto asserts, citing the July 1993 monthly report, that the "inventors and their colleagues encountered ongoing problems of [

] when testing AE-70 that contained the patented mutations."[296] However, each of the metrics compared in the July 1993 report shows that AE-70 was superior to the derivatives of [ ] which

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[294] Kojima, Tr. 480:12-25.
[295] CIB at 22-23.
[296] CFF 5.52.

were also tested.[297] Ajinomoto also asserts, citing a July 1992 monthly report, that "[e]ven prior to being transformed with any genetic modifications, the AE-70 strain showed signs of [ ] but was still useful for study."[298] However, Ajinomoto fails to point out that in the same report the researchers noted that the two strains derived from [ ] which were subjected to the same [ ] conditions, showed signs of greater [ ][299] Ajinomoto further asserts, citing a research report covering the period from April 1992 to March 1993, that AE-70's high yield performance was not maintained after [ ] thereby casting doubt on AE-70's utility.[300] However, the same research report indicates that the [ ] issues were largely settled.[301]

With regard to growth rate, Ajinomoto asserts that in March 1993, the researchers were studying ways to optimize the culturing conditions of AE-70, and that by October 1993, "the inventors could not get the AE-70 to grow: 'RSFD80/AE-70, growth worsens under current culture conditions. . . .'"[302] However, in a separate monthly report from October 1993, Dr. Nishimura stated:

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[297] *See* JX-41CT.

[298] CFF 5.53.

[299] *See* JX-85CT.

[300] CFF 5.55.

[301] *See* JX-127CT at ¶ 3-4 ("The lysine production of these colonies is as shown in Fig. 13, showing that more stable storage is possible through use of a minimal medium.").

[302] CFF 5.66.

[303] CX-198 at AHL437298.

Ajinomoto also asserts, based on the November 1993 monthly report, that an S-jar experiment showed that yield for AE-70 was approximately half of the yield in a flask and that growth of AE-70 stopped in 12 hours. On this point Kojima testified that "[t]o see how bad the problem was, we tested the strain in a larger container called an S-Jar in November 1993, our Dr. J. Kojima reported AE-70 with RSFD80 plasmid grew poorly in the fermentor. Not only was growth poor, but the previously 'best' lysine yield numbers observed in a laboratory flask were not reproduced."[304] However, Ajinomoto fails to point out that in the same November 1993 report, the researchers state that the cause for the slow growth followed by its eventual cessation was insufficient nutrients in the medium. Specifically, the November 1993 report states, "[w]e assumed that some substrates had run out we found that [ ] was missing based on TLC. It is therefore most likely that [ ] ran out - examine [ ] amount."[305]

With regard to sugar consumption, Ajinomoto asserts: (1) based on the research report covering April 1993 through October 1993, that for AE-70/RSFD80 "the residual sugar is approximately 1/4 with 48-hour cultivation and the growth and sugar consumption rates are very slow;" (2) based on the research report covering September 1993 through May 1994, that AE-70/RSFD80 had "a problem in that the growth for this strain was too slow, and unable to consume 40 g/l glucose in a 48-hour flask culture;" (3) based on the research report covering April 1993 through March 1994, that AE-70 had "high yield, low growth and sugar consumption ability, and cannot utilize sucrose;" and (4) based on the research report covering December 1993 through March 1994, that "although this strain has high lysine yields, it has problems of [ ]

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[304] CFF 5.71; CFF 5.72.
[305] *See* JX-200CT.

[ ]"[306] Although Ajinomoto cites to four sources in support of its finding, a review of the underlying research reports shows that each of the first three reports describes the results from a single test and the fourth merely sumarizes those results.[307] Ajinomoto also asserts based on the October 1993 monthly report that AE-70/RSFD80 with dapA & lysC showed[ ] of approximately [ ][308] However, as discussed above, in a separate October 1993 monthly report, Dr. Nishimura found that by using AE-70/RSFD80 with [ ] he was able to obtain results where "[t]his strain consumed 40 g/L of initial sugar after 46-hour culture and also increased the sugar consumption rate compared with AE-70/RSFD80 that left [ ] of sugar."[309]

With regard to reproducibility, Ajinomoto asserts that the [ ] of AE-70 disqualified the strain from being used to best demonstrate the effect of the dapA mutation.[310] However, while AE-70 may have had some issues with [ ] the evidence of record demonstrates that AE-70 was generally more [ ] than any of the other strains with which Ajinomoto was working. Notably, in the July 1992 monthly report, experiments comparing the [ ] of AE-70 versus derivatives of [ ] showed that the loss in producibility by AE-70 was acceptable, but the losses in the derivatives were so bad that the researchers suspended their work on those strains.[311]

With regard to [ ] Ajinomoto asserts based on the research report covering the period from November 1993 through March 1994, that prior to the filing of the Japanese priority patent application, the researchers learned that "inhibition in the lysine production [of AE-70] was

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[306] CFF 5.78.
[307] *See* JX-45CT; JX-52CT; JX-96CT; JX-250CT.
[308] CFF 5.95.
[309] *See* JX-198CT.
[310] CFF 5.103.
[311] *See* JX-85CT.

not based on the [ ] but due to the [ ]"[312] On this point, Kojima testified that "[m]y recollection is that this data [Figure 3-5-7] was obtained prior to the Japan filing date . . . in late November 1993."[313] Contrary to Ajinomoto assertion, however, the evidence of record indicates that the comparison [ ] test on which Ajinomoto relies could not have been run prior to the December 8, 1993, filing of the Japanese priority patent application. Specifically, the research report provides results of [ ] testing on the following strains: AE-70, WC80, BDL215, and TA-325.[314] However, the evidence of record shows that the TA-325 strain was not created until approximately January 1994.[315] Additionally, the evidence of record indicates that decreases in yield of lysine with increases in [ ] appear to be accociated with all E.coli strains.[316] Further, the evidence of record shows that the AE-70 strain fared better than any of its competitors in these comparison tests. Specifically, the report noted:

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[312] CFF 5.113.

[313] *Id.*

[314] *See* JX-98CT at AHL436060.

[315] *See* Kojima, Tr. at 560; JX-96 at AHL436044.

[316] *See* JX-98CT at AHL436081 ("Generally, E.coli has been known to be more sensitive to [ ] compared to brev.").

[ ][317]

Thus, according to the report, while lysine production by derivatives of [ ] decreased dramatically (down to zero in certain instances), the lysine production by the AE-70 strain only decreased slightly under the high [ ][318]

As shown above, Ajinomoto's arguments are often highly selective, focusing on every criticism in the monthly and research reports to the exclusion of other more favorable comments made about AE-70 in the very same reports.[319] Additionally, Ajinomoto conflates its argument by relying on the same tests in the same reports to allegedly show a whole plethora of deficiencies in the AE-70 strain. The undersigned finds the evidence on which Ajinomoto relies does not overcome the clear and convincing documentary evidence discussed in detail, *supra*, that shows that the inventors had a subjective preference for AE-70. Moreover, whatever issues the inventors had with AE-70, the documentary evidence shows that AE-70 was still Ajinomoto's best strain, regardless of the metric used, and the one the inventors preferred at the time they made their priority application.

Accordingly, for the reasons set forth hereinabove, the undersigned finds based on the documentary evidence of record that the inventors of the '160 patent had a subjective preference for the AE-70 host strain at the time of filing the Japanese priority patent on December 8, 1993.

Having determined that the inventors had a subjective preference for the AE-70 host strain at the time of filing the Japanese priority application, the best mode analysis turns to the second

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[317] JX-98 at AHL436082-83.

[318] *Id.*

[319] It is somewhat ironic that while Ajinomoto accuses GBT and the Staff of "cherry-picking" from the monthly and research reports to support their contention that the inventors of the '160 patent had a preference for the AE-70 host strain, it is in fact Ajinomoto that is guilty of "cherry-picking" from the reports.

inquiry, which asks whether the inventors' disclosure is adequate to enable one of ordinary skill in the art to practice the best mode of the invention. As previously discussed, this second inquiry is objective and depends on the scope of the claimed invention and the level of skill in the relevant art.

Ajinomoto argues that GBT failed to show an objective violation, because there is no evidence that the specification of the '160 patent fails to enable one of ordinary skill in the art to practice the best mode of the claimed invention. Ajinomoto's argument is premised on its belief that the scope of the claimed invention is limited to the specific mutations to the dapA gene. However, the undersigned has previously found this argument to be in error and has held that the scope of the claimed invention includes the production of lysine by a host strain from the genus Escherichia transformed with the specific dapA mutant, as well as, the accumulation and cultivation of the lysine. Because the scope of the claimed invention encompasses the host strain and the evidence shows that the inventors had a subjective preference for the AE-70 host strain at the time of filing the Japanese priority patent application, the inventors were obligated under Section 112 to disclose that preference. There can be no question that the AE-70 strain was not disclosed in the '160 patent.[320] Thus, the undersigned finds the '160 patent disclosure insufficient to enable one of ordinary skill in the art to practice the inventors' preferred embodiment of the invention as claimed in claim 15 of the '160 patent, *vis.*, the AE-70 host strain transformed with the dapA mutant.

For the reasons discussed herein, the undersigned finds that Ajinomoto's concealment of its preferred embodiment of claim 15 of the '160 patent to be a violation of the best mode requirement. Accordingly, the undersigned finds claim 15 of the '160 patent invalid under 35 U.S.C § 112.[321]

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[320] *See* JX-1.

[321] Ajinomoto argues for the first time in its post-hearing brief that even if the undersigned (continued...)

b. The disclosed best mode was fictitious

GBT argues that the inventors did not actually perform the lysine-production experiments described in the '160 patent with the disclosed strains and thus the examples in the patent are fictitious and invalid under 35 U.S.C. § 112.[322] Specifically, GBT argues that the inventors did not perform the disclosed experiments with strains B-399 and W3110(tyrA) as described in Examples 3-5 and set forth in Table 5-7.[323] With regard to strain W3110(tyrA), GBT argues that Kojima admits that the inventors did not actually use W3110(tyrA).[324] GBT also argues that Kojima's attempt to characterize strain W3110(tyrA) as merely an abbreviation for the actual strain the inventors used should not be credited given the detailed description of how the W3110(tyrA) strain was derived in the '160 patent.[325] GBT asserts that Ajinomoto's expert, Dr. Liao, admitted that he has never, himself, written a scientific paper about a strain with multiple genes knocked out and reported fewer

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[321](...continued)
finds that Ajinomoto failed to disclose the best mode of practicing claim 15 of the '160 patent as of the December 8 1993 date of the Japanese priority application, "the only result would be that Ajinomoto could not rely on the 1993 Japanese application filing date, but instead would have to reply on the 1994 PCT application filing date." CIB at 21. Both GBT and the Staff argues that Ajinomoto has waived this argument. The undersigned agrees. Ground Rule 8.2 explicitly states that:

> the pretrial brief shall set forth with particularity a party's contentions on each of the proposed issues . . . Any contentions not set forth in detail as required herein shall be deemed abandoned or withdrawn, except for contentions of which a party is not aware and could not be aware in the exercise of reasonable diligence at the time of filing the pre-trial brief.

Since Ajinomoto could have, but did not, set forth this contention in its pre-hearing brief, the undersigned finds that Ajinomotoj has waived this argument. Notably, Ajinomoto never argues that December 8, 1993 is not the effective filing date of claim 15 of the '160 patent. RFF 1.71 ("Thus, the effective filing date of claim 15 is December 8, 1993.") (no dispute).

[322] RIB at 28.

[323] *Id.*

[324] *Id.*

[325] *Id.* at 28-29.

than all of the knocked out genes.[326] GBT also relies on the testimony of its own expert, Dr. Webb, who disagreed with Kojima's argument that W3110(tyrA) is really just an abbreviation for W3110(tyrA, tyrR).[327]

With regard to strain B-399, GBT asserts that according to the patent, strain B-399 was derived from strain B-3996 by removing the pVIC40 plasmid from B-3996.[328] GBT argues that the results reported in the '160 patent for strain B-399 must be fictitious because data obtained with another strain derived from an AEC-resistant strain of [ ] and inserting certain other genes designed to optimize lysine biosynthesis showed lower results than those disclosed in the patent.[329] Specifically, GBT asserts that the [ ] derivative described above with the additional genes designed to optimize lysine production produced [ ] lysine, while disclosed strain B-399 without the additional genes allegedly produced 9.2 g/L lysine.[330] Given these results, GBT argues that "there is every reason to believe that if the inventors had actually used B-399, that strain would not have produced the results recited in the patent."[331]

Like GBT, the Staff also argues that a fictitious example in the '160 patent constitutes a best mode violation.[332] Specifically, the Staff argues that the specification of the '160 patent provides fictitious information relating to strain W3110(tyrA) because Ajinomoto's research records do not contain any experiment wherein such a strain was used prior to the filing of the Japanese priority

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[326] *Id.* at 29.
[327] *Id.*
[328] *Id.*
[329] *Id.*
[330] *Id.*
[331] *Id.*
[332] SIB at 36.

application in December 1993.[333] According to the Staff, Kojima admits that he did not actually use a W3110(tyrA) strain.[334]

Ajinomoto asserts that GBT's argument that there is fictitious data in the 160 patent amounts to little more than "if Ajinomoto did not retain the underlying data, then it must be fabricated."[335] According to Ajinomoto, many of Ajinomoto's records, which were written fifteen years ago, no longer exist.[336] Specifically, Ajinomoto asserts that Japan has a first to file patent system and that under that system documents underlying an invention served no purpose to establish priority and thus at the time of the effective filing date of the '698 patent, Ajinomoto did not require its inventors to keep their laboratory notebooks and allowed them to maintain them or dispose of them as they saw fit.[337] Ajinomoto asserts that it was not until 1996 that Ajinomoto changed its retention policy.[338] With regard to the '160 patent specifically, Ajinomoto argues that Kawamura and Ogawa performed the purportedly fictitious experiments, but that their lab notebooks were not kept.[339] Ajinomoto also argues that both Kojima and Liao testified that the allegedly fictitious strain W3310(tyrA) was the same as the W3110(tyrR tyrA) strain disclosed in the patent.[340] According to Ajinomoto, Kojima dropped the "tyrR" designation from the patent because that particular mutation was irrelevant, a fact on which Ajinomoto asserts its expert Liao agrees.[341] Additionally, Ajinomoto argues that it was acceptable in scientific publications to abbreviate strain designations to delete mutations that are not

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[333] *Id.*
[334] *Id.*
[335] CIB at 37.
[336] *Id.*
[337] *Id.*
[338] *Id.*
[339] *Id.* at 38.
[340] *Id.*
[341] *Id.*

relevant to the publication.[342]

Under the heading "BEST MODE FOR CARRYING OUT THE INVENTION," the '160 patent states that "[t]he present invention will be more concretely explained below with reference to Examples."[343] Examples 1-5 of the patent describe how to mutate dapA on a plasmid and transform a host strain with the resulting mutant plasmid for an Escherichia organism.[344] Specifically, the '160 patent discloses introducing the mutant dapA gene into an Escherichia organism using host strains B-399 and W3110(tyrA).[345] The patent discloses the results of three experiments using strains B-399 and W3110(tyrA) that purport to illustrate the invention of claim 15.[346] Table 7 purports to illustrate the production of lysine using strain W3110(tyrA) transformed with plasmid RSFD80, which harbors both mutant dapA and mutant lysC genes.[347] The data reported in Table 7 indicates that strain W3110(tyrA) transformed with the RSFD80 plasmid produced 8.9 g/L lysine, while the control produced 0 g/L lysine.[348]

Although the results disclosed in Table 7 purport to be the results from an experiment using strain W3110(tyrA)/RSFD80, the evidence of record indicates that no such strain was ever used by the inventors of the '160 patent. In fact, inventor Kojima admits that the actual strain used was strain W3110(tyrR tyrA)/RSFD80.[349] Because strain W3110(tyrR tyrA) was actually used and not strain

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[342] *Id.*
[343] JX-1 at 17:63-67.
[344] *Id.* at 18:1-30:30.
[345] *Id.*
[346] *Id.* at Tables 5-7.
[347] *Id.* at 29:34-30:30.
[348] *Id.* at Table 7.
[349] *See* CX-235C (Kojima WS) at ¶ 270 ("The tyrR gene is the regulatory gene for the biosynthetic genes of phenylalanine and tyrosine. TyrA gene codes prephenate dehydrogenase. . . .W3110 (tyrR tyrA) was used as a host strain for testing the mutations for lysine biosynthesis.").

W3110(tyrA) as disclosed in the '160 patent, the results shown in Table 7 are fictitious.

Ajinomoto asserts that W3110(tyrR tyrA) is the same as W3110(tyrA), arguing that W3110(tyrA) is simply an abbreviation for strain W3110(tyrR tyrA).[350] However, even Ajinomoto's expert Liao admits the two strains are different stating that "one is a two knockout, one is a one knockout, of course, they are different."[351] This is consistent with the testimony of GBT's expert Webb who stated that:

> the designations of genotype in strains is a very precise science and tyrA, tyrR deficiencies, or a combination thereof within a bacterial strain means very different things, and so to in fact say that it's just an abbreviation for something else that was meant, I find, from a scientific standpoint, that to be very difficult to understand why he would say that."[352]

Further, while Kikuchi alleges that WC196 is really shorthand for WC80-196S, none of the meticulously kept monthly reports or research reports from the Lysine Project refers to W3110(tyrR tyrA) as W3110(tyrA).

Accordingly, for the reasons discussed above, the undersigned finds that the evidence of record clearly and convincingly shows that Table 7, and the data presented therein, are fictitious. The Federal Circuit has held that the disclosure of fictitious data in support of a best mode disclosure in a patent is a violation of the best mode requirement of Section 112.[353] Thus, undersigned finds claim 15 of the '160 patent invalid under 35 U.S.C. §112.

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[350] *See* CX-235C (Kojima WS) at ¶ 271; *see also* CORFF 2.22.

[351] Liao, Tr. 1345:16-1346:4.

[352] Webb, Tr. at 1070:16-1071:10.

[353] *See, e.g. Hoffmann-La Roche, Inc. v. Promega Corp.*, 323 F.3d 1354, 1367 (Fed. Cir. 2003); *Consolidated Aluminum Corp. v. Fonseca Int'l Ltd.*, 910 F.2d 804, 808 (Fed. Cir. 1990); *Certain Salinomycin Biomass and Preparations Containing Same*, Inv. No. 337-TA-370, Pub. No. 2978, ID at 46-47 (July 1996), *aff'd sub nom. Kaken Pharm. Co. v. Int'l Trade Comm'n.*, 111 F.3d 143 (Fed. Cir. 1997) ("*Salinomycin*").

3. Obviousness

GBT argues that claim 15 of the '160 patent would have been obvious to one of ordinary skill in the art as of the filing date of the Japanese priority patent application, December 8, 1993.[354] According to GBT, the parties agree that all but one of the elements of claim 15 were well known in the art.[355] GBT asserts that every aspect of claim 15 was well known as of the filing date of the Japanese priority patent application except for the specific mutations to dapA, which GBT argues are obvious.[356]

Specifically, GBT argues that the only element as to which there is any serious debate is the following element of claim 3, on which claim 15 depends:

> a DNA coding for a DDPS originating from a bacterium belonging to the genus Escherichia and having mutation to desensitize feedback inhibition by L-lysine, wherein the mutation is selected from the group . . .[357]

On this point, GBT argues that the enzyme encoded by dapA (DDPS) had long been understood to be one of two significant choke-points in lysine biosynthesis because of the fact that it was feedback-inhibited.[358] Thus, GBT argues one seeking to enhance lysine biosynthesis in E.coli would be motivated to mutate dapA to desensitize it.[359] According to GBT, the dapA gene had been isolated and sequenced in 1986, thus making it readily accessible.[360] Additionally, GBT asserts that AEC, a chemical analog of lysine, was well known to be useful for selecting feedback desensitized mutants.[361]

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[354] RIB at 30.
[355] *Id.*
[356] *Id.*
[357] *Id.* at 31.
[358] *Id.* at 32.
[359] *Id.*
[360] *Id.*
[361] *Id.* at 33.

GBT asserts that in 1972, Herman *et al.* used AEC to select feedback-desensitized dapA mutants of the genus *Pseudomonas*. GBT argues that the work of Herman *et al.* was transferable to E.coli because the two organisms have similar metabolic and physiological functions and have identical lysine biosynthetic pathways.[362] GBT also asserts that in 1992, Bittel *et al.* transformed E.coli cells lacking the dapA gene with maize dapA, mutagenized them, and selected AEC-resistant mutants.[363] According to GBT, these mutants had feedback-desensitized maize DDPS.[364] GBT asserts that its expert, Dr. Somerville, testified that the work done by Bittel and his colleagues was "conceptually identical" to the work done by the inventors of claim 15 of the '160 patent.[365] GBT further asserts that Ajinomoto's expert, Dr. Liao, conceded that it would be reasonable to try the approach demonstrated by Bittel *et al.*[366] Additionally, GBT asserts that both Somerville and Webb have testified that a researcher performing in vitro mutagenesis on the dapA gene followed by AEC selection would obtain at least one of the two identified mutations.[367] According to GBT, the Ajinomoto researchers did not specifically target the specific amino acid residues at the 81st and 118th positions, but instead simply followed known selection techniques and sequenced the resulting mutants.[368]

Like GBT, the Staff also argues that claim 15 of the '160 patent would have been obvious to one of ordinary skill in the art as of the December 8, 1993, filing date of the Japanese priority patent

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[362] *Id.*
[363] *Id.*
[364] *Id.*
[365] *Id.*
[366] *Id.*
[367] *Id.* at 34.
[368] *Id.*

application.[369] In particular, the Staff argues that the inventors of the '160 patent merely applied known and widely-used techniques to a known gene, dapA, to minimize and/or block its production of a known enzyme (DDPS) in the biosynthetic pathway for production of lysine in order to obtain the mutated bacteria covered by claim 3 of the '160 patent.[370] The Staff asserts that as of 1986, the wild-type E.coli dapA gene had been isolated and sequenced.[371] The Staff also asserts that there were many known methods of obtaining mutant E.coli bacteria with desensitized dapA/lysC genes to increase production of lysine and that such mutated E.coli bacteria had been used to produce lysine.[372] Thus, the Staff argues the only difference between the alleged invention of claim 15 of the '160 patent and the prior art is that the inventors of the '160 patent isolated the mutated dapA gene and sequenced it to determine the specific location of the mutation(s).[373]

More specifically, the Staff argues that one following customary mutagenesis/AEC selection procedures would create a bacteria that inevitably would have a mutation at one or more of the specific sites set forth in claim 3 because only a small number of sites exist where lysine could bind on the DDPS enzyme.[374] The Staff argues that the physical interaction between lysine and DDPS causes a change in the shape of that enzyme, that the shape of the enzyme helps the enzyme to carry out its biological function, that any alteration of the shape can alter the activity of the enzyme, and that given the small size of lysine compared to the enzyme one would expect that there would be only

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[369] SIB at 40.
[370] *Id.*
[371] *Id.* at 41.
[372] *Id.*
[373] *Id.*
[374] *Id.* at 42.

a small number of actual sites of binding on the DDPS enzyme.[375] Thus, the Staff argues that, while many mutations may have occurred within the gene, the limitation imposed by the selection process on the products of mutagenesis limits the results to a very small number.[376] Of this small number of surviving mutants, the Staff argues that there is a very high probability that the survivors would have mutations at the 81st and 118th positions.[377]

Ajinomoto asserts that GBT admits that none of the prior art references it relies on discloses the specific mutations recited in claim 15 of the '160 patent.[378] Ajinomoto argues that GBT and the Staff make no attempt to show that the prior art suggests the claimed mutations.[379] Instead, according to Ajinomoto, GBT and the Staff present only a generalized discussion regarding desensitization of the dapA gene.[380] Ajinomoto argues that GBT and the Staff, without any reference to the prior art, simply recite GBT's experts' conclusions that had a person of ordinary skill in the art performed AEC selection and mutagenisis, that person would have discovered at least one of the two mutations recited in claim 3.[381] Ajinomoto argues that this is nothing more than after-the-fact hindsight analysis.[382] Ajinomoto asserts that there is no evidence that the prior art could be used as GBT suggests to obtain the specific mutations recited in claim 15 of the '160 patent.[383] Ajinomoto argues that the lysine binding site on DDPS of E.coli was not known in 1993 and, without that knowledge, there was no method to predict accurately the specific amino acid changes that would promote feedback

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375 *Id.*
376 *Id.*
377 *Id.* at 42-43.
378 CRB at 26.
379 *Id.* at 27.
380 *Id.*
381 *Id.*
382 *Id.*
383 *Id.*

inhibition.[384] Ajinomoto argues that the obviousness case against claim 15 of the '160 patent boils down to GBT arguing that if one of ordinary skill in the art did what no one except the Ajinomoto inventors thought to do, that person would have reached the same result as in claim 15.[385]

The determination of obviousness is a question of law based on underlying factual inquiries into the (1) the scope and content of the prior art, (2) the level of ordinary skill in the art, (3) the differences between the claimed invention and the prior art; and (4) secondary considerations of non-obviousness (also known as "objective evidence"). The undersigned has determined, supra, that a person of ordinary skill in the art to which the '160 patent pertains would have an advanced degree in Biology, Biochemistry, Genetics, Genomics, Microbiology, Molecular Biology, Agricultural Engineering, or Metabolic Engineering with 3-5 years of experience in a laboratory specializing in genetic engineering. The undersigned also found, *supra*, that persons with a Bachelor's degree could also be skilled in the art, but only after on-the-job training under the direct supervision of a Ph.D.-level scientist. *See supra*, at IV.D.1.

As of December 1993, the filing date of the Japanese priority patent application, the evidence of record shows that fermentation was already being used to produce lysine and thus, one of ordinary skill in the art at the time would know that fermentation could be used for the production and accumulation of lysine.[386] The record also shows that the cultivation of lysine produced by fermentation was also known. Additionally, the evidence shows that in 1982, Dauce-Le Reverend

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[384] *Id.*

[385] *Id.*

[386] *See* RX-88C (Somerville WS) at ¶ 33; *see also* CX-231C (Liao WS) at ¶ 46-47; JX-1 at 1:12-13.

et al. disclosed a lysine producing E.coli strain.[387] Also in 1982, US Patent No. 4,346,170 ("the '170 patent") issued, which disclosed lysine production in E.coli.[388] In fact, the '160 patent itself notes that AEC resistant strains of the genus Escherichia were known in the prior art to be lysine producers.[389] Even Ajinomoto's expert, Liao, testified that he had "seen some prior art articles . . . about the use of E.coli to produce lysine.[390] Thus, one of ordinary skill in the art at the time would know generally that E.coli could be used to produce lysine. The evidence also shows that as of December 1993, the steps along the lysine biosynthesis pathway in Escherichia were known.[391]

The prior art also includes a 1962 Yugari and Gilvarg reference that establishes that the lysine biosynthesis pathway involves enzymes that are feedback-inhibited by lysine.[392] In 1976, a prior art reference by Patte, *et al.* disclosed more particularly, two enzymes in the pathway that were subject to feedback inhibition by lysine: DDPS (dapA gene) and AKIII (lysC gene).[393] In 1986, the evidence of record shows that Richaud *et al.* isolated and sequenced the dapA gene.[394]

Prior to the work of Patte, *et al.* and Richaud, *et al.*, in 1972 Hermann, *et al.* published a study in which AEC was used to select feedback-desensitized dapA mutants of the genus Pseudomonas.[395] Also in the prior art is a 1992 reference by Bittel, *et al.* The evidence of record shows that Bittel, *et al.* successfully transformed E.coli cells lacking the dapA gene with maize dapA, mutagenized them,

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[387] *See* JX-123; RX-89C (Webb WS) at ¶ 335.
[388] *See* RX-163; RX-89C (Webb WS) at ¶ 334.
[389] JX-1 at 1:15-19; RX-89C (Webb WS) at ¶¶ 295-96; JX-117.
[390] Liao Tr. at 1423:6-9.
[391] *See* Liao, Tr. 1426:14-17; RX-88C (Somerville WS) at ¶ 25; RX-89C (Webb WS) at ¶¶ 300-305.
[392] JX-179; RX-89C (Webb WS) at ¶ 301.
[393] JX-156; RX-89C (Webb WS) at ¶ 302.
[394] *See* JX-161; Liao, Tr. 1426:23-25; RX-89C (Webb WS) at ¶¶ 303.
[395] *See* JX-120; Liao, Tr. 1450:19-1451:7; RX-88C (Somerville WS) at ¶¶ 33, 36.

and selected AEC-resistant mutants.[396] Specifically, Bittel, *et al.* used AEC selection techniques to isolate the DDPS gene from maize, inserted it into a plasmid, transformed a strain of E.coli that lacked the dapA gene, subjected the bacteria to mutagenesis and selected AEC-resistant strains.[397] According to the record evidence, the selected AEC-resistant strains had feedback desensitized maize DDPS.[398]

In addition to that which is cited above, the record evidence shows that as of the December 1993 filing date of the Japanese priority patent application, the following techniques were known and available to researchers for performing tasks within molecular biology: PCR, the use of endonucleases and ligases to create plasmids, mutagenesis through agents like NTG or hydroxylamine, gene sequencing, use of multiple copy plasmids to increase gene expression, in vitro mutagenesis of a target gene on a plasmid, and AEC selection to identify feedback desensitized mutants.[399]

What is not disclosed in the prior art, but what is claimed in claim 15 of the'160 patent is an Escherichia bacteria that has a mutant dapA gene of E.coli at the 81st or 118th amino acid residue of the DDPS enzyme causing desensitization to feedback inhibition by lysine.[400] While GBT and the Staff argue that creating such a bacteria would have been obvious to one of ordinary skill in the art at the time of the filing of the Japanese priority patent in December 1993, the evidence of record does not support such a conclusion, especially not clearly and convincingly. Moreover, GBT and the Staff

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[396] *See* JX-119; Liao, Tr. 1444:16-1445:5-8; RX-88C (Somerville WS) at ¶¶ 44.

[397] RX-88C (Somerville WS) at ¶¶ 44.

[398] *See* JX-119; RX-88C (Somerville WS) at ¶¶ 46.

[399] *See* Liao Tr. at 1424:1-1425:22; *see also* RX-89C (Webb WS) at ¶¶ 306, 307, 309-12, 331-33, 337, 339.

[400] CX-231C (Liao WS) at ¶ 192; *see also* RIB at 30.

incorrectly frame the obviousness inquiry. The invention of claim 15 is not merely directed to an Escherichia strain with the specific mutations recited in claim 3 of the '160 patent, but rather a method of producing, accumulating and cultivating lysine.[401] Thus, the proper obviousness inquiry is whether one of ordinary skill in the art as of December 8, 1993 would have found it obvious to produce lysine using a bacteria from the genus Escherichia that has a mutant E.coli dapA gene at the 81st or 118th amino acid residue of the DDPS enzyme.

Having properly defined the scope of the inquiry it becomes plain that GBT and the Staff impermissibly used hindsight in concluding that claim 15 was obvious. Notably, GBT's expert Somerville admitted at the hearing that the steps he testified one of ordinary skill in the art could follow to get to the invention, are the very same steps taken by the inventors and described in the '160 patent.[402] GBT and the Staff's case for obviousness amounts to little more than an argument that because the tools and techniques necessary to create an Escherichia strain with the specified E.coli mutant dapA gene were available and known to one of ordinary skill in the art in December 1993, claim 15 must be obvious. The Supreme Court, however, recently reaffirmed the impropriety of such an approach, stating that "a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art."[403] In so reaffirming, the Supreme Court acknowledged the continued importance of identifying "a reason that would have prompted a person of ordinary skill in the relevant art to combine the elements in the way

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[401] *See* 35 U.S.C. §103 (A claim is obvious if "the differences between the subject matter sought to be patented and the prior art are such that ***the subject matter as a whole*** would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.")(emphasis added).

[402] Somerville, Tr. at 1285:15-1286:12, 1251:10-14.

[403] *KSR*, 127 S.Ct. 1727, 1741 (2007).

the claimed new invention does."[404] Additionally, the Federal Circuit in interpreting *KSR* has noted that "the Supreme Court suggests, a flexible approach to the TSM test prevents hindsight and focuses on evidence before the time of invention."[405] Further, the Federal Circuit has more recently stated that "[t]he TSM test, flexibly applied, merely assures that the obviousness test proceeds on the basis of evidence-teachings, suggestions (a tellingly broad term), or motivations (an equally broad term)-that arise before the time of invention as the statute requires."[406]

GBT argues that it would have been an obvious choice in December 1993 to use Escherichia (or at least E.coli) as the host strain for lysine production. However, the evidence shows that there were inherent difficulties in using E.coli for lysine fermentation, not the least of which being that E.coli is not a natural lysine producer.[407] Moreover, at the time, Corynebacterium was being used almost exclusively for the production of lysine.[408] Thus, while Ajinomoto may have had a specific motivation as a result of the competitive threat from Archer Daniels Midland ("ADM") to begin looking for nonconventional ways to more efficiently produce lysine, there is no evidence that anyone else would have been so motivated.[409]

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[404] *See Takeda Chem. Indus. Ltd. v. Alphapharm Pty, Ltd.*, 492 F.3d 1350, 1356-57 (Fed. Cir. 2007)(quoting *KSR*).

[405] *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed.Cir. 2007).

[406] *Ortho-McNeil Pharmaceutical, Inc. v. Mylan Laboratories, Inc.*, 520 F.3d 1358, 1365 (Fed.Cir. 2008).

[407] *See* CX-234C (Kikuchi WS) at ¶ 6; CX-235C (Kojima WS) at ¶ 23.

[408] CX-231C (Liao WS) at ¶ 46, 44, 48; *see also* Somerville, Tr. at 1235:9-13.

[409] *See* CX-235C (Kojima WS) at ¶ 7 (stating that the origin of theLysine Project began "[i]n 1990, [when] Ajinomoto concluded that it was at a competitive disadvantage to Archer Daniels Midland ("ADM") in the production of L-lysine. ADM has access to its own internal glucose supplies at a much lower cost than Ajinomoto. Companies like ADM, who have separate sugar processing operations, generate huge quantities of glucose that can be used as the raw material to make amino acids through fermentation."), ¶ 78 ("In order to compete with Archer Daniels Midland, we attempted to improve the quality of the bacterial strain that is used in a fermentation process to

(continued...)

As is typical when impermissibly relying on hindsight to conclude obviousness, GBT and the Staff fail to provide any reason why one of ordinary skill in the art at the time would have combined or modified the many prior art references cited to get to the claimed invention of claim 15 of the '160 patent. Notably, several prior art references relied on by GBT and the Staff were disclosed and considered by the PTO during the prosecution of the '160 patent. Thus, GBT's burden of showing invalidity is especially difficult.[410]

With regard to the 1962 Yugari and Gilvarg reference and the 1976 Patte reference, GBT contends that the fact that the references disclose that the lysine biosynthesis pathway involves feedback-inhibited enzymes that one seeking to enhance lysine biosynthesis would be motivated to mutate the dapA gene to desensitize it.[411] However, the evidence of record does not support such a finding. Mainly, the references fail to disclose whether or how alterations to the feedback-inhibited enzymes would affect the function of the lysine biosynthesis pathway.[412] Additionally, the record evidence indicates that merely knowing that an enzyme is subject to feedback inhibition is insufficient to determine whether that enzyme plays an important role in E.coli's lysine biosynthesis pathway.[413]

With regard to the 1986 Richaud reference, one of the references cited by the PTO in the '160 patent, GBT contends that the fact the reference disclosed the sequence for the E.coli dapA gene meant that dapA could be isolated and mutated.[414] However, the evidence of record does not support

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[409](...continued)
produce lysine. We hoped that we could overcome the cost advantage that Archer Daniels Midland had in the raw materials with an improvement in the bacteria used in the fermentation process.").

[410] *See Hewlett-Packard Co. v. Bausch & Lomb, Inc.*, 909 F.2d 1464, 1467 (Fed. Cir. 1990).

[411] RIB at 32.

[412] *See* JX-179.

[413] *See* CX-235C (Kojima WS) at ¶¶ 29-30.

[414] RIB at 32.

a finding that by simply knowing the sequence for the E.coli dapA gene that one of ordinary skill in the art in December 1993 would be able to discover the specific mutations claimed in the '160 patent or identify the mutations by their specific lysine binding sites.[415]

With regard to the 1972 Hermann *et al.* reference, another reference cited by the PTO in the '160 patent, GBT contends that because this reference discloses the use of AEC to select feedback-desensitized dapA mutants of the genus Pseudomonas that one of ordinary skill in the art in December 1993 would know that AEC could be used to select feedback-desensitized dapA mutants in the genus Eschericia.[416] At the hearing, GBT's expert Somerville went so far as to testify that the 1972 Hermann *et al.* reference rendered claim 15 of the '160 patent obvious as of the date of the reference.[417] Notably, however, Somerville was unable to come up with any explanation why if the claimed invention was obvious in 1972 that no one else came up with the embodiment of claim 15 before Ajinomoto did in 1993, some 21 years later. Contrary to GBT's contention with regard to Hermann *et al.*, the evidence of record contains nothing that would lead one to believe that the teachings derived from Pseudomanas strains would be transferable to strains of a completely different genus, Escherichia.[418] In addition, the evidence fails to show that any researcher extended the work of Hermann *et al.* to E.coli.[419]

With regard to the 1992 Bittel *et al.* reference, another reference cited by the PTO in the '160 patent, GBT contends that the fact that the reference discloses transforming E.coli cells lacking the

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[415] CX-231C (Liao WS) at ¶ 190.

[416] RIB at 33.

[417] Somerville, Tr. at 1252:17-1253:20.

[418] *See* CX-231C (Liao WS) at ¶ 197; *see also* CX-167 at 5 (1975 Halsall reference disclosing that use of AEC selection with E.coli failed to identify mutatnt dapA gene encoding desensitized DDPS.).

[419] *Id.*

dapA gene with maize dapA, mutagenizing them, and selecting AEC-resistant mutants, that one of ordinary skill in the art at the time of the filing of the Japanese priority patent application in December 1993 would have been motivated to apply the same techniques to E.coli in an effort to achieve E.coli with desensitized dapA gene.[420] However, the evidence of record suggests that the lysine insensitive form of maize DDPS disclosed by Bittel *et al.* is more sensitive to lysine than wild-type E.coli DDPS.[421] Sommerville provides no evidence that using the methodology disclosed in Bittel et al. would have identified mutant genes that are much less sensitive to lysine than the mutant maize genes. Additionally, while Bittel et al. discloses mutagenized transformed E.coli cells, the '160 patent discloses mutant dapA genes obtained via in vitro mutagenesis.[422]

As discussed above, GBT and the Staff use impermissible hindsight to sift through the prior art to conclude that claim 15 of the '160 patent is obvious. While Webb and Somerville's pathway to the invention may in retrospect seem to follow logical steps using available tools and techniques to come to the invention of claim 15, at the time of the invention the inventor's insights and willingness to confront and overcome obstacles cannot be discounted. Accordingly, for the reasons discussed above, the undersigned finds that GBT and the Staff failed to prove by clear and convincing evidence that claim 15 of the '160 patent was obvious as of the date of the filing of the Japanese priority patent application on December 8, 1993.

4. Obviousness Double-Patenting

GBT argues that claim 15 of the '160 patent is invalid under an obviousness-type double patenting analysis because it is not patentably distinct from claim 1 of commonly owned U.S. Patent

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[420] RIB at 33.
[421] *See* CX-231C (Liao WS) at ¶ 195; Liao, Tr. at 1444:16-1445:14.
[422] *See* JX-119; JX-1.

No. 4,278,765 ("the '765 patent").[423] GBT argues that claim 1 of the '765 patent discloses a method for obtaining bacteria of any genus that can produce amino acids. According to GBT, claim 1 recites transforming a recipient host bacterium with a plasmid carrying genes controlling the synthesis of the desired amno acid (*i.e.*, genes along the biosynthesis pathway of the desired amino acid).[424] GBT also asserts that claim 1 requires that the inserted genes be mutated to destroy the negative regulation of the synthesis (*i.e.*, the mutation must destroy feedback inhibition) of the desired amino acid.[425] GBT notes that claim 1 of the '765 patent is not limited to any particular amino acid.[426] GBT argues that the only elements of claim 15 of the '160 patent that do not appear in claim 1 of the '765 patent would have been obvious to one skilled in the art.[427] Specifically, GBT argues that it would have been obvious to transform a host with "genes controlling the synthesis of a selected amino acid," *viz.*, with dapA mutated to destroy "the negative regulation" (*i.e.*, feedback inhibition), and sequence the resulting mutants.[428] GBT asserts that it "is very likely that some of the resulting mutants would have been identical to those claimed."[429] GBT further argues that it would have been obvious to cultivate the bacterium in a culture medium to accumulate and collect lysine.[430]

The Staff argues that claim 15 of the '160 patent is invalid for obviousness-type double patenting in light of the commonly owned '765 patent.[431] The Staff sets forth two arguments in

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[423] RIB at 37.
[424] *Id.*
[425] *Id.*
[426] *Id.*
[427] *Id.* at 39.
[428] *Id.*
[429] *Id.*
[430] *Id.*
[431] SIB at 44.

support.[432] First, the Staff argues that claim 15 of the '160 is not patentably distinct from claim 1 of the '765 patent because claim 1 of the '765 patent anticipates claim 3 of the '160 patent, and the limitations added by claim 15 are obvious.[433] The Staff does not elaborate on this argument in its brief, but rather incorporates by reference its argument in its pre-hearing brief.[434] Ground Rule 11.1 states that "the post-hearing brief shall discuss the issues and evidence tried within the framework of the general issues determined by the Commission's Notice of Investigation, the general outline of the briefs as set forth in Appendix B, and those issues that are included in the pre-trial brief and any permitted amendments thereto. **All other issues shall be deemed waived.**"[435] Additionally, incorporating arguments by reference unfairly circumvents the page limits imposed on the parties in this investigation. Because the Staff did not develop this argument in its post-hearing brief, the undersigned finds the argument waived. Second, the Staff argues that to the extent claim 1 of the '765 patent does not anticipate claim 3 of the '160 patent, that claim 3 is obvious for the reasons set forth in its post-hearing brief regarding obvousness under 35 U.S.C. § 103.[436]

Ajinomoto argues that GBT's expert Webb finds double patenting "by piecing apart each element of claim 15 of the '160 patent and then plugging in the elements of the '765 patent as he sees fit."[437] Ajinomoto asserts that as compared to claim 15 of the '160 patent, claim 1 of the '765 patent does not disclose: (1) limitations directed to producing, accumulating and collecting lysine in a culture; (2) the dapA gene itself; (3) the DDPS enzyme; or (4) the specific mutations recited in claim

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[432] *Id.*
[433] *Id.*
[434] *Id.* ("*See* Staff prehearing brief at 43-47.").
[435] Ground Rule 11.1 (emphasis added).
[436] *Id.*
[437] CIB at 60.

15 of the '160 patent.[438] According to Ajinomoto, GBT's expert Webb admits that the above limitations are missing from claim 1 of the '756 patent.[439] Ajinomoto argues that based on the above differences it cannot be said that the two claims a "so very much alike."[440] Ajinomoto argues that claim 1 of the '765 patent may be broad enough to cover practice of claim 15 of the '160 patent, but the fact that a claim in an earlier patent dominates a claim in a later patent does not, mean that the later claim is invalid for double patenting.[441]

Non-statutory or "obviousness-type" double-patenting is a judicially created doctrine adopted to prevent claims in separate applications or patents that do not recite the "same" invention, but nonetheless claim inventions so alike that granting both exclusive rights would effectively extend the life of the patent protection.[442] Generally, an obviousness-type double patenting analysis entails two steps. First, as a matter of law, the claim in the earlier patent is construed and the claim in the later patent is construed and the differences between the two are determined. Second, the court determines whether the differences in the subject matter between the two claims renders the claims patentably distinct. A later claim that is not patentably distinct from an earlier claim in a commonly owned patent is invalid for obviousness-type double patenting.[443] A later patent claim is not patentably distinct from an earlier patent claim if the later claim is obvious over, or anticipated by, the earlier claim.[444]

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[438] *Id.*
[439] *Id.*
[440] *Id.*
[441] *Id.*
[442] *Georgia-Pacific Corp. v. US Gypsum Co.*, 195 F.3d 1322, 1326 (Fed. Cir. 1999).
[443] *In re Metroprolol Succinate Patent Litigation*, 494 F.3d 1011, 1016 (Fed. Cir. 2007); *Perricone v. Medics Pharmaceutical Corp.*, 432 F.3d 1368, 1371-73 (Fed. Cir. 2005).
[444] *Eli Lilly and Co. v. Barr Laboratories, Inc.*, 251 F.3d 955, 968 (Fed. Cir. 2001).

Claim 1 of the '765 patent is a claim directed to "[a] method for preparing bacterial strains."[445] Claim 15 of the '160 patent is directed to "[a] method for producing lysine."[446] As Ajinomoto points out and GBT's expert Webb admits, claim 1 of the '765 patent differs from claim 15 of the '160 patent in that claim 1 of the '765 patent fails to disclose: (1) limitations directed to producing, accumulating and collecting lysine in a culture; (2) the dapA gene; (3) the DDPS enzyme; or (4) the specific mutations recited in claim 15 of the '160 patent.[447] Relying on the same evidence it presents in support of its contention that claim 15 of the'160 patent is obvious under 35 U.S.C. § 103, GBT argues that these missing limitations would have been obvious in light of the prior art references and tools and techniques known to one of ordinary skill in the art as of December 1993.

However, for the same reasons discussed in detail, *supra*, with regard to GBT's Section 103 obviousness contention, the undersigned finds that claim 15 of the '160 patent is patentably distinct from claim 1 of the '765 patent and thus not invalid for obviousness-type double patenting. While claim 1 of the '765 patent may be broad enough to cover practice of claim 15 of the '160 patent, the fact that a claim in an earlier patent dominates a claim in a later patent does not mean that the later claim is obvious. In particular, the undersigned finds that GBT and the Staff fail to provide any reason why one of ordinary skill in the art as of December 1993, with claim 1 of the '765 patent in hand, would choose to cultivate lysine using a bacteria from the genus Eschericia with the specific mutations claimed in claim 15 of the '160 patent. Again, GBT and the Staff fail to give proper credit to the inventor's insights and willingness to confront and overcome obstacles in achieving the invention embodied in claim 15.

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[445] *See* RX-164 at 12:2.
[446] *See* JX-1 at 68:1-5.
[447] Compare JX-1 with RX-164; *see also* Webb, Tr. at 1004:17-25, 1006:1-20.

E. Unenforceability - Inequitable Conduct

GBT and the Staff argue that the '160 patent is unenforceable because the best mode information Ajinomoto concealed was inherently material, and the omission was deliberate and intentional, thus evidencing an intent to deceive the PTO.[448] GBT also argues that a pattern of nondisclosure, concealment and fictitious examples also supports an inference of intent.[449] Specifically, GBT and the Staff argue that Ajinomoto's failure to disclose their best mode of practicing claim 15 of the '160 patent (*i.e.*, the AE-70 strain) and their best mode of practicing claim 22 of the '160 patent (i.e., the TA-325 strain) are both material, because best mode is a requirement of patentability. [450] Likewise, GBT and the Staff argue that Ajinomoto's disclosure of fictitious examples regarding both claim 15 and claim 22 of the '160 patent is also material for the same reasoning. With regard to intent, GBT argues that "it is difficult to imagine an acceptable reason for disclosing fictionalized data."[451] GBT and the Staff also argue that the Ajinomoto inventors deliberately withheld their best mode strains.[452] With regard to claim 15 in particular, GBT argues that Kawamura testified that according to Kojima, the reason she was named an inventor on the patent was because she developed a highly productive lysine-producing strain (*i.e.*, AE-70), and yet the strain for which she was named an inventor was not disclosed.[453] GBT and Staff additionally argue with regard to both claim 15 and claim 22, that internal, confidential research reports show that the inventors linked AE-70 to the Japanese priority patent application and TA-325 to the PCT application,

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[448] RIB at 41; SIB at 49.
[449] RIB at 41.
[450] SIB at 50, 54.
[451] RIB at 42.
[452] SIB at 50, 51, 54.
[453] RIB at 42.

thus evincing that the inventors were aware that the patents were closely related to their work on AE-70 and TA-325, but chose not to disclose them.[454] GBT further argues on the subject of intent that the fact that Ajinomoto failed to disclose their best mode strains for both claims 15 and 22 and instead disclosed fictitious examples for both claims shows a pattern of nondisclosure and misrepresentation that strongly suggests that the conduct was no accident.

Ajinomoto argues that GBT and the Staff's inequitable conduct argument fails both the materiality and intent prongs.[455] With regard to materiality, Ajinomoto argues that since there was no best mode violation with respect to claim 15 and claim 22 GBT cannot establish materiality.[456] With regard to intent, Ajinomoto asserts that the inventors testified that they did not intend to deceive anyone with respect to either AE-70 or TA-325.[457] Ajinomoto argues that the undersigned was in a position to judge the credibility of the '160 inventors and see that GBT's argument is baseless.[458] Ajinomoto also asserts that Japan has no best mode requirement, arguing that GBT cannot explain how one can have an intent to deceive where there is no opportunity for deception.[459] Additionally, Ajinomoto asserts that claim 22 did not exist in the 1994 PCT application, arguing that GBT has not presented any evidence that the inventors could have intended in 1994 to break a rule that applies to a claim that had not yet been drafted.[460] Further, with regard to GBT's argument that the confidential research reports show that the inventors linked AE-70 to the Japanese priority patent application, Ajinomoto argues: (1) that there is no reference in JX-45C to AE-70 as being the "best," but rather

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[454] *Id.*; SIB at 51.
[455] CIB at 41.
[456] *Id.*
[457] *Id.* at 43.
[458] *Id.*
[459] *Id.*
[460] *Id.*

the reference is to AE-70 having the "highest yield" sometime during the period covered by the research report; (2) that the sentence following that reference recognized that the lysine production ability of the strain is [ ] and (3) the reference to the patent application was written in August or September 1994, after the December 1993 patent application and long after AE-70 was abandoned, so the author of the research report could not have been validating AE-70.[461]

As discussed above, GBT and the Staff argue that the '160 patent is unenforceable because the patent applicants intentionally failed to disclose their best mode for claims 15 and 22 and because the applicants included fictitious examples in the patent specification. The undersigned has already determined, *supra*, that the inventors violated the best mode requirement of Section 112 with regard to claim 15 for failing to disclose their preferred host strain AE-70 as of the Japanese priority date of December 8, 1993. The undersigned has also found, *supra*, that the inventors violated the best mode requirement by including fictitious examples in support of their best mode of practicing claim 15 of the '160 patent. However, the undersigned has not yet adjudicated GBT and the Staff's allegation that the inventors' violated the best mode requirement by failing to disclose their preferred host strain for practicing claim 22 of the '160 patent. Accordingly, before GBT and the Staff's inequitable conduct argument can be addressed , GBT and the Staff's best mode argument with regard to claim 22 must be considered.

a. Best mode of claim 22

Claim 22 depends from claim 16. Claim 22 reads as follows:

22. A method of producing L-lysine, comprising:

cultivating the bacterium of claim 16 in a suitable culture medium,

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[461] *Id.* at 44.

producing and accumulating L-lysine in the culture thereof, and collecting L-lysine from the culture.[462]

Independent claim 16 reads as follows:

16. A bacterium belonging the genus Escherichia which is transformed with a DNA coding for a dihydrodipicolinate synthase originating from a bacterium belonging to the genus Escherichia and having mutation to desensitize feedback inhibition by L-lysine, and

further harboring an aspartokinase which is desensitized to feedback inhibition by L-lysine, and wherein a dihydrodipicolinate reductase gene is enhanced.[463]

Claim 16 is directed to an Escherichia bacterium that is transformed with: (1) Escherichia DNA coding for DDPS that has been mutated to desensitize feedback inhibition by lysine; (2) a mutant of the gene encoding for aspartokinase; and (3) a mutant of the gene encoding for dihydrodipicolinate reductase.[464] The gene encoding for aspartokinase is known as lysC.[465] The gene encoding for dihydrodipicolinate reductase is known as dapB.[466] The effective filing date for claim 22, and claim 16 on which it depends, is the date of the filing of the PCT application on November 28, 1994.[467]

Looking first to the claims of the '160 patent, the undersigned finds that the preamble language of claim 22 clearly and unambiguously sets forth the utility of the claimed invention, namely "producing L-lysine."[468] As set forth in claim 22, the production of L-lysine includes at least the following three steps: (1) cultivating the bacterium of claim 16 in a suitable culture medium (*i.e.*, A

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[462] JX-1 at 68:37-41.
[463] *Id.* at 68:6-14.
[464] RFF 1.61 (no dispute).
[465] RFF 1.62 (no dispute).
[466] RFF 1.63 (no dispute).
[467] RFF 1.73 (no dispute).
[468] *See Northern Telecom*, 215 F.3d at 1287 n.1 ("Preamble language in a claim may provide an indication of how the inventor intended to 'carry out' his invention.").

bacterium belonging to the genus Escherichia having mutations to the dapA gene, dapB gene, and lysC gene.); (2) producing and accumulating L-lysine in the culture thereof; and (3) collecting L-lysine from the culture.[469] Thus, according to the plain language of claim 22, the claimed invention includes the overall production of L-lysine, as well as, the cultivation of an Escherichia bacterium with the specific mutations to the dapA, dapB and lysC genes and the accumulation and collection of the L-lysine. The specification confirms that the invention of the '160 patent is not simply directed to the mutations to the dapA, dapB, and lysC genes, but to a bacterium belonging to the genus Escherichia having the mutation to the dapA, dapB, and lysC genes and an improved method for producing L-lysine using said bacterium.[470] Thus, based on the plain language of the claims, as supported by the specification, the undersigned finds the claimed invention of claim 22 of the '160 patent to encompass the overall production of L-lysine, including the cultivation of an Escherichia bacterium with the specific mutations to the dapA, dapB, and lysC genes, and the accumulation and collection of the L-lysine.

Turning to the first prong in the best mode analysis, the undersigned finds for the reasons discussed below that as of the time of the filing of the PCT application on November 28, 1994, the inventors had a subjective preference for using host strain TA-325 to practice claim 16 of the '160 patent. Specifically, the monthly reports and research reports generated during the Lysine Project clearly and convincingly show the inventors preference for strain TA-325. For example, in Research

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[469] *See* JX-1 at 68:6-14, 37-41.

[470] *See id.* at 4:30-37; *see also id.* at 1:1-2 ("METHOD OF PRODUCING L-LYSINE BY FERMENTATION"), 4:66-5:4 ("The present invention further provides a method of producing L-lysine comprising the steps of cultivating any of the bacterium belonging to the genus Escherichia described above in an appropriate medium, producing and accumulating L-lysine in a culture thereof, and collecting L-lysine from the culture.").

Report No. 7, covering the period between September 1993 and May 1994, Ogawa reported that TA-325 with the pCABD2 plasmid (which included mutant dapA and lysC and enhanced dapB) was the "maximum yield lysine-producing bacteria."[471] Additionally, in Research Report No. 9, covering the period from April 1993 through March 1994, Kojima and Kawamura reported that by using the TA-325 strain "in March 1994 we finally achieved our target of [ ] with [ ]"[472] Kojima and Kawamura also reiterated that "[t]he TA-325 strain had the highest production ability."[473] Moreover, in Research Report No. 13, which covered the period from April 1994 through September 1994, Ogawa wrote that TA-325 was "the best" lysine-producing bacteria.[474] Further, in the monthly report for October 1994, just one month before the PCT application was filed, Kawamura referred to TA-325 as "the current host."[475] Additionally, the monthly reports and research reports show that the inventors were achieving results using the TA-325 strain that exceeded the results reported for the disclosed strains in the '160 patent.[476]

As previously discussed, Ajinomoto argues that the TA-325 strain was not the inventors' preferred host strain because the TA-325 strain still had unresolved problems as of the filing date of the PCT application. However, the fact that the TA-325 strain had not been perfected prior to the filing of the PCT application is irrelevant to the determination of whether the inventors had a subjective preference for strain TA-325 at the time of the PCT filing. The fact that the TA-325 strain may have had objective problems cannot thwart the clear and convincing evidence that the inventors

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[471] JX-52CT at AHL003105.
[472] JX-96CT at AHL436044.
[473] *Id.* at AHL436056.
[474] JX-53CT at AHL003163.
[475] JX-46CT at AHL430675.
[476] *See e.g.*, JX-28CT at AHL430720; JX-31CT at AHL430712; JX-98CT at AHL436092; JX-58CT at AHL436376.

had a subjective preference for strain TA-325 as of November 28, 1994. The undersigned finds the evidence on which Ajinomoto relies does not overcome the clear and convincing documentary evidence discussed in detail, *supra*, that shows that the inventors had a subjective preference for TA-325. Accordingly, for the reasons set forth hereinabove, the undersigned finds based on the documentary evidence of record that the inventors of the '160 patent had a subjective preference for the TA-325 host strain at the time of filing the PCT application on November 28, 1994.

Having determined that the inventors had a subjective preference for the TA-325 host strain at the time of filing the PCT application, the best mode analysis turns to the second prong to determine whether the inventors' disclosure is adequate to enable one of ordinary skill in the art to practice the best mode of the invention. As previously discussed, this second prong is objective and depends on the scope of the claimed invention and the level of skill in the relevant art. Because the scope of the claimed invention encompasses the host strain and the evidence shows that the inventors had a subjective preference for the TA-325 host strain at the time of filing the PCT application, the inventors were obligated under Section 112 to disclose that preference. There can be no question that the TA-325 strain was not disclosed in the '160 patent.[477] Thus, the undersigned finds the '160 patent disclosure insufficient to enable one of ordinary skill in the art to practice the inventors' preferred embodiment of the invention as claimed in claim 22 of the '160 patent, *viz.*, the TA-325 host strain transformed with dapA, dapB, and lysC mutants.

For the reasons discussed herein, the undersigned finds that Ajinomoto's concealment of its preferred embodiment of claim 22 of the '160 patent to be a violation of the best mode requirement of 35 U.S.C. § 112.

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[477] *See* JX-1.

b. Inequitable conduct

The undersigned has found, *supra*, several violations of the best mode requirement with respect to the '160 patent. Specifically, the undersigned has found that the inventors failed to disclose their preferred best mode for practicing claims 15 and 22 of the '160 patent. Additionally, the undersigned has held that the inventors' inclusion of fictitious data in the specification to support the patentability of claim 15 is also a best mode violation.

There can be no doubt based on the evidence of record that the inventors of the '160 patent knew of the preferred AE-70 strain at the time of the filing of the Japanese priority application in December 1993 and of the TA-325 strain at the time of the filing of the PCT application in November 1994. The Federal Circuit has held that "[b]ecause disclosure of the best mode is statutorily required, *see* 35 U.S.C. § 112, failure to disclose the best mode is inherently material and, we believe, reaches the minimum level of materiality necessary for a finding of inequitable conduct."[478] Accordingly, the undersigned finds the above described best mode violations are material.

With regard to intent, the record evidence shows that Ajinomoto engaged in a pattern of non-disclosure in procuring the '160 patent, including the inventors' failure to disclose their preferred host strain for practicing claim 15 in December 1993 when they filed their Japanese priority application, and their failure to disclose their preferred host strain for practicing claim 22 in November 1994, when they filed their expanded PCT application. Notably, Ajinomoto's repeated failure to disclose its best lysine producing host strains comes during a time when the record evidence indicates Ajinomoto was facing increased business competition from ADM. Moreover, the record evidence

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[478] *See Consolidated Aluminum*, 910 F.2d at 808 (citing *J.P. Stevens & Co., Inc. v. Lex Tex Ltd., Inc.*, 747 F.2d 1553, 1559 (Fed. Cir. 1984)).

shows that Ajinomoto also made a series of misrepresentations in procuring the '160 patent, including the explicit description in the specification that describes how to create what has been determined to be a fictitious host strain, W3110(tyrA), and the inclusion of fictitious data in Table 7 to support the patentability of claim 15. Ajinomoto's intentional inclusion of fictitious information and data, coupled with its repeated failure to disclose the inventors' true best mode for practicing claims 15 and 22 of the '160 patent, leads the undersigned to the inescapable conclusion that Ajinomoto had an intent to deceive when it filed its patent application. Because both the materiality and intent elements are high, equity demands a finding of inequitable conduct. Accordingly, based upon strong evidence of specific acts of concealment and misrepresentation by the applicants in connection with the '160 patent, the undersigned finds by clear and convincing evidence that the '160 patent is unenforceable due to inequitable conduct before the PTO.[479]

V. The '698 Patent

A. Claim Construction

1. Asserted Claims

Claim 15 is the only asserted claim of the '698 patent. Claim 15 of the '698 patent depends from claim 13, which in turn depends from independent claim 3. Claim 15 reads as follows:

> 15. The method of claim 13, wherein the microorganism belongs to the species Escherichia coli.

Claim 13 reads as follows:

> 13. A method for producing L-lysine, comprising:
>
> (a) cultivating the microorganism of claim 3 in a liquid medium,

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[479] *Kingsdown*, 863 F.2d 867 (Fed. Cir. 1988); *Salinomycin*, Inv. No. 337-TA-370, Unreviewed Initial Determination, 1995 WL 1049822 (U.S.I.T.C. November 6, 1995).

thereby producing the L-lysine and accumulating the L-lysine in the liquid medium, and

(b) collecting the L-lysine produced and accumulated in step (a).

Independent claim 3 reads as follows:

3. An isolated microorganism belonging to the genus Escherichia,

wherein the microorganism contains a mutant of a wild-type gene encoding a wild-type lysine decarboxylase;

the microorganism lacks the wild-type gene encoding the wild-type lysine decarboxylase;

the wild-type lysine decarboxylase comprises the amino acid sequence of SEQ ID NO:4; and

the mutant gene encodes no lysine decarboxylase having decarboxylating activity, the mutant gene encodes a mutant lysine decarboxylase having less decarboxylating activity than the wild-type lysine decarboxylase, or the mutant gene contains a mutation in a regulatory region causing the microorganism to produce less of the wild-type lysine decarboxylase than a microorganism containing the wild-type gene encoding the wild-type lysine decarboxylase.

2. Disputed Claim Limitations

There are no disputed claim limitations *per se*. However, GBT and the Staff argue that the '698 patent at issue is invalid for failing to satisfy the best mode requirement of 35 U.S.C. § 112. As previously stated, the contours of the best mode analysis are defined by the scope of the claimed invention, which in turn is determined by applying the ordinary principles of claim construction. Thus, in this regard, the parties do dispute how the scope of the claimed invention is construed. However, this dispute is more appropriately resolved, *infra*, when analyzing GBT and the Staff's best mode argument.

B. Infringement

Ajinomoto and GBT stipulate that GBT's manufacture of L-lysine feed products using the Old Escherichia bacterium strain deposited with the ATCC under Accession #SD-5590 infringes claim 15 of the '698 patent.[480] Ajinomoto and GBT also stipulate that GBT's manufacture of L-lysine products using the Corynebacterium strain deposited with the ATCC under Accession #SD-5620 does not infringe Claim 15 of the '698 patent.[481] Additionally, Ajinomoto and GBT stipulate that GBT's manufacture of L-lysine products using the New Escherichia bacterium strain deposited with the ATCC under Accession #SD-5717 does not infringe Claim 15 of the '698 patent.[482] Based on the stipulation, the undersigned finds that: (1) GBT's manufacture of L-lysine feed products using the Old Escherichia bacterium strain deposited with the ATCC under Accession #SD-5590 infringes claim 15 of the '698 patent; (2) GBT's manufacture of L-lysine products using the Corynebacterium strain deposited with the ATCC under Accession #SD-5620 does not infringe Claim 15 of the '698 patent; and (3) GBT's manufacture of L-lysine products using the New Escherichia bacterium strain deposited with the ATCC under Accession #SD-5717 does not infringe Claim 15 of the '698 patent.

C. Domestic Industry - Technical Prong

Ajinomoto and GBT stipulate that Heartland uses the method of Claim 15 of the '698 patent to make L-lysine products.[483] The Staff does not dispute this fact.[484] Based on the stipulation, the undersigned finds that Ajinomoto practices claim 15 of the '698 patent. Accordingly, the undersigned finds that Ajinomoto satisfies the technical prong of the domestic industry requirement of Section 337

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[480] JX-190C at ¶ 10.
[481] *Id.* at ¶ 11.
[482] *Id.* at ¶ 12.
[483] *Id.* at ¶ 5.
[484] *See* CFF 3.22 (no dispute).

with regard to the asserted '698 patent.

D. Validity

1. Ordinary Skill in the Art

The parties propose the same definitions of one of ordinary skill in the art that they proposed for the '160 patent, *supra*. Accordingly, for the same reasons discussed with regard to the '160 patent, the undersigned finds a person of ordinary skill in the art to which the '698 patent pertains would have an advanced degree in Biology, Biochemistry, Genetics, Genomics, Microbiology, Molecular Biology, Agricultural Engineering, Metabolic Engineering with 3-5 years of experience in a laboratory specializing in genetic engineering. The undersigned also finds that persons with a Bachelor's degree could be skilled in the art, but only after on-the-job training under the direct supervision of a Ph.D.-level scientist.

2. Best Mode

The first task in the best mode analysis is to define the invention claimed in the '698 patent. In defining the invention, the parties make virtually identical arguments to the ones they made with regard to the '160 patent. Ajinomoto argues that the inventors of the '698 patent fully disclosed the invention and the best mode of carrying it out by disclosing the best mode of making the specific mutation to the ldc gene.[485] As with the '160 patent, Ajinomoto argues that the scope of the claimed invention of the '698 patent is limited to the claimed mutation, *viz.*, the mutant ldc gene. GBT and the Staff argue, however, that the scope of the claimed invention is not limited to the mutation to the ldc gene. Rather, GBT and the Staff argue that the scope of the claimed invention encompasses the production of lysine using a bacteria of the species E.coli with mutant ldc gene, the accumulation of

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[485] CIB at 9.

the lysine and its collection. As with the '160 patent, GBT and Staff argue that Ajinomoto's interpretation of the claimed invention impermissibly reads out explicit claim limitations of claim 15 of the '698 patent.

Looking first to the claims of the '698 patent, the undersigned finds that the preamble language of claim 13, on which asserted claim 15 depends, clearly and unambiguously sets forth the utility of the claimed invention, namely "producing L-lysine."[486] As set forth in claim 13, the production of L-lysine includes at least the following steps: (1) cultivating the microorganism of claim 3 (*i.e.*, a microorganism belonging to the species E.coli having a mutant ldc gene) in a liquid culture medium; (2) producing and accumulating L-lysine in the liquid medium; and (3) collecting the produced and accumulated L-lysine.[487] Thus, according to the plain language of claim 13, the claimed invention includes the overall production of L-lysine, as well as, the cultivation of an E.coli microorganism with the mutant ldc gene, and the accumulation and collection of the L-lysine.

Having examined the claims, the specification is consulted. The specification confirms that the invention of the '698 patent is not simply directed to the mutation to the ldc gene, but to a microorganism belonging to the species E.coli having the mutation to the ldc gene and an improved method for producing L-lysine using said microorganism. For example, the specification states that "an object of the present invention is to obtain a novel lysine decarboxylase gene of Escherichia coli, create an L-lysine producing microorganism belonging to the genus Escherichia with restrained expression of the gene and/or the cadA gene, and provide a method or producing L-lysine by

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[486] *See* JX-2 at 32:34; *Northern Telecom*, 215 F.3d at 1287 n.1 ("Preamble language in a claim may provide an indication of how the inventor intended to 'carry out' his invention.").

[487] *See* JX-2 at 31:19-36, 32:34-40.

cultivating the microorganism."[488] The Federal Circuit has recognized that the use of the phrase "present invention" puts the public on notice as to the scope of the invention as a whole.[489]

Thus, based on the plain language of the claims, as supported by the specification, the undersigned finds the claimed invention of claim 15 of the '698 patent to encompass the overall production of L-lysine, including the cultivation of an Escherichia coli microorganism with a mutation to the ldc gene, and the accumulation and collection of the L-lysine. The undersigned rejects Ajinomoto's argument that the scope of the claimed invention should be limited to the mutation to the ldc gene for the reasons discussed, *supra*, with regard to the '160 patent, including that Ajinomoto's argument impermissibly reads explicit limitations out of claim 15 of the '698 patent.

Having defined the invention of claim 15 of the '698 patent, the undersigned turns to GBT's specific arguments supporting its contention that there has been a violation of the best mode requirement with regard to claim 15 of the '698 patent. GBT makes three separate arguments: (1) that the Ajinomoto inventors failed to disclose their preferred host strain; (2) that the Ajinomoto inventors failed to disclose their preference for sucrose as a carbon source; and (3) that the disclosed best mode was fictitious.[490] Each argument will be addressed in turn below.

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[488] *See* JX-2 at 1:46:52; *see also id.* at 1:1-2 ("LYSINE DECARBOXYLASE GENE AND METHOD OF PRODUCING L-LYSINE"), 2:7-10 ("[T]he present invention provides a microorganism belonging to the genus Escherichia . . ."), 2:11-17 ("[T]he present invention provides a method of producing L-lysine comprising the steps of cultivating, in a liquid medium, a microorganism belonging to the genus Escherichia described above to allow L-lysine to be produced and accumulated in a culture liquid, and collecting it.").

[489] *See, e.g., Honeywell Int'l Inc. v. ITT Indus., Inc.*, 452 F.3d 1312, 1318 (Fed. Cir. 2006); *Alloc, Inc. v. US. Int'l Trade Comm'n*, 342 F.3d 1361, 1378 (Fed. Cir. 2003).

[490] RIB at 48-55.

a. The Ajinomoto inventors failed to disclose their preferred host strain

GBT argues that as of the time of filing the '698 patent, on December 9, 1994, the inventors had only one host strain for practicing claim15, a strain denominated WC80-196S.[491] GBT asserts that Ajinomoto failed to disclose the WC80-196S host strain in the '698 patent. GBT argues that Ajinomoto's failure to disclose the only mode they actually contemplated for carrying out the invention is a violation of the best mode requirement of 35 U.S.C. § 112.[492] GBT asserts that to create WC80-196S, the inventors took two additional steps that are not disclosed in the specification of the '698 patent. Specifically, GBT argues that the inventors replaced the lysC gene on the chromosome with a feedback desensitized lysC mutant before exposing the cells to NTG mutation and the inventors inserted a package of five sucrose-utilization genes into the chromosome of the host cell.[493] GBT asserts that Kikuchi admitted at trial that a skilled artisan would not realize from the patent's best mode description that the host strain was created by replacing the lysC gene before metagenesis.[494] GBT also asserts that Kikuchi agreed that the '698 patent does not disclose the introduction of the sucrose utilization genes.[495] Additionally, GBT argues that Ajinomoto should be estopped from arguing that one of ordinary skill would have known to add sucrose utilization genes, because Ajinomoto recently obtained U.S. Patent No. 7,179,623 ("the '623 patent") which covers the sucrose utilization genese Ajinomoto failed to disclose in the '698 patent.[496]

Ajinomoto argues that GBT has failed to adduce clear and convincing evidence of a best mode

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[491] *Id.* at 48.
[492] *Id.*
[493] *Id.*
[494] *Id.* at 51.
[495] *Id.*
[496] *Id.* at 49.

violation.[497] Ajinomoto asserts that the '698 patent is directed to the reduction or elimination of lysine decarboxylation by modification of the ldc gene, arguing that there can be no best mode violation because the inventors made the novel ldc gene available by public deposit.[498] Ajinomoto also argues that the inventors disclosed the nucleotide sequence of the ldc gene.[499] With regard to GBT's allegation that the inventors failed to disclose their use of a modified lysC gene prior to NTG mutagenesis, Ajinomoto asserts that Dr. Kikuchi did not know if the use of a modified lsyC gene prior to NTG mutagenesis worked and that according to Dr. Liao's testimony it probably did not.[500] Thus, Ajinomoto argues there is no scientific basis for calling the use of a modified lysC gene prior to mutagenesis a "best mode."[501] According to Ajinomoto, a belief that an experiment may yield positive results is not a "best mode" where there is no evidence that an experiment actually succeeded.[502] Additionally, Ajinomoto argues that the only point of introducing the lysC mutant was to try to enhance lysine biosynthesis, which was a property of mutant lysC genes already known in the art at the time of filing.[503] Ajinomoto asserts that it is undisputed that the '698 patent discloses using a desensitized lysC gene. Further, Ajinomoto argues that Kikuchi publically deposited strain WC80-196, which was created using a modified lysC gene prior to NTG mutagenesis.[504]

With regard to GBT's allegation that the inventors failed to disclose the use of sucrose utilization genes, Ajinomoto argues that Kikuchi believed that the choice of sugar had nothing to do

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[497] CIB at 30.
[498] *Id.*
[499] *Id.*
[500] *Id.* at 31.
[501] *Id.*
[502] *Id.* at 35.
[503] *Id.* at 33.
[504] *Id.* at 31.

with the claimed invention.[505] According to Ajinomoto, the evidence shows that glucose is better than sucrose and is still the preferred carbon source because it is usually cheaper than sucrose.[506] Ajinomoto argues that it used glucose almost exclusively and that its own experiments never established that sucrose was a better carbon source.[507] Ajinomoto also argues that at the time of filing, one skilled in the art would know that sucrose could be used as a carbon source for E.coli simply by adding sucrose utilization genes and that one skilled in the art would know how to insert the utilization genes.[508] Additionally, Ajinomoto asserts that there were at least a dozen articles published on the subject at the time of the effective filing date of the '698 patent.[509] Further Ajinomoto asserts that GBT's expert, Dr. Webb, agreed that one or ordinary skill would have known to add sucrose utilization genes to use sucrose as a carbon source and how to do it.[510]

As previously discussed, the first part of the best mode inquiry is subjective and asks whether the inventors had a preferred embodiment in mind at the time the patent application was filed. Inventor Kikuchi testified at the hearing that before the filing of the '698 patent, strain WC80-196S and its derivatives were the only strains from which he had knocked out the ldc gene.[511] According to Kikuchi's hearing testimony, Research Report No.10 and the strain development chart of Exhibit RX-64C disclose the method used to create the WC80-196S strain.[512] At his deposition, however,

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[505] *Id.* at 32.
[506] *Id.*
[507] *Id.* at 33.
[508] *Id.* at 31.
[509] *Id.*
[510] *Id.* at 32.
[511] *See* Kikuchi, Tr. at 702:17-21 ("Q. And before the filing of the patent, the strain WC80-196S and its derivatives were the only strains from which you had knocked out the ldc gene, right? A. That is correct.").
[512] *See id.* at 625:20-626:1, 626:25-627:22; RFF 3.62 (no dispute); *see also* JX-51CT; RX-
(continued...)

Kikuchi more candidly admitted that Research Report No. 10 and the strain development chart showed the "best way" known to him at the time for creating the host strain WC80-196S.[513] Specifically, Research Report No. 10, covering the period from December 1993 through March 1994, describes the methodology used to create strain WC80-196S as follows:

> (1) When RSFD80 is introduced into E.coli strain W3110-derived Phe-producing bacterial host that produces Lys as the sole byproduct amino acid and Lys-producing cultivation is performed, it shows a high [ ] yield, suggesting high latent capabilities for strain W3110 Lys production, and furthermore, effectiveness in giving nutritional demands.
> (2) To obtain AEC-resistant strains from strain W3110, we obtained strain WC80 with lysC on chromosomes substituted with desensitized-type lysC80 through homologous substitution.
> (3) We obtained approximately 800 AEC-resistant strains by processing strain WC80 with NG, and selected nine high Lys-producing strains (1-2g/L) through test-tube cultivation.
> (4) We gave sucrose utilization capability by transducing strain B399 sucrose-utilizing genes to the aforementioned nine strains using PI phages. Furthermore, when we introduced plasmid pCAB1 which has lysC80, dapA*24 and dapB to these strains and performed Lys-producing cultivation using sucrose as C-source, strain WC80-196S/pCABl showed a [ ] yield.[514]

Stated more succinctly, to create strain WC80-196S the inventors: (1) replaced the chromosomal copy of the lysC gene of E.coli W3110 with a feedback-desensitized mutant, thereby creating strain WC80; (2) subjected the lysC-replaced cells to NTG mutagenesis; (3) selected colonies able to survive in

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[512](...continued)
64C.

[513] Kikuchi, Tr. 700:5-12 ("QUESTION: So looking at the research report, Exhibit 51, and the summary of the steps in it, which is Exhibit 64, those are the sources that show the best way known to you at the time of creating a host strain that you could then use for disruption or deletion of the lysine decarboxylase genes, right? ANSWER: I believe so."). Kikuchi, Tr. 700:5-12 ("QUESTION: So looking at the research report, Exhibit 51, and the summary of the steps in it, which is Exhibit 64, those are the sources that show the best way known to you at the time of creating a host strain that you could then use for disruption or deletion of the lysine decarboxylase genes, right? ANSWER: I believe so.").

[514] JX-51CT at AHL003185.

AEC; (4) chose a colony having L-lysine productivity, thereby creating strain WC80-196; and (5) inserted sucrose utilization genes into strain WC80-196, thereby creating host strain WC80-196S.[515] Inventor Kikuchi documented his reasons for following the above steps in Research Report No. 10.[516] For example, with respect to the first step of replacing the lysC gene of strain W3110 with a feedback-desensitized mutant, Kikuchi explained that:

> The initial plan was to obtain AEC-resistant strains by mutating wild E.coli strain W3110. However, when AEC-resistant strains are introduced in E.coli wild strains, it is reported that bacterial strains are obtained for which lysC has been desensitized for most of the strains. Desensitized-type has already been obtained for lysC, which is also easy to amplify with plasmids. Therefore, in order to obtain bacterial strains that have mutation points in various places other than lysC, we thought to substitute the lysC on chromosomes with desensitized type lysC80 beforehand.[517]

Ajinomoto's argument that Dr. Kikuchi did not know if the use of a modified lsyC gene prior to NTG mutagenesis worked and thus there was no scientific basis for calling the use of a modified lysC gene prior to mutagenesis a "best mode" is misplaced. The first step in the best mode inquiry is focused on the inventors subjective belief at the time of filing and not whether that belief has an objective basis for support. Thus, the fact that Kikuchi did not know if using a modified lysC gene prior to NTG mutation produced positive results is immaterial as the evidence shows that Kikuchi had a clear preference for using strain WC80-196S to practice claim 15 of the '698 patent. Moreover, Kikuchi's testimony at the hearing is belied by Kikuchi's written comments in Research Report No. 10, which shows that Kikuchi thought that lysC replacement prior to mutagenesis was important in developing a lysine-producing host strain.[518] In fact, at the hearing, Kikuchi testified that with regard

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[515] *See* CX-234CT (Kikuchi WS) at ¶¶ 40-42, 45, 54; *see also* RX-64C.
[516] *See* JX-51CT.
[517] *Id.* at AHL003180.
[518] *See* JX-51CT at AHL003176; Kikuchi, Tr. 785:16-786:3, 821:21-822:7.

to lysine production, the lysC replacement was the "number one key step."[519]

Ajinomoto argues more generally that Kikuchi did not have a best strain in mind at the time of the December 9, 1994, effective filing date of the '698 patent. However, the evidence of record shows that strain WC80-196S was the only strain the Ajinomoto inventors used to practice claim 15 of the '698 patent.[520] Because the WC80-196S strain was the only strain that the inventors used, it must necessarily be the best strain they had at the time of the effective filing date of the patent. Moreover, the evidence shows that Kukuchi clearly preferred to create the host strain by first incorporating a mutated lysC gene into the chromosome before subjecting the organism to mutagenesis, followed by AEC selection, and incorporating sucrose utilization genes into the cells that survived the selection process that produced high lysine yields.[521] In light of the documentary evidence and testimony, the undersigned finds Ajinomoto's argument that Kikuchi did not have a best mode in mind at the time of the filing of the '698 patent unpersuasive.

Accordingly, the undersigned finds for the reasons discussed above that as of December 9, 1994, the Ajinomoto inventors had a subjective preference for the WC80-196S strain as the microorganism used to practice claim 15 of the '698 patent.

Having determined that the inventors had a subjective preference for the WC80-196S strain, the next step in the best mode analysis if to determine whether the specification of the '698 patent would have enabled one of ordinary skill in the art at the time of the invention to practice Ajinomoto's best mode, or in other words, whether the inventors concealed their best mode from the

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[519] Kikuchi, Tr. 647:20-648:2.
[520] *Id.* at 702:17-21.
[521] *See, e.g.*, JX-51CT at AHL003185.

public.[522] The purported best mode for practicing claim 15 of the '698 patent is described in the patent under the heading "Best Mode For Carrying Out The Invention."[523] Under the subheading "Preparation of Escherichia coli having L-lysine productivity," the patent purports to describe the best way of preparing the host strain that is used to practice claim 15.[524] The patent describes the following three steps for producing a host strain: (1) subject cells of E.coli W3110 to N-methyl-N'-nitro-N-nitrosoguanidine mutation treatment; (2) select colonies able to survive in the lysine analog AEC; and (3) choose a colony having L-lysine productivity.[525] According to the patent, a host strain obtained using these steps is denominated WC196.[526] Also according to the patent specification, a host strain allegedly produced according to these steps was deposited by the Ajinomoto inventors under accession number FERM P-14690.[527] Notably, however, the deposited strain was not WC196 as the specification states, but rather a strain denominated WC80-196.[528]

The method described in the specification for creating the host strain used to practice claim 15 of the '698 patent fails to explicitly recite two steps taken by the inventors in creating their preferred host strain, WC80-196S. Specifically, the patent fails to describe the steps of inserting a mutant lysC gene prior to mutagenesis and AEC selection, and adding sucrose utilization genes. Because the description in the patent is written as if those were the steps actually performed in creating the host strain, the fact that two additional steps taken by the inventors were not disclosed leads to the conclusion that the patent specification is a misrepresentation of what was actually done

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[522] *See Chemcast*, 913 F.2d at 928.
[523] JX-2 at 7:18-19.
[524] *Id.* at 8:40-41.
[525] *Id.* at 8:40-63.
[526] *Id.* at 8:55-63.
[527] *Id.*
[528] Kikuchi, Tr. at 718-19; see also RFF 3.43 (no dispute).

by the inventors.

Although the patent specification fails to disclose two of the steps taken by the inventors in creating their preferred host strain WC80-196S, Ajinomoto argues that the specification nevertheless satisfies the objective prong of the best mode requirement because the specification of the '698 patent discloses the use of a desensitized lysC gene and persons of ordinary skill in the art knew of prior art disclosures that taught incorporation of a desensitized lysC gene before mutagenesis and the incorporation of sucrose utilization genes into E.coli was well known in the art. As discussed in more detail below, the undersigned finds Ajinomoto's arguments without merit.

The specification describes the incorporation of a desensitized lysC gene as one of five potential methods that could be used to increase production of lysine by the microorganism.[529] Thus, the specification does not inform one of ordinary skill which method, *if any*, was used by the inventors in creating their preferred host strain. Further, Kikuchi admitted that the disclosure of the '698 patent would not place one of ordinary skill in the art on notice that the insertion of the lysC mutation had been done prior to NTG mutation.[530]

With regard to the sucrose utilization genes, whether one of ordinary skill in the art would have known how to insert sucrose utilization genes into a strain is of no moment, because there is no disclosure in the '698 patent that would suggest to one of ordinary skill in the art that such was the inventors' preference or that it was beneficial to do so. The fact is, the starting strain disclosed in the '698 patent, W3110, was known by those of skill in the art not to be able to naturally use sucrose.[531] Further, the evidence shows that Ajinomoto did not just incorporate any sucrose utilization genes in

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[529] JX-2 at 5:20-67.
[530] *See* Kikuchi, Tr. at 823-24.
[531] Kikuchi, Tr. at 650, Liao, Tr. at 1406.

their preferred WC80-196S host strain, but rather incorporated the specific utilization genes that Ajinomoto obtained the '623 patent on some thirteen years later.[532] The '623 patent includes claim 1, which states:

> A method for producing an amino acid selected from the group consisting of isoleucine, lysine, and valine comprising:
>
> a) cultivating in a culture medium which contains sucrose as a carbon source a bacterium belonging to the genus Escherichia which has been constructed from a sucrose non-assimilative strain belonging to the genus Escherichia , wherein said bacterium harbors sucrose PTS genes from Escherichia coli VKPM B-7915 and has an ability to produce said amino acid, and
>
> b) collecting said amino acid from said medium.[533]

During prosecution of the '623 patent, in response to an anticipation rejection from the PTO, Ajinomoto argued that its invention was patentable because the reference cited by the examiner did not teach the production of lysine and did not teach that the "production of . . . lysine . . . was higher when the bacterium of the present invention is cultivated in a medium which contains sucrose, as opposed to glucose, as the carbon source."[534] If the use of sucrose PTS genes in an E.coli bacteria to produce lysine was patentable in 2007, it is hard to even begin to understand how Ajinomoto could argue that as of the effective filing date of the '698 patent in 1994 one or ordinary skill in the art would have known to incorporate such genes in a host strain to practice claim 15 of the '698 patent.

Ajinomoto also argues that the omissions in the '698 patent are of no matter because the inventors deposited their preferred strain. However, it is undisputed that the deposited strain, deposited under accession number FERM P-14690, fails to include the sucrose utilization genes found

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[532] *See* RFF 3.154 (no dispute); Liao, Tr. at 1415:25-1416:4, 1416:9-13; RX-235 at 7:38-44.
[533] RX-235 at 15:2-16-3.
[534] *See* RX-197 at 8-9.

in the inventors' preferred strain WC80-196S.[535] Because the deposit does not reflect the best mode practiced by the inventors, the deposit in and of itself cannot satisfy the best mode requirement. Nor, as Ajinomoto contends, can the deposited strain be considered a satisfactory disclosure of the inventors' preferred lysC replacement step. While it is true that the deposited strain WC80-196 was in fact created using the preferred lysC replacement step, the deposit cannot cure the incomplete and misleading description of its creation in the '698 patent. The inventors purported to give a detailed explanation of their best mode in both words and in an allegedly matching deposit. The undersigned finds the mismatch between the deposit and the misleading description in the patent effectively results in concealment. Nothing in the patent would signal one of skill in the art that the deposit is anything other than what was described. Thus, the undersigned finds the '698 patent disclosure insufficient to enable one of ordinary skill in the art to practice the inventors' preferred embodiment of the invention as claimed in claim 15 of the '698 patent, *viz.*, the WC80-196S host strain with the ldc knockout.

For the reasons discussed herein, the undersigned finds Ajinomoto's concealment of its preferred embodiment of claim 15 of the '698 patent to be a violation of the best mode requirement. Accordingly, the undersigned finds claim 15 of the '698 patent invalid under 35 U.S.C § 112.

b. The Ajinomoto inventors failed to disclose their preferred carbon source

GBT argues that as of the effective filing date of the '698 patent, Ajinomoto had a preference for sucrose as the carbon source for culturing the claimed microorganism.[536] GBT further argues that Ajinomoto inserted sucrose utilization genes into its preferred host strain and usually used sucrose

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[535] Kikuchi, Tr. at 718-19.
[536] RIB at 52.

for their experimental work.[537] GBT asserts that Ajinomoto failed to disclose its preference for sucrose and thus violated the best mode requirement.[538] Specifically, GBT argues that the '698 patent does not reveal that sucrose may be used as a carbon source, but instead discloses numerous other carbon sources, including glucose, lactose, galactose, fructose, and starch hydrolysate.[539] GBT argues that the specification does not inform a person of ordinary skill in the art that sucrose could be used as the carbon source with the only host strain described in the patent.[540]

Like GBT, the Staff also argues that Ajinomoto failed to disclose its preference for using sucrose as a carbon source and thus violated the best mode requirement of 35 U.S.C. § 112.[541] Specifically, the Staff argues that the W3110 strain that the inventors used to create the allegedly preferred strain described in the '698 patent was known not to be able to naturally utilize sucrose.[542] According to the Staff, the specification only states that "[a]s the carbon source, it is possible to use sugars such as glucose, lactose, galactose, fructose, and starch hydrolysate; alcohols such as glycerol and sorbitol; and organic acids such as fumaric acid, citric acid, and succinic acid."[543] Additionally, the Staff argues that sucrose was used as the carbon source in the experiment that forms the basis of Example 2 of the '698 patent although the specification states that glucose was the carbon source and does not disclose that sucrose was used in the experiments.[544] Further, the Staff argues that the evidence demonstrates that the Ajinomoto inventors added the sucrose utilization genes to increase

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[537] *Id.*
[538] *Id.*
[539] *Id.*
[540] *Id.*
[541] SIB at 59.
[542] *Id.*
[543] *Id.*
[544] *Id.*

the lysine productivity of the bacteria because sucrose is a more efficient carbon source than glucose.[545] On this point, the Staff argues that the Ajinomoto research department reported that sucrose may be better than glucose for the production of amino acids in E.coli and that lysine yields were higher when sucrose was used as the carbon source.[546] The Staff also asserts that Kikuchi generally used sucrose as the carbon source during his experiments.[547] The Staff further asserts that increasing productivity through sucrose utilization was one of the three goals set by Kojima at the time he became project leader in April 1993 and continued to be a goal throughout the term of the Lysine Project.[548]

Ajinomoto argues that there is no best mode violation for not mentioning sucrose in the '698 patent.[549] Ajinomoto argues specifically that all the experts agreed that at the time of filing one skilled in the art would know sucrose could be used as a carbon source for E.coli simply by adding a sucrose utilization gene.[550] According to Ajinomoto, GBT's case essentially boils down to "sucrose is suspiciously missing from the '698 Patent, and it might give a 5% higher yield, therefore, the inventors cannot be believed."[551] On this point, Ajinomoto argues without citation that while theoretically sucrose may give 5% higher yield, that does not make it better.[552] Ajinomoto asserts that Kikuchi testified that he believed that the choice of sugar sources had nothing to do with the

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[545] *Id.*
[546] *Id.* at 61.
[547] *Id.*
[548] *Id.* at 59-60.
[549] CIB at 31.
[550] *Id.*
[551] *Id.* at 32.
[552] *Id.*

claimed invention.[553] Ajinomoto also asserts that while all E.coli use glucose, only some E.coli use sucrose.[554] Additionally, Ajinomoto asserts that Ajinomoto used glucose almost exclusively. Further, noting that the sentence in the specification of the '698 patent stating that "[a]s the carbon source, it is possible to use sugars such as glucose, lactose, galactose, fructose, and starch hydrolysate; alcohols such as glycerol and sorbitol; and organic acids such as fumaric acid, citric acid, and succinic acid" is also in the '160 patent specification, Ajinomoto insinuates that the reason the '698 patent specification does not mention sucrose as a potential carbon source was because it was just stock wording added by a patent prosecutor.[555]

As previously stated, the best mode analysis is constrained by the scope of the claimed invention. Thus, with regard GBT and the Staff's assertion that Ajinomoto's failure to disclose sucrose as a carbon source in the '698 patent is a best mode violation, the undersigned must consider at the outset whether Ajinomoto failure to disclose their alleged best carbon source is within the scope of the claimed invention. Turning first to the claims, the undersigned finds nothing in asserted claim 15 that would indicate that the inventors were trying to claim the carbon source as part of the invention.[556] Further, the undersigned finds nothing in the specification to support such a notion. Thus, the undersigned finds that "carbon source" is outside the claimed invention of claim 15 of the '698 patent. Although "carbon source" is an unclaimed element, that does not end the best mode inquiry. The Federal Circuit has held that unclaimed subject matter may still have to be disclosed in some instances to satisfy the best mode requirement if the unclaimed matter "materially affects the

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[553] *Id.*
[554] *Id.*
[555] *Id.* at 33.
[556] *See* JX-2 at 32:47-48.

properties of the claimed invention."[557] In this instance the record is clear that to cultivate E.coli for lysine production the bacteria *must* be grown in a culture that includes a carbon source.[558] Thus, because the scope of the claimed invention includes the cultivation of lysine, the undersigned finds that a carbon source is necessary to practice the claimed invention. Additionally, the evidence suggests that using sucrose improves lysine yields.[559] Accordingly, the undersigned finds that under the Federal Circuit's best mode jurisprudence if the Ajinomoto inventors had a preferred carbon source, they would be required to disclose it.

The first step in the best mode analysis is to determine whether the Ajinomoto inventors had a subjective preference for a particular carbon source. The undersigned has previously found, *supra*, that the inventors' preferred host strain (*i.e.* microorganism) is the strain denominated WC80-196S. This strain includes sucrose utilization genes that allow the bacteria to utilize sucrose as a carbon source. The inventors' intentional insertion of the sucrose utilization genes in their preferred host strain is strong evidence that the inventors had a preference for sucrose as the carbon source. Moreover, it is undisputed that one of the goals of the Lysine Project as of April 1993 was to "[i]mprove productivity from sucrose-based raw material."[560] This fact was reaffirmed by the inventors in Research Report No. 14, where the inventors wrote that one of the objectives of their research was "[t]o breed high-yield bacteria from sucrose."[561] Also, inventor Kikuchi admitted at the

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[557] Bayer AG v. Schein Pharmaceuticals, Inc., 301 F.3d 1306, 1319 (Fed. Cir. 2002).

[558] RFF 3.13 (no dispute).

[559] *See* CX-234CT (Kikuchi WS) at ¶ 85.

[560] *See* JX-38CT at AHL430779; RX-89C (Webb WS) at ¶ 249; *see also* RFF 3.47 (no dispute).

[561] JX-81CT at AHL433698; Kikuchi, Tr. at 653:11-18; RX-89C at ¶ 253.

hearing that one of the goals of the Lysine Project was in fact to use sucrose as a carbon source.[562] Additionally, the evidence of record shows that once the Ajinomoto researchers had added the sucrose utilization genes to WC80-196 to create their preferred host strain WC80-196S, the researchers thereafter generally used sucrose for their experimental work.[563] Further, in Research Report No. 11, the inventors provide a reason why sucrose would be their preferred carbon source stating that "[i]t is important to fulfill our needs of using cost-saving materials such as sucrose and running a highly productive operation in order to beat our competitors such as ADM Corporation."[564] Accordingly, for the reasons discussed above, the undersigned finds that the evidence of record clearly shows that the Ajinomoto inventors had a subjective preference for using sucrose as the carbon source in practicing asserted claim 15, as of the December 1994 effective filing date of the '698 patent.

Having found that the inventors had a subjective preference for sucrose as their carbon source in practicing claim 15 of the '698 patent, the second part of the best mode inquiry asks whether the '698 patent disclosure would enable one of skill in the art at the time of the invention to practice the inventors' best mode. The specification of the '698 patent states "[a]s the carbon source, it is possible to use sugars such as glucose, lactose, galactose, fructose, and starch hydrolysate; alcohols such as glycerol and sorbitol; and organic acids such as fumaric acid, citric acid, and succinic acid."[565] Notably, this rather extensive list does not include sucrose. Ajinomoto argues that the reason the above quoted language does not list sucrose is simply because it was "stock language" used by its patent counsel. However, that argument is irrelevant to this facet of the best mode inquiry as the

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[562] Kikuchi, Tr. at 652:16-23.
[563] *See* Kikuchi, Tr. at 664:24-665:9; CX-234CT (Kikuchi WS) at ¶ 88.
[564] JX-98CT at AHL436062.
[565] JX-2 at 6:47-51.

second part of the best mode analysis focuses on whether *objectively* the patent disclosure would enable one of skill in the art at the time to practice the inventors' best mode of the claimed invention. Because one of ordinary skill would only be aware that the specification does not disclose sucrose, Ajinomoto's reasons for why sucrose is not disclosed are irrelevant.

According to the evidence of record, it is undisputed that the patent does not mention sucrose.[566] It is also undisputed that the '698 patent does not disclose the introduction of the sucrose utilization genes.[567] Additionally, the evidence of record establishes that strain W3110, the parent strain from which the preferred host strain WC80-196S was created, is known to those of skill in the art not to be able to naturally use sucrose as a carbon source.[568]

Ajinomoto argues that there is no best mode violation for not mentioning sucrose in the '698 patent, because at the time of filing, one skilled in the art would know sucrose could be used as a carbon source for E.coli by adding a sucrose utilization gene. While the record supports Ajinomoto's assertion regarding the knowledge of one of ordinary skill at the time of the filing, the argument is irrelevant to the current best mode inquiry. The allegation by GBT and the Staff is that the Ajinomoto inventors failed to disclose sucrose as their preferred carbon source for practicing claim 15 of the '698 patent. Thus, even if one or ordinary skill in the art at the time would know sucrose could be used as a carbon source for E.coli by adding a sucrose utilization gene, that fact would not remedy the failing of the '698 patent disclosure to inform one of ordinary skill in the art of the inventors'

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[566] RFF 3.17 (no dispute); RFF 3.18 (no dispute)("Dr. Kikuchi admitted that the use of sucrose is not mentioned anywhere in the '698 patent even though the patent lists several other carbon sources.").

[567] RFF 3.75 (no dispute).

[568] *See* Kikuchi, Tr. at 650:4-6; RX-89C (Webb WS) at ¶ 247; *see also* Kikuchi, Tr. at 614:20-25.

preference for sucrose. From the evidence discussed above, it is clear that the '698 patent fails to disclose sucrose, and more specifically the inventors' preference for sucrose as the carbon source for practicing claim 15.[569] Thus, the undersigned finds that the '698 patent would not enable one of ordinary skill in the art as of effective filing date of December 9, 1994 to practice the inventors' preferred embodiment of the invention, *viz.*, cultivation of lysine produced using the WC80-196S host strain with the ldc knockout and sucrose as the carbon source.

For the reasons discussed hereinabove, the undersigned finds Ajinomoto's concealment of its preferred carbon source, sucrose, to be a violation of the best mode requirement. Accordingly, the undersigned finds claim 15 of the '698 patent invalid under 35 U.S.C § 112.

c. The disclosed best mode was fictitious

GBT argues that the inventors did not actually perform the lysine-production experiments described in the '698 patent with the disclosed strains and thus the examples in the patent are fictitious and invalid under 35 U.S.C. § 112.[570] Specifically, GBT argues that Table 1 of the '698 patent purports to reflect the best mode of practicing claim 15, but the evidence establishes that the AEC strain on which the experiment supposedly was performed never existed.[571] On this point, GBT argues that the NTG/AEC-resistance step used in creating the inventors preferred host strain, WC81-196S, was done only on strains that had already undergone the mutant lysC replacement and thus, the experiments reported in Table 1 were not performed with the described strain.[572] GBT also argues that when Ajinomoto was asked to identify the laboratory notebook or other source of the data set

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[569] *See e.g.*, RX-89C (Webb WS) at ¶ 269.
[570] RIB at 53.
[571] *Id.*
[572] *Id.* at 53-54.

forth in Table 1, Ajinomoto was unable to do so.[573] Further, GBT argues that in response to interrogatory questions, Ajinomoto pointed to documents that establish that the experiment reported in Figure 3 of the '698 patent was carried out with different strains and a different carbon source from those disclosed in the patent.[574] According to GBT, the monthly report from September 1994 contains a graph that is identical to the data for the corresponding time points in Figure 3 of the patent, but the tested strains are derivatives of the actual best mode host strain.[575] Additionally, GBT asserts that the experiment used to create the graph in the September 1994 report was done using sucrose as the medium, not glucose as disclosed in the '698 patent.[576] GBT further asserts that Kikuchi's lab notebook contains a table with data identical to the data for the corresponding time points in Figure 3.[577] In contrast to what is disclosed in the '698 patent, GBT argues that the experiments in Kikuchi's lab notebook were carried out using a derivative of the best mode strain, WC80-196S using sucrose as the carbon source.[578]

The Staff, like GBT, argues that claim 15 of the '698 patent is invalid because the examples disclosed in the '698 patent are fictitious.[579] Specifically, the Staff argues that the experiments reflected in Example 3 of the '698 patent were actually performed using a bacteria having a different genotype than that which is described in the Example.[580] Additionally, the Staff asserts that the description of Example 3 does not disclose that the actual carbon source used in the underlying

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[573] *Id.* at 54.
[574] *Id.*
[575] *Id.*
[576] *Id.*
[577] *Id.* at 55.
[578] *Id.*
[579] SIB at 62.
[580] *Id.* at 62-63.

experiments was sucrose.[581] Further, even if the experiments reflected in Examples 3 were run using glucose as the carbon source, the Staff argues the examples are nevertheless fictitious because the experiments were run using a different strain than that described in the '698 patent.[582]

Ajinomoto argues that GBT's argument of fictitious data amounts to little more than "if Ajinomoto did not retain the underlying data, then it must be fabricated."[583] According to Ajinomoto, many of Ajinomoto's records, which were written fifteen years ago, no longer exist.[584] Specifically, Ajinomoto asserts that Japan has a first to file patent system and that under that system documents underlying an invention served no purpose to establish priority and thus at the time of the effective filing date of the '698 patent, Ajinomoto did not require its inventors to keep their laboratory notebooks and allowed them to maintain them or dispose of them as they saw fit.[585] Ajinomoto asserts that it was not until 1996 that Ajinomoto changed its retention policy.[586] With regard to the '698 patent specifically, Ajinomoto argues that Kikuchi testified that he did generate the data in the tables in the'698 patent specification, that the data was on his MacIntosh computer, and that he did not save the data when he upgraded to a Windows system.[587] Ajinomoto asserts that under Ajinomoto's retention policy, Kikuchi had no reason to retain the data.[588] Ajinomoto also argues that GBT's assertion that the Figure 3 data is fictitous because it was based on experiments that used glucose and the curve in Figure 3 looks like the curve in a figure in Kikuchi's lab notebook that was

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[581] *Id.* at 63.
[582] *Id.*
[583] CIB at 37.
[584] *Id.*
[585] *Id.*
[586] *Id.*
[587] *Id.* at 39.
[588] *Id.*

based on sucrose is incorrect because Kikuchi explained that he would expect the curves to look the same regardless of the carbon source.[589] Additionally, Ajinomoto argues in response to GBT's assertion that the WC196 strain described in the patent never existed that Kikuchi and Liao testified that WC196 was just an abbreviated name of WC80-196S.[590]

Under the heading "BEST MODE FOR CARRYING OUT THE INVENTION," the '698 patent states that "[t]he present invention will be more specifically explained below with reference to Examples."[591] Example 1 of the patent discloses knocking out the ldc gene from WC196 to create a strain WC196L, knocking out the cadA gene from WC196 to create a strain called WC196C, and knocking out the cadA gene from WC196L to create the strain WC196LC.[592] Example 2 of the '698 patent discloses the confirmation of L-lysine-decomposing activities of WC196, WC196C, WC196L, and WC196LC strains and provides results showing the accumulation of L-lysine and the accumulation of cadaverine as a decomposition product of L-lysine.[593] Table 1 purports to show the amounts of lysine and cadaverine produced and accumulated using strains WC196, WC196C, WC196L, and WC196LC.[594] The '698 patent describes the results reported in Table 1, and by virtue thereof the purported benefit of the claimed invention, stating:

> The accumulation of lysine was increased and the accumulation of cadaverine as a decomposition product of lysine was decreased in the WC196C strain with destruction of the cadA gene as compared with WC196 strain, and in WC196L strain with destroyed function of the novel lysine decarboxylase gene as compared with WC196 and WC196C strains. The accumulation of lysine was further increased, and the accumulation of cadaverine as a decomposition product of lysine was not detected in

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589 *Id.*
590 *Id.*
591 JX-2 at 7:17-21.
592 RFF 3.10 (no dispute).
593 *See* CRRFF 3.12-1; JX-2 at 9:63-10:60.
594 JX-2 at Table 1.

WC196LC strain with destroyed function of the both lysine decarboxylase genes.[595] Although Example 1 discloses that strains WC196L and WC196LC both have the ldc gene knocked out, inventor Kikuchi admitted at the hearing that strain WC80-196S and its derivatives were the *only* strains from which the ldc gene had been knocked out.[596] Because according to Kikuchi strain WC80-196S and its derivatives were the only strains from which the ldc gene had been knocked out, strains WC196L and WC196LC disclosed in the '698 patent, must be fictitious. Thus, the results shown in Table 1 must also be fictitious.

Ajinomoto asserts that WC196 is the same as WC80-196S, arguing that "WC196 . . . is the same as the strain WC80-196S used to generate some of the '698 patent data except for the presence of prior art sucrose utilization genes."[597] However, while Ajinomoto argues that WC196 is the same as WC80-196S, in the same breath Ajinomoto admits that the two strains are different because strain WC196 admittedly does not include the sucrose utilization genes undisputedly incorporated in the WC80-196S strain. Additionally, as described in the '698 patent, strain WC196 also lacks the mutant lysC gene undisputedly found in strain WC80-196S. Further, while Kikuchi alleges that WC196 is really shorthand for WC80-196S, none of the meticulously kept monthly reports or research reports dated prior to the effective filing date of the '698 patent on December 9, 1994, refers to WC80-196S as WC196.[598]

Accordingly, for the reasons discussed above, the undersigned finds that the evidence of record clearly and convincingly shows that Table 1, and the data presented therein, is fictitious. The

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[595] *Id.* at 10:40-60.
[596] Kikuchi, Tr. at 702:17-21 (emphasis added); *see also* SFF 443 (no dispute).
[597] *See* CRRFF 3.98.
[598] *See, e.g.*, JX-43CT; JX-51CT.

Federal Circuit has held that the disclosure of fictitious data in support of a best mode disclosure in a patent is a violation of the best mode requirement of Section 112.[599] Thus, the undersigned finds claim 15 of the '698 patent invalid under 35 U.S.C. §112.

3. Obviousness

GBT argues that claim 15 of the '698 patent would have been obvious to one of ordinary skill in the art as of its effective filing date of December 9, 1994.[600] According to GBT, clear and convincing evidence, including the admissions of one of the inventors, shows that the existence of a second lysine decarboxylase was known as of December 1994.[601] Knowing that the gene existed, GBT argues that a "skilled researcher who wished to do so" would have been able to isolate the gene and knock it out using routine techniques.[602] GBT argues that techniques for lysine production and accumulation were also known, as was the use of E.coli.[603] GBT thus argues that every aspect of claims 3, 13 and 15 was known, and claim 15 is obvious.[604]

More specifically, with regard to the limitation of claim 3 requiring "wherein the microorganism contains a mutant . . . lysine decarboxylase [and] lacks the wild-type gene . . . [and] the wild-type lysine decarboxylase comprises the amino acid sequence of SEQ ID NO: 4" GBT argues

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[599] *See, e.g. Hoffmann-La Roche, Inc. v. Promega Corp.*, 323 F.3d 1354, 1367 (Fed. Cir. 2003); *Consolidated Aluminum Corp. v. Fonseca Int'l Ltd.*, 910 F.2d 804, 808 (Fed. Cir. 1990); *Certain Salinomycin Biomass and Preparations Containing Same*, Inv. No. 337-TA-370, Pub. No. 2978, ID at 46-47 (July 1996), *aff'd sub nom. Kaken Pharm. Co. v. Int'l Trade Comm'n.*, 111 F.3d 143 (Fed. Cir. 1997) ("*Salinomycin*").

[600] RIB at 58.

[601] *Id.*

[602] *Id.*

[603] *Id.*

[604] *Id.*

that by December 1994, researchers knew that the claimed wild-type lysine decarboxlyase existed.[605] GBT further argues that knowing the existance of the the claimed decarboxlase researchers would also be able to discern the gene encoding it.[606] On this point GBT asserts that Kojima reported at the outset of the Lysine Project that "there are at least two Lys decarboxylases, a major one and a minor one."[607] GBT also relies on a 1980 article from Goldemberg and a 1983 article from Wertheimer and Leifer in support of its assertion that that the claimed lysine decarboxylase was known to researchers in December 1994.[608] GBT argues in the alternative that even if the existence of the ldc gene was not clearly known, given there was strong evidence that a gene encoding the claimed lysine decarboxlyase enzyme did exist, it would have been "obvious to try" to isolate the gene.[609] Further, GBT asserts that one trying to isolate the gene "would certainly have found it."[610] GBT argues that once the claimed decarboxlase was found,creating a mutant gene that would not encode a functioning enzyme or alternatively, a mutant gene that would reduce its activity or expression, would be routine.[611] GBT asserts that Ajinomoto expert Liao agreed that the ability to knock out a known gene was known in the art.[612]

Like GBT, the Staff also argues that claim 15 of the '698 patent would have been obvious to one of ordinary skill as of the patent's effective filing date of December 9, 1994.[613] Specifically, the Staff argues that the evidence demonstrates that the inventors of the '698 patent merely applied

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[605] *Id.* at 59.
[606] *Id.*
[607] *Id.*
[608] *Id.* at 59-60.
[609] *Id.*
[610] *Id.*
[611] *Id.* at 62-63.
[612] *Id.* at 63.
[613] SIB at 63.

known techniques to identify a gene that was believed to exist, and used well known and widely-used techniques to neutralize the gene's effects in order to obtain the mutated bacteria covered by claim 3, on which claim 15 depends.[614] In support of its argument that the claimed decarboxlyase was believed to exist, the Staff, like GBT, relies on the 1980 article by Goldemberg and the 1983 article by Wertheimer and Leifer.[615] The Staff also relies on the statement by Kojima that "[t]here are at least two Lys decarboxylases, a major one and minor one."[616] Additionally, the Staff cites to the testimony of GBT's expert, Webb, who states that amino acid decarboxylases generally come in pairs in many types of bacteria, that two decarboxylases have been demonstrated with respect to lysine in bacteria of the genus Hafnia and Selenomonas, and that E.coli was known to have two decarboxylase genes with respect to other amino acids.[617] The Staff argues that the specification makes clear that one of ordinary skill would have been interested in discovering whether or not E.coli bacteria had the claimed decarboxylase gene, because the specification states that two genes were believed to be involved in the decarboxylasion of lysine and that only one had been found .[618] The Staff further argues that Kikuchi's testimony provides the motivation to discover the ldc gene at the time of the invention.[619] Specifically, the Staff refers to the testimony of Kikuchi, where he states:

> [B]ut there was a movement underway, globally speaking, to sequence the entire genome, not just for E. coli but for different organisms. And so there was, in my mind, the notion that prior to my discovery of the gene the lysine decarboxylase gene itself, that someone may come out with the sequence for that. And therefore, I think I was feeling that I wanted to perform the knockout and see what that knockout would have physiologically, so I think I wanted to see quickly what the physiological effect

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[614] *Id.*
[615] *Id.* at 63-64.
[616] *Id.* at 63.
[617] *Id.* at 64.
[618] *Id.*
[619] *Id.* at 64-65.

of that knockout would be.[620]

Ajinomoto argues that claim 15 of the '698 patent is valid and nonobvious.[621] Ajinomoto asserts that the invention of claim 15 of the '698 patent covers a method for producing lysine by use of E.coli having reduced lysine degradation activity resulting from a mutation to or deletion of the ldc gene.[622] According to Ajinomoto, there is no dispute that the inventors were the first to produce lysine using the novel method and were the first to cultivate microorganisms having a mutated ldc gene as described in claim 3, from which claim 15 is depends.[623] Ajinomoto also argues that as of the December 9, 1994 effective filing date of the '698 patent, a second lysine decarboxylase gene had not been isolated or characterized, nor was the sequence known.[624] Additionally, Ajinomoto argues that it is impossible to engineer the wild-type gene out of a strain without first knowing the sequence of the gene, and "knowledge of the sequence encoding an enyzme is not a trivial step from merely suspecting the existence of an enzyme."[625] Because the ldc gene required by claim 15 had never been isolated or sequenced, Ajinomoto argues that the prior art could not show a mutation or deletion of the ldc gene.[626] Ajinomoto also asserts that GBT's expert agreed that Ajinomoto was the first to isolate and sequence the ldc gene and the first to describe and possess the ldc knockout.[627] Further, Ajinomoto argues that there is no evidence in the record of any specific motivation for one skilled in the art to combine or modify the disclosures of the multitude of prior art references relied upon by

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[620] *Id.* at 65.
[621] CIB at 62.
[622] *Id.*
[623] *Id.*
[624] *Id.*
[625] *Id.*
[626] *Id.*
[627] *Id.*

GBT to be able to: (1) obtain an Escherichia coli having the ldc knockout gene described in claim 3 of the '698 patent; or (2) use such a microorganism to produce lysine using the method recited in asserted claim 15.[628]

More specifically, Ajinomoto argues that GBT's experts Somerville and Webb ignore the evidence of record that there was considerable uncertainty as of the effective filing date of the '698 patent to the existence of a second lysine decarboxylase gene.[629] Additionally, Ajinomoto argues that GBT has failed to provide any motivation as to why one of ordinary skill in the art would combine the prior art in the way GBT suggests to choose only those specific techniques necessary to produce the claimed invention.[630]

The determination of obviousness is a question of law based on underlying factual inquiries into the (1) the scope and content of the prior art, (2) the level of ordinary skill in the art, (3) the differences between the claimed invention and the prior art ; and (4) secondary considerations of non-obviousness (also known as "objective evidence"). The undersigned has determined, *supra*, that a person of ordinary skill in the art to which the '698 patent pertains would have an advanced degree in Biology, Biochemistry, Genetics, Genomics, Microbiology, Molecular Biology, Agricultural Engineering, or Metabolic Engineering with 3-5 years of experience in a laboratory specializing in genetic engineering. The undersigned also found, *supra*, that persons with a Bachelor's degree could also be skilled in the art, but only after on-the-job training under the direct supervision of a Ph.D.-level scientist.[631]

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[628] *Id.* at 62-63.
[629] *Id.* at 63.
[630] *Id.*
[631] *See supra*, at IV.D.1.

As of December 1994, the effective filing date for claim 15 of the '698 patent, the evidence of record shows that fermentation was already being used to produce lysine and thus, one of ordinary skill in the art at the time would know that fermentation could be used for the production and accumulation of lysine.[632] The record shows that the cultivation of lysine produced by fermentation was also known. Additionally, as discussed in more detail previously with regard to the '160 patent, the evidence shows that one of ordinary skill at the time would know generally that E.coli could be used to produce lysine.

The prior art also includes a 1980 article by Goldemberg titled "Lysine Decarboxylase Mutants of Escherichia coli: Evidence for Two Enzyme Forms."[633] Goldemberg stated in the article that her observations were "consistent with the existence of two kinds of lysine decarboxylase: an inducible form, and ... a constitutive enzyme, thermosensitive and present in very small amounts in the three strains compared in this study."[634] However, contrary to GBT and the Staff's assertion that Goldemberg's work constitutes proof that a second form of lysine decarboxylase existed that was distinct from the inducible form, the undersigned finds Goldemberg did not conclusively demonstrate that the observed lysine decarboxylase activity was caused by a gene other than inducible lysine

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[632] *See* RX-88C (Somerville WS) at ¶ 33; *see also* CX-231C (Liao WS) at ¶ 46-47; JX-1 at 1:12-13.

[633] *See* JX-126.

[634] JX-126 at 2. There are two forms of lysine decarboxylases: the constitutive form and the inducible form. RFF 3.211 (no dispute). Constitutive and inducible lysine decarboxylases differ in amino acid sequence, conditions under which they catalyze the decomposition of lysine, and conditions under which each one is formed. RFF 3.212 (no dispute). Inducible lysine decarboxylase is formed only when cells are cultivated in rich medium, with limited available oxygen, at acidic pH. RFF 3.213 (no dispute). Constitutive lysine decarboxylase is formed under all conditions of growth. RFF 3.214 (no dispute). When cells are cultivated in the presence of excess oxygen, at neutral pH, the constitutive lysine decarboxylase is the only one formed. RFF 3.215 (no dispute). The ldc gene encodes the constitutive form of lysine decarboxylase. RFF 3.221 (no dispute).

decarboxylase. Goldemberg admits only that the observed lysine decarboxylase activity "*might* imply the existence of at least two enzymes."[635]

In 1983 a prior art article by Wertheimer and Leifer was published with the title, "Putrescine and Spermidine Sensitivity of Lysine Decarboxylase in Escherichia coli: Evidence for A Constitutive Enzyme . . ."[636] While Ajinomoto's expert Liao agreed that the title of the article suggested that there was a constitutive lysine decarboxylase, Liao testified that the activity Wertheimer and Leifer observed could have been produced by ornithine decarboxylase.[637] Thus, while the article may suggest the existence of a constitutive lysine decarboxylase, the evidence does not support the conclusion that such a decarboxylase actually existed.

Also in 1983, a reference by Kamio & Terawaki reported the existence of a constitutive and inducible lysine decarboxylase in bacteria belonging to the genus Selenomonas. A 1986 prior art reference to Fecker *et al.* also reported the existence of a constitutive and inducible lysine decarboxylase, but in bacteria belonging to the genus Hafnia.[638] Additionally, in a 1986 prior art article, Igarashi *et al.* observed two separate lysine decarboxylase activities, but the second observed lysine decarboxylase activity appears to be attributed to ornithine decarboxylase and not a constitutive form of lysine decarboxylase.[639] Further, a 1985 prior art article by Tabor & Tabor discussed the fact that both ornithine and arginine decarboxylases exist in both inducible and constitutive forms in E. coli.[640]

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[635] JX-126 at 2 (emphasis added).
[636] JX-125.
[637] Liao, Tr. at 1464:24-1465:3.
[638] *See* JX-144; JX-138; RX-89C (Webb WS) at ¶¶ 357-359.
[639] JX-132 at 6.
[640] RX-160; *see also* RX-89C (Webb WS) at ¶ 360-361.

In addition to that which is cited above, the record evidence shows that as of the December 1994 effective filing date of the '698 patent, the following techniques were known and available to researchers for performing tasks within molecular biology: PCR, the use of endonucleases and ligases to create plasmids, mutagenesis through agents like NTG or hydroxylamine, gene sequencing, use of multiple copy plasmids to increase gene expression, in vitro mutagenesis of a target gene on a plasmid, and AEC selection to identify feedback desensitized mutants.[641]

What is not disclosed in the prior art, but what is claimed in claim 15 of the'698 patent is an Escherichia coli microorganism that lacks the wild-type ldc gene and instead has a mutated ldc gene encoding a lysine decarboxylase that has reduced or eliminated activity. Contrary to arguments by GBT and the Staff, the record evidence does not support a finding that as of December 1994 a constitutive form of lysine decarboxylase in E.coli was *known* to exist.

While GBT and the Staff argue that creating such a microorganism would have been obvious to one of ordinary skill in the art at the time of the effective filing date of December 1994, the evidence of record does not support such a conclusion, especially not clearly and convincingly. Moreover, GBT and the Staff incorrectly frame the obviousness inquiry. The invention of claim 15 is not merely directed to an Escherichia coli strain with the specific mutation recited in claim 3 of the '698 patent, but rather a method of producing, accumulating and cultivating lysine. Thus, the proper obviousness inquiry is whether one of ordinary skill in the art as of December 9, 1994 would have found it obvious to produce lysine using a microorganism of the species Escherichia coli that lacks

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[641] *See* Liao Tr. at 1424:1-1425:22; *see also* RX-89C (Webb WS) at ¶¶ 306, 307, 309-12, 331-33, 337, 339.

the wild-type ldc gene and instead has a mutant ldc gene.[642]

As with regard to the '160 patent, GBT and the Staff again have used impermissible hindsight to conclude that claim 15 of the '698 patent was obvious. GBT and the Staff's case for obviousness amounts to little more than an argument that because the tools and techniques necessary to create the specified mutant ldc gene were available and known to one of ordinary skill in the art in December 1994, claim 15 must be obvious. The Supreme Court, however, recently reaffirmed the impropriety of such an approach, stating that "a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art."[643] Additionally, GBT argues that given the evidence that the ldc gene existed, it would have been "obvious to try" to isolate the gene.[644] However, the Federal Circuit has consistently held that "obvious to try" is not to be equated with obviousness.[645]

GBT argues that it would have been an obvious choice in December 1994 to use E.coli as the microorganism for lysine production. However, the evidence shows that there were inherent difficulties in using E.coli for lysine fermentation, not the least of which being that E.coli is not a natural lysine producer.[646] Moreover, at the time, Corynebacterium was being used almost exclusively for the production of lysine.[647] Thus, while Ajinomoto may have had a specific motivation as a result of the competitive threat from Archer Daniels Midland to begin looking for nonconventional ways

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[642] *See* 35 U.S.C. §103 (A claim is obvious if "the differences between the subject matter sought to be patented and the prior art are such that *the subject matter as a whole* would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.")(emphasis added).

[643] *KSR*, 127 S.Ct. 1727, 1741 (2007).

[644] RIB at 62.

[645] *See Gillette Co. v. S.C. Johnson & Son, Inc.*, 919 F.2d 720, 725 (Fed. Cir. 1990).

[646] *See* CX-234C (Kikuchi WS) at ¶ 6; CX-235C (Kojima WS) at ¶ 23.

[647] CX-231C (Liao WS) at ¶ 46, 44, 48; *see also* Somerville, Tr. at 1235:9-13.

to more efficiently produce lysine, there is no evidence that anyone else would have been so motivated.[648]

It is undisputed that the wild type ldc gene whose absence is required by claim 15 of the '698 patent had not been isolated or sequenced in the art.[649] On this point, the evidence indicates that it is impossible to engineer the wild-type gene out of a strain without knowing the sequence of the gene, and knowledge of the sequence encoding an enzyme is not a trivial step from merely suspecting the existence of the ldc enzyme.[650] Further, it is undisputed that Ajinomoto was the first to describe the ldc knockout and the first to possess the ldc gene with a knockout.[651] The prior art relied on by GBT and the Staff does not show that the techniques available at the time of the invention could have been used by one of ordinary skill to disclose the ldc gene or to use a mutation of the ldc gene. As is typical when impermissibly relying on hindsight to conclude obviousness, GBT and the Staff fail to provide any reason why one of ordinary skill in the art at the time would have combined or modified the many prior art references cited to get to the claimed invention of claim 15 of the '698 patent.

As discussed above, GBT and the Staff use impermissible hindsight to sift through the prior art to conclude that claim 15 of the '698 patent is obvious. While Webb and Somerville's pathway

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[648] *See* CX-235C (Kojima WS) at ¶ 7 (stating that the origin of theLysine Project began "[i]n 1990, [when] Ajinomoto concluded that it was at a competitive disadvantage to Archer Daniels Midland ("ADM") in the production of L-lysine. ADM has access to its own internal glucose supplies at a much lower cost than Ajinomoto. Companies like ADM, who have separate sugar processing operations, generate huge quantities of glucose that can be used as the raw material to make amino acids through fermentation."), ¶ 78 ("In order to compete with Archer Daniels Midland, we attempted to improve the quality of the bacterial strain that is used in a fermentation process to produce lysine. We hoped that we could overcome the cost advantage that Archer Daniels Midland had in the raw materials with an improvement in the bacteria used in the fermentation process.").

[649] CX-231C (Liao WS) at ¶ 203; Somerville, Tr. at 890:13-890:23.

[650] CX-231C (Liao WS) at ¶ 202.

[651] Somerville, Tr. at 891:24-892:7.

to the invention may in retrospect seem to follow logical steps using available tools and techniques to come to the invention of claim 15, at the time of the invention the inventor's insights and willingness to confront and overcome obstacles cannot be discounted. Accordingly, for the reasons discussed above, the undersigned finds that GBT and the Staff failed to prove by clear and convincing evidence that claim 15 of the '698 patent was obvious as of the date of the effective filing date of December 9, 1994.

E. Unenforceability - Inequitable Conduct

GBT and the Staff argue that the '698 patent is unenforceable based on the applicants' inequitable conduct.[652] Specifically, GBT and the Staff argue that Ajinomoto's failure to disclose their best mode of practicing claim 15 of the '698 patent (*i.e.*, the WC80-196S strain) and their best mode of practicing claim 13 of the '698 patent (i.e., the TAML66E strain) are material, because best mode is a requirement of patentability.[653] Likewise, GBT argues that both the inventors' failure to disclose sucrose as their preferred carbon source and the inventors' inclusion of fictitious examples in the specification supports a finding of inequitable conduct.[654]

GBT asserts that the inventors did not disclose in the '698 patent the one strain, WC80-196S, they used to practice claim 15.[655] Instead, GBT asserts the inventors disclosed a fictitious strain that made no mention of the lysC replacement and the insertion of sucrose utilization genes that are included in preferred strain WC80-196S.[656] GBT argues that while Ajinomoto's internal documents candidly disclose the lysC replacement and the insertion of sucrose utilization genes, in public

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[652] SIB at 68-71; RIB at 63-66.
[653] SIB at 68, 69; RIB at 63, 65.
[654] RIB at 63-64.
[655] RIB at 63.
[656] *Id.*

documents these two steps were concealed.[657] GBT and the Staff argue that keeping the two steps a secret is strong evidence of an intent to deceive.[658] Additionally, with regard to intent, GBT notes that while the patent explicitly recites an extensive list of possible carbon sources to practice claim 15 of the'698 patent, the list conspicuously does not include sucrose, the inventors preferred carbon source.[659] GBT asserts that Ajinomoto kept the beneficial effects of sucrose on lysine production as a trade secret for over ten years and then filed and received a patent covering that very thing.[660] According to GBT, had the inventors publicly deposited and disclosed WC80-196S, Ajinomoto could not have obtained patent protection for the producing lysine using strains with sucrose utilization genes because the disclosure in WC80-196S would have anticipated any such patent claims.[661] GBT argues that the only conclusion to be drawn from Ajinomoto's actions is that the inventors intentionally withheld their preference for sucrose as a carbon source.[662] GBT argues that the inventors' conduct evinces a pattern of non-disclosure and misrepresentation. Because the omission of information concerning the inventors' best mode is highly material and there is strong evidence of intent, GBT and the Staff argue that the inventors committed inequitable conduct when prosecuting the '698 patent.[663]

Ajinomoto argues that GBT and the Staff's inequitable conduct argument fails both the materiality and intent prongs.[664] With regard to materiality, Ajinomoto argues that since there was

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[657] *Id.*
[658] *Id.*; SIB at 69.
[659] RIB at 64.
[660] *Id.*
[661] *Id.*
[662] *Id.*
[663] *Id.* at 64, 66; SIB at 69.
[664] CIB at 45.

no best mode violation with respect to claim 15 and claim 13, GBT cannot establish materiality.[665] With regard to intent, Ajinomoto asserts that the inventors testified that they did not intend to deceive anyone with respect to either sucrose, the lysC replacement, or TAML66E.[666] Ajinomoto argues that the undersigned was in a position to judge the credibility of the '698 inventors and see that GBT's argument is baseless.[667] Ajinomoto also asserts that Japan has no best mode requirement, arguing that GBT cannot explain how one can have an intent to deceive where there is no opportunity for deception.[668]

As discussed above, GBT and the Staff argue that the '698 patent is unenforceable because the patent applicants intentionally failed to disclose their best mode for claims 15 and 13, intentionally failed to disclose their preference for sucrose as a carbon source and because the applicants included fictitious examples in the patent specification. The undersigned has already determined, *supra*, that the inventors violated the best mode requirement of Section 112 with regard to claim 15 for failing to disclose their preferred host strain WC80-196S and their preference for sucrose as a carbon source. Additionally, the undersigned has found, *supra*, that the inventors violated the best mode requirement by including fictitious examples in the specification allegedly in support of their best mode of practicing claim 15 of the '698 patent. While the undersigned has not yet adjudicated GBT and the Staff's allegation that the inventors also violated the best mode requirement by failing to disclose their preferred host strain for practicing claim 13 of the '698 patent, the undersigned finds such an exercise unnecessary as its previous findings provide ample evidence of inequitable conduct.

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[665] *Id.*
[666] *Id.* at 47.
[667] *Id.*
[668] *Id.*

There can be no doubt based on the evidence of record that the inventors of the '698 patent knew of the preferred WC80-196S strain as of the effective filing date of December 9, 1994. Likewise, there can be no doubt that the inventors were well aware that sucrose could be used as a carbon source in the production of lysine using strain WC80-196S. Because disclosure of the best mode is statutorily required, the undersigned finds Ajinomoto's failure to disclose its preference for using host strain WC80-196S to practice claim 15 and its failure to disclose its preference for sucrose as a carbon source is material.

With regard to intent, the record evidence shows that Ajinomoto engaged in a pattern of non-disclosure in procuring the '698 patent, including the failure to disclose its preferred host strain for practicing claim 15 and its preference for sucrose as a carbon source. Moreover, the record evidence shows that Ajinomoto made a series of misrepresentations in procuring the '698 patent. Specifically, the '698 patent describes how to create the alleged best mode strain for practicing claim 15, but fails to disclose two steps the inventors took in creating their preferred host strain WC80-196S, namely the lysC replacement step and the inclusion of sucrose utilization genes. Additionally, while the specification explicitly discloses a long list of carbon sources that may be used to practice claim 15, the specification conspicuously fails to disclose the inventors' preferred carbon source, sucrose. The specification further conceals the inventors' preference for sucrose by only disclosing examples in support of the best mode disclosure that are based on experiments allegedly run using glucose. By failing to disclose both the addition of sucrose utilization genes in its preferred host strain and the use of sucrose as a preferred carbon source, the evidence suggests the inventors intended to deceive the PTO. Furthermore, the intentional inclusion of fictitious data in Table 1 to support the patentability of claim 15 also supports a finding of the requisite intent to deceive. Notably, Ajinomoto's failure

to disclose its best lysine producing host strain comes during a time when the record evidence indicates Ajinomoto was facing increased business competition from ADM. Ajinomoto's intentional inclusion of fictitious information and data, coupled with its failure to disclose the inventors' true best mode for practicing claim 15 and the inventors' preference for sucrose as a carbon source, leads the undersigned to the inescapable conclusion that Ajinomoto had an intent to deceive when it filed its patent application. Because both the materiality and intent elements are high, equity demands a finding of inequitable conduct. Accordingly, based upon strong evidence of specific acts of concealment and misrepresentation by the applicants in connection with the '698 patent, the undersigned finds by clear and convincing evidence that the '698 patent is unenforceable due to inequitable conduct before the PTO.

VI. Unclean Hands

GBT argues that Ajinomoto has "engaged in a duplicitous and inherently inequitable scheme to bolster its prospects for success in this investigation by misusing for litigation purposes its feigned interest in purchasing GBT's facilities for producing lysine."[669] According to GBT, Ajinomoto has "contracted in bad faith, procured commercial information and technology through false pretenses, and attempted to conceal and perpetuate this deceitful scheme and maximize its advantage in this investigation."[670] GBT asserts that Ajinomoto seeks equity from the ITC, but has not behaved equitably.[671]

Ajinomoto argues that GBT's unclean hands defense should be denied.[672] Contrary to GBT's

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[669] RIB at 67.
[670] *Id.*
[671] *Id.*
[672] CIB at 69.

argument, Ajinomoto argues that the evidence shows that Ajinomoto participated in discussions with GBT in good faith.[673] Specifically, Ajinomoto argues that the significant time, resources and energy it devoted to the discussions with GBT, the fact that it did not breach any duty of confidentiality owed to GBT in connection with the discussions, and the fact that the discussions failed for reasons unrelated to the patent infringement at issue here, demonstrate that Ajinomoto acted in good faith.[674] Ajinomoto asserts that its interactions with GBT, its investigation of GBT's patent infringement, and its initiation of this investigation "were not unconscionable, fraudulent or deceitful conduct justifying the application of the unclean hands doctrine."[675] Ajinomoto argues that GBT has failed to prove a nexus between its alleged inequitable conduct and the equity it seeks in this investigation.[676] In particular, Ajinomoto argues that GBT's unclean hands theory is neither "borne out by the facts nor does it establish the required nexus between the validity and enforceability of the patents-in-suit and Ajinomoto's participation in acquisition discussions and its investigation of suspected infringement."[677] While GBT argues that it was misconduct for Ajinomoto to test the lysine product samples GBT provided during the September 5, 2005 plant tour, Ajinomoto argues that the samples were of finished lysine products available in the marketplace and thus could not be confidential.[678] Additionally, Ajinomoto asserts that there is no evidence that Ajinomoto's plant tour was intended as anything other than a fact finding mission in pursuit of a potential future business relationship.[679] Further, Ajinomoto argues that there is no evidence that Ajinomoto participated in the plant knowing

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[673] *Id.* at 68.
[674] *Id.*
[675] *Id.*
[676] *Id.* at 70.
[677] *Id.*
[678] *Id.*
[679] *Id.*

that it intended to pursue litigation against GBT. In fact, Ajinomoto asserts that GBT acknowledges that Ajinomoto's decision to pursue a Section 337 investigation against GBT was made after the September 5, 2005 plant tour.[680] Ajinomoto also asserts, in contrast to GBT's allegation that Ajinomoto's consideration of a potential purchase of GBT was a "pure sham," that it established a working group composed of some of its highest executives to study the potential transaction, set a budget of $8 million for advisory and legal fees and due diligence, hired JPMorgan as an investment advisor, and conducted numerous high-level meetings regarding the viability of a potential transaction.[681] Ajinomoto notes that it took the above steps after the September 5, 2005 plant tour and before GBT provided any substantive due diligence information.[682] Ajinomoto also argues that GBT's unclean hands theory is barred by the Noerr-Pennington Doctrine.[683] Ajinomoto argues that under the Noerr-Pennington Doctrine, a patent holder is immune from claims of unfair competition or antitrust violation premised upon enforcing patent rights.[684]

The Staff also argues that GBT's unclean hands argument should be rejected.[685] Specifically, the Staff argues that the factual circumstances surrounding GBT's allegations of unclean hands are unlike those in the decisions GBT cites, where the act complained of bore a direct relationship to the cause of action.[686] The Staff argues that GBT's unclean hands defense, which the Staff asserts is based on allegedly fraudulent acquisition negotiations, is similar to the allegedly fraudulent settlement negotiations that served as the basis of the defendant's unclean hands defense that was rejected in

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[680] *Id.* at 70-71.
[681] *Id.*
[682] *Id.*
[683] *Id.* at 72.
[684] *Id.*
[685] SIB at 72.
[686] *Id.* at 71.

Sanofi-Synthelabo v. Apotex, Inc., 470 F.3d 1368, 1384 (Fed. Cir. 2006).[687] The Staff argues that as in *Sanofi*, Ajinomoto's alleged fraudulent conduct relates to "negotiations" well after the patents were obtained and thus GBT's unclean hands defense should be denied.[688]

The unclean hands doctrine provides that a court's equitable power "can never be exerted on behalf of one who has acted fraudulently, or who by deceit or any unfair means has gained an advantage."[689] Courts will only apply the doctrine when it has been shown that the inequitable conduct bears "an immediate and necessary relation to the equity" that the patent holder seeks in litigation.[690] Unclean hands must be proven by clear and convincing evidence.[691]

The parties have stipulated to the following facts regarding GBT's defense of unclean hands. In September 2004, Ajinomoto received an inquiry from an officer of Nikko Citigroup Limited regarding a sale [ ] of [ ] 8.1% holdings of GBT shares.[692] A meeting with [ ] regarding such possible sale took place in Hong Kong in February 2005.[693] There was no further direct contact between Ajinomoto and GBT until August 8, 2005, when Ajinomoto, in the context of expressing its interest in the possible acquisition of GBT's lysine operation, wrote GBT requesting a plant visit, expressing understanding for GBT's sensitivity

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[687] *Id.* at 72.

[688] *Id.*

[689] *Keystone Driller Co. v. General Excavator Co.*, 290 U.S. 240, 245 (1933).

[690] *Certain Home Vacuum Packaging Products*, 337-TA-496, 2004 WL 1082507, Notice, at 88-89 (March 2004); *see also Precision Instrument Mfg., Co. v. Automotive Maint. Mach. Co.*, 324 U.S. 806, 815 (1945).

[691] *In re Omeprazole Patent Litigation*, 483 F.3d 1364, 1374 (Fed. Cir. 2007) ("Andrx bears the burden of proving by clear and convincing evidence that Astra acted with unclean hands."). Notably, GBT incorrectly asserts in its post-hearing brief that the standard is preponderance of the evidence. *See* RIB at 69.

[692] JX-191C at ¶ 1.

[693] *Id.* at ¶ 2.

about trade secrets and offering a confidentiality agreement not to use or disclose any confidential information obtained during the visit.[694] A confidentiality agreement, dated August 8, 2005, was executed by Ajinomoto and delivered to GBT.[695] On and after August 24, 2005, Ajinomoto, unknown to GBT, was testing the L-lysine products of GBT and another manufacturer that were purchased from the market to determine whether the microorganism used in producing them were brevibacteria or E. coli.[696] On August 25 and 29, 2005, E. coli and brevibacteria DNA were detected in the lysine products of GBT.[697] On September 5, 2005, at Ajinomoto's request, five employees of Ajinomoto visited GBT for a plant tour.[698] One of Ajinomoto's employees took pictures of a GBT facility from a highway outside the GBT facility.[699] Ajinomoto's employees visited GBT's plants for the manufacture of L-lysine, including its plant in Dehui, China.[700] During the plant tours, Ajinomoto's employees were provided information with respect to GBT's L-lysine, including its principal raw materials, its auxiliary materials, energy use, production facilities and technology.[701] At Ajinomoto's request, GBT provided Ajinomoto's representatives with samples of its finished crystalline and sulphate L-lysine products during the plant visit.[702] On or after September 8, Ajinomoto's laboratory was requested to test the GBT product samples obtained during the GBT plant visit and purchased by Ajinomoto for the dapA and ldc genes covered by the '160 and '698 patents.[703] Those tests, in

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[694] *Id.* at ¶ 3.
[695] *Id.* at ¶ 4.
[696] *Id.* at ¶ 5.
[697] *Id.*
[698] *Id.* at ¶ 6.
[699] *Id.* at ¶ 7.
[700] *Id.* at ¶ 8.
[701] *Id.* at ¶ 9; *see also* RX-121C.
[702] *Id.* at ¶ 10.
[703] *Id.* at ¶ 11.

Ajinomoto's view, confirmed that the dapA and ldc mutations were present.[704] On September 22, 2005, Ajinomoto decided to consult Dr. Labgold at Patton Boggs.[705] The issue of initiating an investigation under Section 337 was discussed when Ajinomoto representatives met with U.S. counsel on or around September 29, 2005.[706] By about October 31, 2005, Heartland had obtained samples of GBT's L-lysine in the United States.[707] By October 20, 2005, Ajinomoto and Heartland had begun preparing for filing a case against GBT "as soon as possible."[708] In late October 2005 Ajinomoto continued to conduct analyses of GBT's L-lysine provided during the GBT plant tour and purchased by Ajinomoto from the market for purposes of determining the microorganism used in producing it and other qualities.[709] On October 31, 2005, Ajinomoto thanked [ ] and GBT for the plant visit and stated that it wished to pursue "strategic opportunities" with GBT based on "internal discussions at both divisional and management levels."[710] A meeting for this purpose in Hong Kong was proposed.[711] On November 2, 2005, Ajinomoto kicked off its "Gallop Project," which was formed to negotiate with GBT. The Gallop Project team was advised that "[i]nformation disclosed in the course of negotiations may be used for purposes of evaluating M&A, and may not be used for any other purposes such as, for example, patent litigation (relevant information may not be conveyed to members who are assigned to patent litigation)."[712] Senior Managing Director Yanagihara was

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[704] *Id.*
[705] *Id.*
[706] *Id.* at ¶ 12.
[707] *Id.* at ¶ 13.
[708] *Id.* at ¶ 14.
[709] *Id.* at ¶ 15.
[710] *Id.* at ¶ 16.
[711] *Id.*
[712] *Id.* at ¶ 17.

assigned to head the team for the Gallop Project.[713] On November 2, 2005, [ ] on behalf of GBT, agreed to hold a meeting with Ajinomoto in Hong Kong and/or other suitable locations to discuss "the potential transaction."[714] On November 16, 2005, General Manager of Production & Technology Administration Center of Ajinomoto, Koji Igarashi, sent an email to Kazuhito Suzuki of Ajinomoto USA regarding "PCR analysis in the USA," of GBT's L-lysine which stated "this matter concerns the fate of the company, and the top management is demanding urgency."[715] Ajinomoto continued to have internal discussions about the possibility of a transaction with GBT, and contacts between Ajinomoto and GBT relating to negotiations for a potential transaction continued until December 20, 2005.[716] On December 21, 2005, Ajinomoto advised GBT through JPMorgan there would be no meeting in Hong Kong and that the discussions had come to an end.[717] On January 11, 2006, Heartland's and Ajinomoto's counsel discussed with the ITC's Office of Unfair Import Investigations the time and date for a meeting to discuss Section 337 filing procedures and a complaint.[718] On April 24, 2006, Heartland filed a Complaint with the U.S. International Trade Commission under Section 337 charging GBT with patent infringement, and, simultaneously, filed a complaint for patent infringement in the U. S. District Court for the District of Delaware.[719] The decision for Heartland to file a Section 337 complaint with the U.S. International Trade Commission was made by Ajinomoto.[720] Prior to the filing of the complaints with the U.S. International Trade

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[713] *Id.* at ¶ 18.
[714] *Id.* at ¶ 19.
[715] *Id.* at ¶ 20.
[716] *Id.* at ¶ 21.
[717] *Id.* at ¶ 22.
[718] *Id.* at ¶ 23.
[719] *Id.* at ¶ 24.
[720] *Id.* at ¶ 25.

Commission and the U.S. District Court for the District of Delaware, neither Ajinomoto nor Heartland ever advised GBT of their views regarding GBT's infringement of their L-lysine patents or their intention to initiate litigation premised on patent infringement.[721]

GBT's unclean hands argument is devoid of substance and, for the reasons discussed below, is rejected. GBT asserts that Ajinomoto acted in bad faith in its dealing with GBT, but provides no credible evidence of bad faith.[722] Rather GBT simply restates the stipulated facts without explaining how those facts relate to its assertion of bad faith.[723] The only evidence GBT points to in support of its assertion of bad faith is that Ajinomoto failed to tell the people who toured GBT's plant that there was a confidentiality agreement in place.[724] However, without more, the undersigned fails to see how the mere fact that the people on the plant tour were unaware of the confidentiality agreement evinces bad faith on the part of Ajinomoto.[725]

GBT also argues that Ajinomoto engaged in inequitable conduct "in misrepresenting to GBT that it was dealing as a prospective buyer, while concealing that it was preparing to be an opposing party in litigation and was breaching the Confidentiality Agreement."[726] However, GBT provides no credible evidence that Ajinomoto was in fact misrepresenting to GBT that is was a prospective buyer. After all, GBT does not dispute that a potential joint venture or acquisition of some or all of GBT's amino acid feed division presented several strategic benefits to Ajinomoto, including access to the

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[721] *Id.* at ¶ 26.

[722] *See* RIB at 69-70.

[723] *Id.*

[724] *Id.*

[725] Notably, while the people on the plant tour may have been unaware of the confidentiality agreement, the evidence does show that the group that toured GBT's facility did discuss that "whatever that we would see would not be divulged to outside parties." *See* RX-52C (Shiroshita Depo.) at 56:2-14.

[726] *See* RIB at 70.

large and growing Chinese market.[727] Additionally, the evidence shows that it was [ ] who initiated discussions in 2004 regarding the sale of [ ] 8.1% holdings in GBT.[728] Furthermore, the evidence of record shows that Ajinomoto expended considerable resources and energy in furtherance of its acquisition negotiations with GBT, thus undercutting GBT's argument that Ajinomoto was misrepresenting itself as a prospective buyer. Specifically, the evidence shows that Ajinomoto established a working group comprising high-level executives, hired JPMorgan Securities as an investment advisor, established an $8 million budget and plan for hiring other advisors and conducting due diligence, and held numerous high-level meetings.[729]

With regard to GBT's assertion that there is something inequitable about Ajinomoto negotiating with GBT as a prospective buyer while at the same time preparing for litigation against GBT, the undersigned finds that without more the mere fact that Ajinomoto was investigating the possible acquisition of GBT while at the same time preparing for litigation against GBT is not evidence of inequitable conduct or bad faith. As for GBT's assertion that the plant tour was in furtherance of Ajinomoto litigation strategy, GBT acknowledges that Ajinomoto's decision to pursue a Section 337 investigation against GBT was made after the September 5, 2005 plant tour.[730]

The crux of GBT's unclean hands argument rests on its assertion that Ajinomoto violated the confidentiality agreement when Ajinomoto used the lysine samples provided by GBT in furtherance of the acquisition negotiations to prepare for litigation against GBT. Notably, the alleged breach of

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[727] CFF 7.8 (no dispute).
[728] *See* JX-191C at 1; RX-122C.
[729] *See* RX-137C at 3-4; RX-136C at 4-5; RX-133C at 14.
[730] JX-191C at ¶¶ 11, 12; *see also* RX-125C.

the confidentiality agreement is really the only arguably bad act that GBT points to in support of its unclean hands defense. The confidentiality agreement defined Confidential Information as:

> All data, reports, interpretations, forecasts and records containing or otherwise reflecting information concerning [GBT], its affiliates and subsidiaries that is not available to the general public and is disclosed to Ajinomoto by [GBT] in the course of its dealings with [GBT] and that is conspicuously specified to be "Confidential" by [GBT] in writing prior to disclosure.[731]

The evidence of record shows that the lysine samples provided to Ajinomoto were finished lysine products that could have been purchased in the marketplace.[732] Additionally, GBT fails to provide any proof that the samples given to Ajinomoto were marked "Confidential" as required by the Confidentiality Agreement. Because the samples given Ajinomoto were publically available and there is no evidence that the samples were marked "Confidential," the undersigned finds that Ajinomoto's use of the lysine samples could not constitute a violation of the confidentiality agreement.

As previously discussed, to prove the defense of unclean hands, the inequitable acts must bear an immediate and necessary relation to the equity being sought in litigation. The undersigned has found herein that GBT has failed to prove any inequitable act that could form the basis of GBT's unclean hands defense. However, assuming arguendo that the use of the samples provided to Ajinomoto in preparation for litigation against GBT is deemed an inequitable act, the evidence still does not support a finding of unclean hands, because the breach of the confidentiality agreement has no immediate and necessary relation to Ajinomoto's claim that GBT infringes claim 15 of the '160 patent.

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[731] CFF 7.5 (no dispute).

[732] RX-52C (Shiroshito Depo.) at 50:4-51:17, 171:18-172:2.

Accordingly, for the reasons set forth hereinabove, the undersigned finds that GBT has failed to prove by clear and convincing evidence its defense of unclean hands. Because the undersigned has found against GBT on the issue of unclean hands, the undersigned need not address Ajinomoto's alternative argument that GBT's unclean hands argument is barred under the Noerr-Penington Doctrine.

VII. Domestic Industry - Economic Prong

Ajinomoto and GBT stipulate that an industry relating to the production and sale of the amino acid L-lysine exists in the United States, that L-lysine is used in a number of products, including animal feed additives, and that the domestic industry includes Ajinomoto's substantial United States investment and expenditures in the manufacture of L-lysine products using patented genetic constructs and methods as well as distributors for L-lysine products, which includes Ajinomoto's investment in its wholly-owned subsidiary - Heartland.[733] Ajinomoto and GBT also stipulate that Heartland's headquarters are located in the United States at 8430 W. Bryn Mawr Avenue, Suite 650, Chicago, Illinois. Heartland's manufacturing/production facilities are located in Eddyville, Iowa.[734]

Additionally, Ajinomoto and GBT stipulate that Heartland and Ajinomoto have made significant investment in their manufacturing facilities and equipment in the United States relating to the manufacture of their L-lysine products.[735] Specifically, Ajinomoto and GBT stipulate that Ajinomoto has substantially invested in its manufacturing facility and equipment at Heartland's Eddyville, Iowa, facility where the relevant L-lysine products are manufactured.[736] Ajinomoto and

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[733] JX-192C at ¶ 3.
[734] JX-192C at ¶ 4.
[735] JX-192C at ¶ 6.
[736] *Id.*

GBT additionally stipulate that Heartland and Ajinomoto have made significant capital investments in Heartland's business infrastructure including, but not limited to, expansion and modification of Heartland's Eddyville, Iowa, plant.[737] Further, Ajinomoto and GBT stipulate that Heartland employs a significant number of employees in its U.S. L-lysine operations and, in particular, its manufacture of L-lysine products.[738]

Accordingly, based on the above stipulations, the undersigned finds that Ajinomoto has satisfied the economic prong of the domestic industry requirement of Section 337.[739]

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[737] *Id.* at ¶ 7.

[738] *Id.* at ¶ 8.

[739] The Staff acknowledges that the stipulation resolves all issues concerning jurisdiction, infringement, and domestic industry. SPHB at 19.

CONCLUSIONS OF LAW

1. The Commission has subject matter jurisdiction in this investigation.

2. The Commission has personal jurisdiction over Respondents Global Bio-Chem Technology Group Company Limited, Changchun Dacheng Bio-Chem Engineering Development Co., Ltd., Changchun Baocheng Bio-Chem Development Co., Ltd., Changchun Dahe Bio Technology Development Co., Ltd., and Bio-Chem Technology (HK) Limited.

3. Respondents' manufacture of L-lysine feed products using the Old Escherichia bacterium strain deposited with the ATCC under Accession #SD-5590 infringes claim 15 of U.S. Patent No. 6,040,160 in violation of 35 U.S.C. § 271(a).

4. Respondents' manufacture of L-lysine products using the Corynebacterium strain deposited with the ATCC under Accession #SD-5620 and the New Escherichia bacterium strain deposited with the ATCC under Accession #SD-5717 do not infringe Claim 15 of U.S. Patent No. 6,040,160.

5. Respondents' manufacture of L-lysine feed products using the Old Escherichia bacterium strain deposited with the ATCC under Accession #SD-5590 infringes claim 15 of U.S. Patent No. 5,827,698 in violation of 35 U.S.C. § 271(a).

6. Respondents's manufacture of L-lysine products using the Corynebacterium strain deposited with the ATCC under Accession #SD-5620 and the New Escherichia bacterium strain deposited with the ATCC under Accession #SD-5717 do not infringe Claim 15 of U.S. Patent No. 5,827,698.

7. An industry in the United States exists with respect to Ajinomoto's products that is protected by U.S. Patent Nos. 6,040,160 and 5,827,698 as required by 19 U.S.C. § 1337(a)(2) and (3).

8. Claim 15 of U.S. Patent No. 6,040,160 is invalid under 35 U.S.C. § 112 for failing to disclose best mode.

9. Claim 15 of U.S. Patent No. 5,827,698 is invalid under 35 U.S.C. § 112 for failing to disclose best mode.

10. Claim 15 of U.S. Patent No. 6,040,160 is not invalid under 35 U.S.C. § 103 for obviousness.

11. Claim 15 of U.S. Patent No. 6,040,160 is not invalid for obviousness-type double patenting.

12. Claim 15 of U.S. Patent No. 5,827,698 is not invalid under 35 U.S.C. § 103 for obviousness.

13. U.S. Patent No. 6,040,160 is unenforceable due to inequitable conduct.

14. U.S. Patent No. 5,827,698 is unenforceable due to inequitable conduct.

15. U.S. Patent No. 6,040,160 is not unenforceable due to unclean hands.

16. U.S. Patent No. 5,827,698 is not unenforceable due to unclean hands.

INITIAL DETERMINATION

Based on the foregoing opinion, findings of fact, conclusions of law, the evidence, and the record as a whole, and having considered all pleadings and arguments, including the proposed findings of fact and conclusions of law, it is the Administrative Law Judge's Initial Determination that a violation of Section 337 of the Tariff Act of 1930, as amended, has not been found in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain L-lysine feed products, their methods of production and genetic constructs for production.

The Administrative Law Judge hereby CERTIFIES to the Commission this Initial Determination, together with the record of the hearing in this investigation consisting of the following: the transcript of the evidentiary hearing, with appropriate corrections as may hereafter be ordered by the Administrative Law Judge; and further the exhibits accepted into evidence in this investigation as listed in the attached exhibit lists.

Pursuant to 19 C.F.R. § 210.42(h), this Initial Determination shall become the determination of the Commission unless a party files a petition for review pursuant to 19 C.F.R. § 210.43(a) or the Commission, pursuant to 19 C.F.R. § 210.44, orders on its own motion a review of the Initial Determination or certain issues therein.

RECOMMENDED DETERMINATION ON REMEDY AND BOND

Pursuant to Commission Rules 210.36(a) and 210.42(a)(1)(ii), the Administrative Law Judge is to consider evidence and argument on the issues of remedy and bonding and issue a recommended determination thereon.

VIII. Remedy and Bonding

A. Limited Exclusion Order

Under Section 337(d), the Commission may issue either a limited or a general exclusion order. A limited exclusion order instructs the U.S. Customs Service to exclude from entry all articles that are covered by the patent at issue and that originate from a named respondent in the investigation. Ajinomoto requests that an exclusion order be issued that prohibits the importation of GBT's infringing products.[740] The Staff argues that if a violation is found a limited exclusion order should issue.[741] The undersigned finds in this investigation that if a violation is found, the appropriate remedy would be a limited exclusion order directed to GBT's old Escherichia coli bacteria strain deposited under Accession No. SD-5590.

By stipulation, the parties have agreed that should an exclusion order issue that such an order include a certification provision. Specifically, the parties stipulate as follows:

> Pursuant to procedures to be specified by the Bureau of Customs and Border Protection ("Customs"), as Customs deems necessary, persons seeking to import L-lysine feed products produced by Global Bio-Chem Technology Group Company Limited, Changchun Dacheng Bio-Chem Engineering Development Co., Ltd., Changchun Baocheng Bio-Chem Development Co., Ltd., Changchun Dahe Bio Technology Development Co., Ltd. or Bio Chem Technology (HK) Limited (collectively "GBT") that are potentially subject to this Order may be required to certify that they are familiar with the terms of this Order, that they have made

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[740] CRB at 35.
[741] SIB at 73.

> appropriate inquiry, and thereupon state that, to the best of their knowledge and belief, the products being imported are not excluded from entry under paragraphs - through - of this Order, including because they were manufactured using the Corynebacterium strain deposited with the ATCC under Accession #SD-5620 or they were manufactured using the E. coli bacterium strain deposited with the ATCC under Accession #SD-5717, it being understood that incidental contamination of the product does not constitute a violation of such certification. At its discretion, Customs may require persons who have provided the certification described in this paragraph to furnish such records or analysis as are necessary to substantiate the certification.[742]

Based on the above stipulation, the undersigned recommends that any limited exclusion order that issues in this investigation include a certification provision as requested by the parties.

B. Cease and Desist Order

Under Section 337(f)(1), the Commission may issue a cease and desist order in addition to, or instead of, an exclusion order. Cease and desist orders are warranted primarily when the respondent maintains a commercially significant inventory of the accused products in the United States.[743] Ajinomoto has not put forth any evidence that GBT maintains any inventory of lysine made by the accused method in the United States. In fact, Ajinomoto has not even briefed this issue in its post hearing briefs. Thus, there is no basis in the record to support the issuance of a cease and desist order in this investigation. Accordingly, the undersigned does not recommend a cease and desist order issue in this investigation.

C. Bond During Presidential Review Period

If the Commission enters an exclusion order or cease and desist order, parties may continue to import and sell their products during the pendency of the Presidential review under a bond in an amount determined by the Commission to be "sufficient to protect the Complainants from any

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[742] JX-190C at ¶ 14.

[743] *Certain Crystalline*, 15 U.S.P.Q.2d at 1277-79.

injury."[744] Ajinomoto does not brief this issue. The Staff asserts that the record does not contain any information that could serve as a basis for determining an appropriate bond and thus recommends that no bond be imposed on GBT during the presidential review period.[745] GBT argues that if a bond is imposed, the amount of the bond should be minimal, but not to exceed 5% of the entered value of the imported goods.[746]

In this case, Ajinomoto did not introduce any evidence of current sales or pricing information that would permit the undersigned to determine a price differential. Nor did Ajinomoto introduce evidence of a reasonable royalty rate. Thus, the undersigned has no basis in the record for determining an appropriate bond. In *Certain Rubber Antidegradants*, the Commission rejected a request for a 100% bond holding that "the complainant had the burden of supporting any proposition it advances, including the amount of the bond."[747] Because Ajinomoto has failed to provide any evidence that could be used as a basis for determining a bond amount and because Ajinomoto failed to address this issue in its post-hearing brief, the undersigned would recommend in this investigation that if a violation is found that no bond be required during the Presidential review period.

Within seven days of the date of this document, each party shall submit to the office of the Administrative Law Judge a statement as to whether or not it seeks to have any portion of this document deleted from the public version. The parties' submissions must be made by hard copy by the aforementioned date.

Any party seeking to have any portion of this document deleted from the public version

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[744] 19 U.S.C. § 1337(e); 19 C.F.R. § 210.50(a)(3).

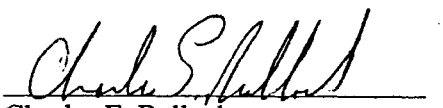
[745] SIB at 73.

[746] RIB at 78.

[747] *Certain Rubber Antidegradants*, Inv. No. 337-TA-533, Commission Opinion at 40 (2006).

thereof must submit to this office a copy of this document with red brackets indicating any portion asserted to contain confidential business information. The parties' submission concerning the public version of this document need not be filed with the Commission Secretary.

SO ORDERED.



Charles E. Bullock
Administrative Law Judge

APPENDIX OF EXHIBIT LISTS

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

Before The Honorable Charles E. Bullock

IN THE MATTER OF CERTAIN L-LYSINE FEED PRODUCTS, THEIR METHODS OF PRODUCTION AND GENETIC CONSTRUCTS FOR PRODUCTION	Investigation No. 337-TA-571

COMPLAINANTS' FINAL LIST OF TRIAL EXHIBITS

Complainants hereby submit the parties' Joint Exhibit List and Complainant's Final List of Trial Exhibits.

JOINT TRIAL EXHIBITS

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
JX-001	U.S. Patent No. 6,040,160 (AHL 000713-000766)	Validity, enforceability	Kawamura	3/17/08
JX-002	U.S. Patent No. 5,827,698 (AHL 000001-000021)	Validity, enforceability	Kikuchi	3/17/08
JX-003	05/1996 Transmittal Letter re U.S. Patent Application No. 08/648,010 (AAHL 000466-000634)	Validity	Stipulation of the Parties	3/17/08
JX-004	('160) Japanese Patent Application (AAHL001912-001940)	Validity	Kojima	3/17/08
JX-005	U.S. Patent Application No. 08/849,212 for "Novel Lysine Decarboxylase Gene and Method of Producing L-Lysine" (AAHL 000005-000155)	Validity	Stipulation of the Parties	3/17/08
JX-006	('698) Japanese Patent Application (AAHL 000070-000102)	Validity	Kojima	3/17/08
JX-007C	E.coli development plan (AHL 429318)	Validity, enforceability	Kojima	3/17/08

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
JX-008C	Lab Notebook (AHL 429210-429319)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-009C	Lab Notebook (AHL 429190-429209)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-010C	Monthly Research Reports for 11/1990 (AHL 430879-430881)	Validity, enforceability	Webb	3/17/08
JX-011C	Monthly Research Reports for 10/1990 (AHL 430882-430884)	Validity, enforceability	Kojima	3/17/08
JX-012C	Monthly Research Reports for 12/1990 (AHL 430876-78)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-013C	Monthly Research Reports for 02/1991 (AHL 430870-430872)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-014C	Monthly Research Reports for 08/1991 (AHL 430846-430847)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-015C	Monthly Research Reports for 01/1992 (AHL 430820-430823)	Validity, enforceability	Kawamura	3/17/08
JX-016C	Monthly Research Reports for 02/1992 (AHL 430816-430818)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-017C	2nd Lysine Project Research Report No. 11370 (AHL 002992-003014)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-018C	Monthly Research Reports for 08/1990 (AHL 430844-430845)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-019C	Monthly Research Reports for 09/1990 (AHL 430838-30839)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-020C	Monthly Research Reports for 03/1992 (AHL 430811-430813)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-021C	Monthly Research Reports for 09/1993 (AHL 430757-430758)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-022C	Monthly Research Reports for 01/1991 (AHL 430873-430875)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-023C	Monthly Research Reports for 01/1994 (AHL 430725-430730)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-024C	Monthly Research Reports for 03/1991 (AHL 430867-430869)	Validity, enforceability	Stipulation of the Parties	3/17/08

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
JX-025C	Monthly Research Reports for 04/1991 (AHL 430860-430862)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-026C	Monthly Research Reports for 06/1991 (AHL 430853-430855)	Validity, enforceability	Kikuchi	3/17/08
JX-027C	Monthly Research Reports for 07/1991 (AHL 430849-430852)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-028C	Monthly Research Reports for 02/1994 (AHL 430718-21 & 430723-24)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-029C	Monthly Research Reports for 10/1991 (AHL 430833-430836)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-030C	Monthly Research Reports for 12/1991 (AHL 430824-430827)	Validity, enforceability	Kojima	3/17/08
JX-031C	Monthly Research Reports for 03/1994 (AHL 430712-430717)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-032C	Monthly Research Reports for 04/1994 (AHL 430706-430711)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-033C	Monthly Research Reports for 05/1994 (AHL 430700-430705)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-034C	Monthly Research Reports for 08/1995 (AHL 430608 & 430613)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-035C	Monthly Research Reports for 07/1994 (AHL 430688-430693)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-036C	Monthly Research Reports for 08/1994 (AHL 430682-430687)	Validity, enforceability	Kojima	3/17/08
JX-037C	3rd Lysine Project Research Report No. 11416 (AHL 003015-003050)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-038C	Monthly Research Reports for 04/1993 (AHL 430779-430782)	Validity, enforceability	Kawamura	3/17/08
JX-039C	Monthly Research Reports for 05/1993 (AHL 430775-430778)	Validity, enforceability	Webb	3/17/08
JX-040C	Monthly Research Reports for 06/1993 (AHL 430771-430774)	Validity, enforceability	Kawamura	3/17/08
JX-041C	Monthly Research Reports for 07/1993 (AHL 430765-430770)	Validity, enforceability	Kawamura	3/17/08

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
JX-042C	Monthly Research Reports for 08/1993 (AHL 430759-430764)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-043C	Monthly Research Reports for 09/1994 (AHL 430676-430681)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-044C	Monthly Research Reports for 10/1993 (AHL 430746-430751)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-045C	6th Lysine Project Research Report No. 11815 (AHL 003084-3102)	Validity, enforceability	Webb	3/17/08
JX-046C	Monthly Research Reports for 10/1994 (AHL 430670-430675)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-047C	Monthly Research Reports for 11/1994 (AHL 430663-430669)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-048C	Monthly Research Reports for 12/1994 (AHL 430657-430662)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-049C	Monthly Research Reports for 02/1995 (AHL 430645-430649)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-050C	Monthly Research Reports for 03/1995 (AHL 430638-430644)	Validity, enforceability	Kikuchi	3/17/08
JX-051C	10th Lysine Project Research Report No. 11819 (AHL 003171-003187)	Validity, enforceability	Kikuchi	3/17/08
JX-052C	7th Lysine Project Research Report No. 11816 (AHL 003103-3131)	Validity, enforceability	Webb	3/17/08
JX-053C	13th Lysine Project Research Report No. 11901 (AHL 003156-3170)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-054C	Monthly Research Reports for 09/1991 (AHL 430840-430841)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-055C	1st Lysine Project Research Report No. 11369 (AHL 435942-435969)	Validity, enforceability	Kojima	3/17/08
JX-056C	Monthly Research Reports for 09/1995 (AHL 430607-430611)	Validity, enforceability	Nakiniski	3/17/08

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
JX-057C	Nishimura Monthly Reports (AHL 436344-436360)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-058C	Junichiro Kojima Monthly Reports (AHL 436361-436382)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-059C	Nakanishi Monthly Reports (AHL 437016-437048)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-060C	Monthly Research Reports for 12/1993 (AHL 430731-430737)	Validity, enforceability	Webb	3/17/08
JX-061C	Monthly Research Reports for 01/1992 (AHL430819)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-062C	Monthly Research Reports for 05/1991 (AHL 430856-430859)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-063C	Monthly Research Reports for 02/1991 (AHL 430863)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-064C	Monthly Research Reports for 12/1990 (AHL 430864-65)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-065C	Monthly Research Reports for 10/1990 and 11/1990 (AHL430866)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-066	Withdrawn			
JX-067C	Withdrawn			
JX-068C	Withdrawn			
JX-069C	Monthly Research Reports for 10/1995 (AHL 430601-606)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-070C	Compilation of experimental result charts (AHL 430404-430473)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-071	11/06/1997 Deposit record for strain WC196 (AHL 500000)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-072	Request to make a deposit of strain AJ13069 with a public depository (AHL 434302-434313)	Validity, enforceability	Kikuchi	3/17/08
JX-073C	15th Lysine Project Research Report No. 12230 (AHL 003188-3207)	Validity, enforceability	Kikuchi	3/17/08

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
JX-074C	Monthly Research Reports for 04/1995 (AHL 430634-430637)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-075C	Monthly Research Reports for 05/1995 (AHL 430628-430633)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-076C	Monthly Research Reports for 06/1995 (AHL 430623-430627)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-077C	Monthly Research Reports for 07/1995 (AHL 430617-430622)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-078C	Monthly Research Reports for 11/1995 (AHL430596-430600)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-079C	Monthly Research Reports for 12/1995 (AHL 430590-430595)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-080C	Monthly Research Reports for 11/1991 (AHL 430829-430832)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-081C	14th Lysine Project Research Report No. 11902 (AHL 433696-433742)	Validity, enforceability	Kikuchi	3/17/08
JX-082C	Monthly Research Reports for 04/1992 (AHL 430806-430808)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-083C	Monthly Research Reports for 05/1992 (AHL 430803-430805)	Validity, enforceability	Kawamura	3/17/08
JX-084C	Monthly Research Reports for 06/1992 (AHL 430800-430802)	Validity, enforceability	Kawamura	3/17/08
JX-085C	Monthly Research Reports for 07/1992 (AHL 430798-430799)	Validity, enforceability	Kawamura	3/17/08
JX-086C	Monthly Research Reports for 08/1992 (AHL 430796-430797)	Validity, enforceability	Webb	3/17/08
JX-087C	Monthly Research Reports for 09/1992 (AHL 430794-430795)	Validity, enforceability	Webb	3/17/08
JX-088C	Withdrawn			
JX-089C	Monthly Research Reports for 10/1992 (AHL 430793 & 430522)	Validity, enforceability	Webb	3/17/08
JX-090C	Monthly Research Reports for 11/1992 (AHL 430791-430792)	Validity, enforceability	Webb	3/17/08

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
JX-091C	Monthly Research Reports for 12/1992 (AHL 430789-430790)	Validity, enforceability	Kawamura	3/17/08
JX-092C	Monthly Research Reports for 01/1993 (AHL 430787-430788)	Validity, enforceability	Kawamura	3/17/08
JX-093C	Monthly Research Reports for 02/1993 (AHL 430785-430786)	Validity, enforceability	Kojima	3/17/08
JX-094C	Monthly Research Report for 03/1993 (AHL 430783-430784)	Validity, enforceability	Kawamura	3/17/08
JX-095C	5th Lysine Project Research Report No. 11530 (AHL 003051-003082)	Validity, enforceability	Kawamura	3/17/08
JX-096C	9th Lysine Project Research Report No. 11818 (AHL 436040-436057)	Validity, enforceability	Kawamura	3/17/08
JX-097C	Withdrawn			
JX-098C	11th Lysine Project Research Report No. 11820 (AHL 436058-436095)	Validity, enforceability	Kojima	3/17/08
JX-099C	Withdrawn			
JX-100C	Withdrawn			
JX-101	Alvarez-Jacobs, J. et al., "Lysine and Methionine Overproduction by an Escherichia coli Strain Transformed with Pseudomonas acidovorans DNA," Biotechnology Letters 12:425-430 (1990)	Background, validity	Stipulation of the Parties	3/17/08
JX-102	Applebaum, D. M. et al., "Comparison of the Biosynthetic and Biodegradative Ornithine Decarboxylases of Escherichia coli," Biochem. 16:1580-1584 (1977)	Background, validity	Stipulation of the Parties	3/17/08
JX-103	Bouvier, J. et al., "Nucleotide Sequence and Expression of the Escherichia coli dapB Gene," J. Biol. Chem. 259:14829-14834 (1984)	Background, validity	Stipulation of the Parties	3/17/08

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
JX-104	Bukhari, AI. and Taylor, AL., "Genetic Analysis of Diaminopimelic Acid- and Lysine-Requiring Mutants of Escherichia coli," J. Bacteriol. 105:844-54 (1971)	Background, validity	Stipulation of the Parties	3/17/08
JX-105	Busby, S. M. et al., "Isolation of mutant promoters on the Escherichia coli galactose operon using local mutagenesis on cloned DNA fragments," J. Mol. Biol. 154:197 (1982)	Background, validity	Stipulation of the Parties	3/17/08
JX-106C	Employment invention reporting form for "A Novel Lysine Decarboxylase Gene" (AHL 434373)	Validity, background, enforceability	Stipulation of the Parties	3/17/08
JX-107C	05/06/1997 Employment invention reporting form re Japan as being the designated state for a PCT filing (AHL 434374)	Validity, background, enforceability	Stipulation of the Parties	3/17/08
JX-108	Prosecution file history for '698 patent (AAHL000001-463)	Validity, background, enforceability	Stipulation of the Parties	3/17/08
JX-109C	11/26/1993 Employment invention reporting form corresponding to the patent application that is Exh. 4 (AHL 434375)	Validity, background, enforceability	Stipulation of the Parties	3/17/08
JX-110C	Employment invention reporting form for the Japanese national phase of WIPO Publication of PCT Application No. PCT/JP94/01994 as WO 95/16042, (Foreign Counterpart of '160 patent) (AHL 434376)	Validity, background, enforceability	Stipulation of the Parties	3/17/08
JX-111C	16th Lysine Project Research Report No. 12231 (AHL 436128-436143)	Validity, enforceability	Kikuchi	3/17/08
JX-112	Prosecution file history for the '160 patent (AAHL000464-2041)	Validity, enforceability	Stipulation of the Parties	3/17/08

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
JX-113	Deposit Receipt of a microorganism with translation (OSMMN000141-142)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-114	Deposit Receipt of a microorganism with translation (OSMMN000143-144)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-115	Canellakis, E. S. et al., "Regulation of polyamine biosynthesis by antizyme and some recent developments relating the induction of polyamine biosynthesis to cell growth," Bioscience Reports 5:189-204 (1985)	Background, validity	Stipulation of the Parties	3/17/08
JX-116	Cassan, M. et al., "Nucleotide Sequence of lysC Gene Encoding the Lysine-Sensitive Aspartokinase III of Escherichia coli K12: Evolutionary Pathway Leading to Three Isofunctional Enzymes," J. Biol. Chem. 261:1052-1057 (1986)	Background, validity	Stipulation of the Parties	3/17/08
JX-117	Sano, K., and Shiio, I., "Microbial Production of L-Lysine: III. Production by Mutants Resistant to S-(2Aminoethyl)-L-Cysteine," J. Gen. Appl. Microbiol. 16:373-391 (1970)	Background, validity	Stipulation of the Parties	3/17/08
JX-118	Brock, R. D. et al., "The modification of the amino acid composition of higher plants by mutation and selection," Caplus Access No: 174:488102 Caplus (1973)	Background, validity	Webb	3/17/08
JX-119	Bittel, et al., "Characterization of a Lysine-insensitive Form of Dihydrodipicolinate Synthase from Maize." In Biosynthesis and Molecular Regulation of Amino Acids in Plants, BK Singh, H.E. Flores and J.C. Shannon, eds. American Society of Plant Physiologists, p. 322 – 323 (1992)	Background, validity	Webb	3/17/08

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
JX-120	Hermann, M. et al., "Consequences of Lysine Oversynthesis in Pseudomonas Mutants Insensitive to Feedback Inhibition," Eur. J. Biochem. 30:100-106 (1972)	Background, validity	Webb	3/17/08
JX-121C	Monthly Research Reports for 11/1993 (AHL 430740-430745)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-122	Chan, E-C, "Disruption of targeted gene in bacterial chromosome by using a temperature-sensitive plasmid," Biochem. Biophys. Res. Comm. 194:525 530 (1993)	Background, validity	Stipulation of the Parties	3/17/08
JX-123	Reverend, B. D. et al., "Improvement of Escherichia coli Strains Overproducing Lysine Using Recombinant DNA Techniques," Eur. J. Appl. Microbiol. 15:227-231 (1982)	Background, validity	Stipulation of the Parties	3/17/08
JX-124	Tabor, H., Hafner, E. W., and Tabor, C. W., "Construction of an Escherichia coli Strain Unable to Synthesize Putrescine, Spermidine, or Cadaverine: Characterization of Two Genes Controlling Lysine Decarboxylase," J. Bacteriol. 144:952-956 (1980)	Background, validity	Stipulation of the Parties	3/17/08
JX-125	Wertheimer, S. J., and Leifer, Z., "Putrescine and Spermidine Sensitivity of Lysine Decarboxylase in Escherichia coli: Evidence for a Constitutive Enzyme and its Mode of Regulation," Biochem. Biophys. Res. Comm. 114:882 888 (1983)	Background, validity	Stipulation of the Parties	3/17/08
JX-126	Goldemberg, S., "Lysine Decarboxylase Mutants of Escherichia coli: Evidence for Two Enzyme Forms," J. Bacteriol. 141:1428-1431 (1980)	Background, validity	Somerville	3/17/08
JX-127C	4th Research Report No. 11529 (AHL 435970-435993)	Validity, enforceability	Kawamura	3/17/08

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
JX-128C	12th Research Report No. 11900 (AHL 003132-003155)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-129C	17th Research Report No. 12232 (AHL 433743-433774)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-130	Morris, D. R. and Boeker, E. A, "Biosynthetic and Biodegradative Ornithine and Arginine Decarboxylases from Escherichia coli," Methods in Enzymol. 94:125-134 (1983)	Background, validity	Stipulation of the Parties	3/17/08
JX-131C	20th Research Report No. 12468 (AHL 003233-003271)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-132	Igarashi, K. et al., "Formation of a Compensatory Polyamine by Escherichia coli Polyamine-Requiring Mutants during Growth in the Absence of Polyamines," J. Bacteriol. 166: 128-134 (1986)	Background, validity	Webb	3/17/08
JX-133	Ravnikar, P. D., Somerville, R. L, "Localization of the structural gene for threonine dehydrogenase in Escherichia coli, " J. Bacteriol. 168:434-436 (1986)	Background, validity	Stipulation of the Parties	3/17/08
JX-134	Cohen, S. A et al., "Construction of biologically functional bacterial plasmids in vitro," Proc. Natl. Acad. Sci. 70:3240-3244 (1973)	Background, validity	Stipulation of the Parties	3/17/08
JX-135	Cunningham-Rundles, S., and Maas, W. K., "Isolation, Characterization, and Mapping of Escherichia coli Mutants Blocked in the Synthesis of Ornithine Decarboxylase," J. Bacteriol. 124:791-799 (1975)	Background, validity	Stipulation of the Parties	3/17/08

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
JX-136	Dobson et al., "The crystal structures of native and (S)-lysine-bound dihydrodipicolinate synthase from Escherichia coli with improved resolution show new features of biological significance," Acta Cryst. D61:1116-1124 (2005) (GBT217852-217860)	Background, validity	Stipulation of the Parties	3/17/08
JX-137	Farmer, J.J. III et al., "Biochemical identification of new species and biogroups of Enterobacteriaceae isolated from clinical specimens," J. of Clin. Microbiol., 21:46-76 (1985)	Background, validity	Stipulation of the Parties	3/17/08
JX-138	Fecker, L. F. et al., "Cloning and characterization of a lysine decarboxylase gene from Hafnia alvie," Molecular Genetics and Genomics 203:177-184 (1986)	Background, validity	Stipulation of the Parties	3/17/08
JX-139	Hamilton, C. M. et al., "New Method for generating deletions and gene replacements in Escherichia coli," J. Bacteriol. 171:4617-4622 (1989)	Background, validity	Stipulation of the Parties	3/17/08
JX-140	Ingram, V. M., "Gene Mutations in Human Hemoglobin: The Chemical Difference Between Normal and Sickle Cell Hemoglobin," Nature 180:326-328 (1957)	Background, validity	Stipulation of the Parties	3/17/08
JX-141	Jacob, F., and Monod, J., "Generic Regulatory Mechanisms in the Synthesis of Proteins," J. Mol. Biol. 3:318-356 (1961)	Background, validity	Stipulation of the Parties	3/17/08
JX-142	Jasin, M., Schimmel, P., "Deletion of an essential gene in Escherichia coli by site-specific recombination with linear DNA fragments," J. Bacteriol. 159:783-786 (1984)	Background, validity	Stipulation of the Parties	3/17/08

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
JX-143	Kadonaga, J. T., and Knowles, J. R., "A simple and efficient method for chemical mutagenesis of DNA," Nucleic Acids Res. 13:1733 (1985)	Background, validity	Stipulation of the Parties	3/17/08
JX-144	Kamio, Y., and Terawaki, Y., "Purification and Properties of Selenomonas reminantium Lysine Decarboxylase," J. Bacteriol. 153:658-664 (1983)	Background, validity	Stipulation of the Parties	3/17/08
JX-145	Kironde, F. A et al., "Random mutagenesis of the gene for the beta-subunit of F1-ATPase from Escherichia coli," Biochem. J. 259:421-426 (1989)	Background, validity	Stipulation of the Parties	3/17/08
JX-146	Kohara, Y. et al., "The physical map of the whole E. coli chromosome: Application of a new strategy for rapid analysis and sorting of a large genomic library," Cell 50:495-508	Background, validity	Stipulation of the Parties	3/17/08
JX-147	Koonin, E. et al., "Sequencing and Analysis of Bacterial Genomes," Current Biology 6:404-416 (1996)	Background, validity	Stipulation of the Parties	3/17/08
JX-148	Li, S., and Cronan, J. E., "The Genes Encoding the Two Carboxyltransferase Subunits of Escherichia coli Acetyl-CoA Carboxylase," J. Biol. Chem. 267:16841-16847 (1992)	Background, validity	Stipulation of the Parties	3/17/08
JX-149	Lidholm, J., and Gustafsson, P., "Homologues of the green algal gidA gene and the liverwort frxC gene are present on the chloroplast genomes of conifers," Plant Mol. Biol. 17:787-798 (1991)	Background, validity	Stipulation of the Parties	3/17/08
JX-150	Lobban, P., and Kaiser, A D., "Enzymatic end-to-end joining of DNA molecules," J. Mol. Biol. 79:453-471 (1973)	Background, validity	Stipulation of the Parties	3/17/08

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
JX-151	Matsushime, L. H. et al., "Human c-ros-1 gene homologues to the v-ros sequence of UR2 sarcoma virus encodes for a transmembrane receptorlike molecule," Mol. Cell Biol. 6:3000-3004 (1986)	Background, validity	Stipulation of the Parties	3/17/08
JX-152	Matsuyama, S., and Mizushima, S., "Construction and characterization of a deletion mutant lacking micF, a proposed regulatory gene for OmpF synthesis in Escherichia coli," J. Bacteriol. 162:1196-1202 (1985)	Background, validity	Stipulation of the Parties	3/17/08
JX-153	Mertz, J. E. et al., "Cleavage of DNA by RI restriction endonucleases generates cohesive ends," Proc. Natl. Acad. Sci. 69:3370-3374 (1972)	Background, validity	Stipulation of the Parties	3/17/08
JX-154	Mirwaltd, C. et al., "The Crystal Structure of Dihydrodipicolinate Synthase from Escherichia coli at 2.5 Å Resolution," J. Mol. Biol. 246:227-239 (1995)	Background, validity	Stipulation of the Parties	3/17/08
JX-155	Number intentionally not used			
JX-156	Patte, J. C. et al., "Regulation of Lysine Biosynthesis in Escherichia coli K12*," Acta Microbiol. Acad. Sci. Hung. 23:121-128 (1976)	Background, validity	Stipulation of the Parties	3/17/08
JX-157	Patte, J. C. et al., "Role of the Lysine-Sensitive Aspartokinase II in the Regulation of DAP-Decarboxylase Synthesis in Escherichia coli K12," FEBS Letters 43:67-70 (1974)	Background, validity	Stipulation of the Parties	3/17/08
JX-158	Popkin, P. S., and Mass, W., "Escherichia coli Regulatory Mutation Affecting Lysine Transport and Lysine Decarboxylase," J. Bacteriol., 141:485-492 (1980)	Background, validity	Stipulation of the Parties	3/17/08

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
JX-159	Prober, J. M. et al., "A System for Rapid DNA Sequencing with Fluorescent Chain-Terminating Dideoxynucleotides," Science, 238:336-341 (1987)	Background, validity	Stipulation of the Parties	3/17/08
JX-160	Ren, S-X et al., "Unique physiological and pathogenic features of Leptospira interrogans revealed by whole-genome sequencing," Nature 422, 888-493 (2003)	Background, validity	Webb	3/17/08
JX-161	Richaud, F. et al., "Chromosomal Location and Nucleotide Sequence of the Escherichia coli dapA gene," J. Bacteriol. 166:297-300 (1986)	Background, validity	Stipulation of the Parties	3/17/08
JX-162	Roberts, R. J., "Restriction enzymes and their isoschizomers," Nucleic Acid Res. 16 suppl:r271313 (1988)	Background, validity	Stipulation of the Parties	3/17/08
JX-163	Roberts, R. J., "Restriction and modification enzymes and their recognition sequences," Nucleic Acid Res. 11:r135-r167 (1983)	Background, validity	Stipulation of the Parties	3/17/08
JX-164	Rood, J. I. et. al, "Characterization of Monofunctional Chorismate Mutase/Prephenate Dehydrogenase Enzymes Obtained via Mutagenesis of Recombinant Plasmids in vitro," Eur. J. Biochem. 124: 513-519 (1982)	Background, validity	Stipulation of the Parties	3/17/08
JX-165	Sahm, H., "Metabolic Design in Amino Acid-Producing Bacteria," Institut für Biotechnologie, pp. 55-62 (1990)	Background, validity	Stipulation of the Parties	3/17/08
JX-166	Saiki, R. K. et al., "Primer-directed enzymatic amplification of DNA with a thermostable DNA polymerase," Science 239:487 (1988)	Background, validity	Stipulation of the Parties	3/17/08

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
JX-167	Sambrook, J. et al., "Molecular Cloning," Cold Spring Harbor Laboratory, Sections 5.3-5.32, 5.62-5.67, 11, 17:10-17.16 (2nd ed. 1989)	Background, validity	Stipulation of the Parties	3/17/08
JX-168	Shaver, J. M. et al., "Single-amino acid substitutions eliminate lysine. inhibition of maize dihydrodipicolinate synthase," Proc. Natl. Acad. Sci. 93:1962-1966 (1996)	Background, validity	Stipulation of the Parties	3/17/08
JX-169	Shortle, D., and Nathans, D., "Local Mutagenesis: A method for generating viral mutants with bases substitutions in preselected regions of the viral genome," Proc. Natl. Acad. Sci. 75:21702174 (1978)	Background, validity	Stipulation of the Parties	3/17/08
JX-170	Singleton, C.K. et al., "DNA sequence of the E. coli trpR gene and prediction of the amino acid sequence of Trp repressor," Nucl. Acids Res. 8: 1551-1560 (1980).	Background, validity	Stipulation of the Parties	3/17/08
JX-171	Southern, E. M., "Detection of Specific Sequences Among DNA Fragments Separated by Gel Electrophoresis," J. Mol. Biol., 98:503-517 (1975)	Background, validity	Stipulation of the Parties	3/17/08
JX-172	Tsunekawa, H. et al., Acquisition of a Sucrose Utilization System in Escherichia coli K-12 Derivative and Its Application to Industry, Applied and Environmental Microbiology 58(6):2081-2088 (1992)	Background, validity	Stipulation of the Parties	3/17/08
JX-173	Vik, S. B. et al., "Mutagenesis of the a Subunit of the F1F0-ATPase from Escherichia coli," J. Biol. Chem. 263:6599-6605 (1988)	Background, validity	Stipulation of the Parties	3/17/08

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
JX-174	Wahl, G. M. et al., "Molecular Hybridization of Immobilized Nucleic Acids: Theoretical Concepts and Practical Considerations," Methods in Enzymol. 152:399-407 (1987)	Background, validity	Stipulation of the Parties	3/17/08
JX-175	Weiss, B. A et al., "Enzymatic breakage and joining of deoxyribonucleic acid. VI. Further purification and properties of polynucoleotide ligase from Escherichia coli infected with bacteriophage T4," J. Biol. Chem. 243:4543 (1968)	Background, validity	Stipulation of the Parties	3/17/08
JX-176	Yamamoto, Y. et al. 'The Escherichia coli ldcC gene encodes another lysine decarboxylase, probably a constitutive enzyme.' Genes Genet. Syst. 72: 167-172 (1997).	Background, validity	Webb	3/17/08
JX-177	Yang, W. et al., "A stationary phase protein of Escherichia coli that affects the mode of association between the Trp repressor protein and operator-bearing DNA," Proc. Natl. Acad. Sci. 90:5796 (1993)	Background, validity	Stipulation of the Parties	3/17/08
JX-178C	8th Lysine Project Research Report No. 11817 (AHL 435994-436039)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-179	Yugari, Y., and Gilvarg, C., "Coordinated end-product inhibition in lysine synthesis in Escherichia coli.," Biochim. Biophys. Acta 62:612–614 (1962)	Background, validity	Stipulation of the Parties	3/17/08
JX-180	Zoller, M. J., and Smith, M., "Oligonucleotide-directed mutagenesis of DNA fragments cloned into M13 vectors," Methods Enzymol. 100:468-500 (1983)	Background, validity	Stipulation of the Parties	3/17/08
JX-181C	Withdrawn			

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
JX-182C	Withdrawn			
JX-183C	Withdrawn			
JX-184C	Withdrawn			
JX-185	Withdrawn			
JX-186C	Withdrawn			
JX-187	Meng, S., and Bennett, G., "Nucleotide Sequence of the Escherichia coli cad Operon: A System for Neutralization of Low Extracellular pH," J. Bacteriol. 174:2659-2669 (1992)	Background, validity	Webb	3/17/08
JX-188C	18th Lysine Project Research Report No. 12466 (AHL 436182-436193)	Validity, enforceability	Stipulation of the Parties	3/17/08
JX-189C	Schematic drawing of the Dahe plant showing the principal pieces of equipment and operating stations	Background	Stipulation of the Parties	3/17/08
JX-190C	February 19, 2008 Stipulation and Agreement	Background	Stipulation of the Parties	3/17/08
JX-191C	Stipulation dated March 8, 2008	Unclean Hands Defense	Stipulation of the Parties	3/10/08
JX-192C	Monthly Research Reports for 04/1993 (AHL 437292)	Validity, enforceability	Stipulation of the Parties	3/19/08
JX-193C	Monthly Research Reports for 05/1993 (AHL 437293)	Validity, enforceability	Stipulation of the Parties	3/19/08
JX-194C	Monthly Research Reports for 06/1993 (AHL 437294)	Validity, enforceability	Stipulation of the Parties	3/19/08
JX-195C	Monthly Research Reports for 07/1993 (AHL 437295)	Validity, enforceability	Stipulation of the Parties	3/19/08
JX-196C	Monthly Research Reports for 08/1993 (AHL 437296)	Validity, enforceability	Stipulation of the Parties	3/19/08
JX-197C	Monthly Research Reports for 09/1993 (AHL 437297)	Validity, enforceability	Stipulation of the Parties	3/19/08
JX-198C	Monthly Research Reports for 10/1993 (AHL 437298)	Validity, enforceability	Stipulation of the Parties	3/19/08

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
JX-199C	Monthly Research Reports for 11/1993 (AHL 437299)	Validity, enforceability	Stipulation of the Parties	3/19/08
JX-200C	Monthly Research Reports for 11/1993 (AHL 437300)	Validity, enforceability	Stipulation of the Parties	3/19/08
JX-201C	Monthly Research Reports for 12/1993 (AHL 437301)	Validity, enforceability	Stipulation of the Parties	3/19/08
JX-202C	Monthly Research Reports for 12/1993 (AHL 437302)	Validity, enforceability	Stipulation of the Parties	3/19/08
JX-203C	Monthly Research Reports for 01/1994 (AHL 437303)	Validity, enforceability	Stipulation of the Parties	3/19/08
JX-204C	Monthly Research Reports for 01/1994 (AHL 437304)	Validity, enforceability	Stipulation of the Parties	3/19/08
JX-205C	Monthly Research Reports for 02/1994 (AHL 437305)	Validity, enforceability	Stipulation of the Parties	3/19/08
JX-206C	Monthly Research Reports for 02/1994 (AHL 437306)	Validity, enforceability	Stipulation of the Parties	3/19/08
JX-207C	Monthly Research Reports for 03/1994 (AHL 437307)	Validity, enforceability	Stipulation of the Parties	3/19/08
JX-208C	Monthly Research Reports for 03/1994 (AHL 437308)	Validity, enforceability	Stipulation of the Parties	3/19/08
JX-209C	Monthly Research Reports for 09/1993 (AHL 430752)	Validity, enforceability	Kojima	3/19/08
JX-210C	Monthly Research Reports for 05/1991 (AHL 430859)	Validity, enforceability	Stipulation of the Parties	3/19/08

COMPLAINANTS' EXHIBIT LIST

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
CX-001	Number intentionally not used			
CX-002	Withdrawn			
CX-003	Number intentionally not used			
CX-004	Number intentionally not used			

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
CX-005	Number intentionally not used			
CX-006C	Withdrawn			
CX-007C	Withdrawn			
CX-008C	Withdrawn			
CX-009C	Global Bio-Chem Discussion Materials, January 2006 (GBT105234-105260)	Background, validity	Motion by Complainants	3/19/08
CX-010	Number intentionally not used			
CX-011	Withdrawn			
CX-012C	Withdrawn			
CX-013	Number intentionally not used			
CX-014	Number intentionally not used			
CX-015	Withdrawn			
CX-016C	Withdrawn			
CX-017C	Withdrawn			
CX-018C	Withdrawn			
CX-019C	Withdrawn			
CX-020C	Withdrawn			
CX-021C	Withdrawn			
CX-022C	Withdrawn			
CX-023C	Withdrawn			
CX-024C	Withdrawn			
CX-025C	Withdrawn			
CX-026C	Withdrawn			
CX-027C	Withdrawn			
CX-028C	Withdrawn			
CX-029C	Withdrawn			
CX-030C	Withdrawn			
CX-031C	Withdrawn			
CX-032C	Withdrawn			

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
CX-033C	Withdrawn			
CX-034C	Withdrawn			
CX-035	GBT promotional document (GBT 109036-109040)	Background, validity	Motion by Complainants	3/19/08
CX-036	GBT promotional presentation (GBT 119525-119545)	Background, validity	Motion by Complainants	3/19/08
CX-037	Number intentionally not used			
CX-038	Number intentionally not used			
CX-039	Number intentionally not used			
CX-040	Number intentionally not used			
CX-041	Number intentionally not used			
CX-042	Withdrawn			
CX-043	Number intentionally not used			
CX-044	Withdrawn			
CX-045	Number intentionally not used			
CX-046	Number intentionally not used			
CX-047	Number intentionally not used			
CX-048	Number intentionally not used			
CX-049C	Bacterial Gene Reconstruction Contract (GBT213315-317)	Background, validity	Stipulation of the Parties	3/19/08
CX-050	Number intentionally not used			
CX-051	Number intentionally not used			
CX-052C	Withdrawn			
CX-053	Number intentionally not used			
CX-054	Number intentionally not used			
CX-055	Withdrawn			
CX-056	Withdrawn			
CX-057	Withdrawn			
CX-058	Withdrawn			
CX-059	Withdrawn			

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
CX-060	GBT 2005 Interim Results (September 2005)	Background, validity	Stipulation of the Parties	3/19/08
CX-061	GBT Press Release (September 22, 2005)	Background, validity	Stipulation of the Parties	3/19/08
CX-062C	Withdrawn			
CX-063	Number intentionally not used			
CX-064	Number intentionally not used			
CX-065	Withdrawn			
CX-066	Number intentionally not used			
CX-067	Number intentionally not used			
CX-068	Number intentionally not used			
CX-069	Number intentionally not used			
CX-070	Number intentionally not used			
CX-071	Number intentionally not used			
CX-072	Number intentionally not used			
CX-073	Number intentionally not used			
CX-074	Number intentionally not used			
CX-075	Number intentionally not used			
CX-076	Number intentionally not used			
CX-077	Cowan et al., "Characterization of the Major Promoter for the Plasmid-Encoded Sucrose Genes scrY, scrA, and scrB," Journal of Bacteriology 173(23):7464-7470 (1991)	Validity	Liao	3/19/08
CX-078	Withdrawn			3/19/08
CX-079	Alaeddinoglu et al., "Transfer of a Gene for Sucrose Utilization into Escherichia coli K-12, and Consequent Failure of Expression of Genes for D-Serine Utilization," Journal of General Microbiology 110:47-59 (1979)	Validity	Liao	3/19/08

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
CX-080	Garcia, "Cloning in Escherichia coli and molecular analysis of the sucrose system of the Salmonella plasmid SCR-53," Mol. Gen. Genet. 201:575-577 (1985)	Validity	Liao	3/19/08
CX-081	Schmid et al., "Plasmid-Mediated Uptake and Metabolism of Sucrose by Escherichia coli K-12," Journal of Bacteriology 151(1):68-76 (1982)	Validity	Liao	3/19/08
CX-082	Scholle et al., "Expression and Regulation of a Vibrio alginolyticus Sucrose Utilization System Cloned in Escherichia coli," Journal of Bacteriology 169(6):2685-2690 (1987)	Validity	Liao	3/19/08
CX-083	Number intentionally not used			
CX-084	Withdrawn			
CX-085	Number intentionally not used			
CX-086C	Withdrawn			
CX-087C	Withdrawn			
CX-088C	Withdrawn			
CX-089C	Withdrawn			
CX-090C	Withdrawn			
CX-091C	Withdrawn			
CX-092C	Withdrawn			
CX-093C	Withdrawn			
CX-094C	Withdrawn			
CX-095C	Withdrawn			
CX-096C	Withdrawn			
CX-097C	Withdrawn			
CX-098C	Withdrawn			
CX-099C	Withdrawn			
CX-100C	Withdrawn			
CX-101C	Withdrawn			

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
CX-102C	Withdrawn			
CX-103C	Withdrawn			
CX-104C	Withdrawn			
CX-105C	Withdrawn			
CX-106C	Withdrawn			
CX-107C	Respondents' Supplemental Responses to Complainants' Interrogatories Nos. 13, 14, 19, 20, 52, 54, 57, 58, 65, 68, 78 and 83.	Background, validity	Somerville	3/19/08
CX-108C	Withdrawn			
CX-109C	Withdrawn			
CX-110C	Withdrawn			
CX-111C	Withdrawn			
CX-112C	Withdrawn			
CX-113C	Withdrawn			
CX-114C	Withdrawn			
CX-115C	Withdrawn			
CX-116C	Withdrawn			
CX-117C	Withdrawn			
CX-118C	Withdrawn			
CX-119C	Withdrawn			
CX-120C	Withdrawn			
CX-121C	Withdrawn			
CX-122C	Withdrawn			
CX-123C	Withdrawn			
CX-124C	Withdrawn			
CX-125C	Withdrawn			
CX-126C	Withdrawn			
CX-127C	Withdrawn			
CX-128C	Withdrawn			
CX-129	Withdrawn			

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
CX-130	Analyst report (GBT088255-088260)	Validity	Liao	3/19/08
CX-131C	GBT communication with HSBC re: lysine business (GBT117650-117653, GBT117846-117849)	Validity	Liao	3/19/08
CX-132	Analyst report (GBT163980-163983)	Validity	Liao	3/19/08
CX-133	Analyst report (GBT151721-151727)	Validity	Liao	3/19/08
CX-134	Withdrawn			
CX-135	Withdrawn			
CX-136	GBT website content (GBT174161-174168)	Validity	Liao	3/19/08
CX-137	Number intentionally not used			
CX-138	Withdrawn			
CX-139	GBT message to shareholders (GBT155240)	Validity	Stipulation of the Parties	3/19/08
CX-140C	Withdrawn			
CX-141	Number intentionally not used			
CX-142	Number intentionally not used			
CX-143	Number intentionally not used			
CX-144	Number intentionally not used			
CX-145	Number intentionally not used			
CX-146	Number intentionally not used			
CX-147	Number intentionally not used			
CX-148	Number intentionally not used			
CX-149	Number intentionally not used			
CX-150C	Withdrawn			
CX-151	Number intentionally not used			
CX-152	Number intentionally not used			
CX-153	Number intentionally not used			
CX-154	Number intentionally not used			

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
CX-155	Number intentionally not used			
CX-156C	Withdrawn			
CX-157	Number intentionally not used			
CX-158	Number intentionally not used			
CX-159	Number intentionally not used			
CX-160	Number intentionally not used			
CX-161	Number intentionally not used			
CX-162	Withdrawn			
CX-163	Withdrawn			
CX-164	Withdrawn			
CX-165	Number intentionally not used			
CX-166	Withdrawn			
CX-167	Halsall, D. M., "Overproduction of Lysine by Mutant Strains of Escherichia coli with Defective Lysine Transport Systems," Biochemical Genetics, Vol. 13, Nos. 112, (1975)	Background, validity	Liao	3/19/08
CX-168	Withdrawn			
CX-169	Withdrawn			
CX-170	Withdrawn			
CX-171	Lemonnier, M., and Lane, D., "Expression of the second lysine decarboxylase gene of Escherichia coli," Microbiology 144:751-760 (1998)	Background, validity	Webb	3/19/08
CX-172	Withdrawn			
CX-173	Number intentionally not used			
CX-174	Number intentionally not used			
CX-175	Number intentionally not used			

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
CX-176C	Hague Judgment	Background, validity	Motion by Complainants	3/19/08
CX-177C	Withdrawn			
CX-178C	Withdrawn			
CX-179C	Withdrawn			
CX-180C	Withdrawn			
CX-181C	Withdrawn			
CX-182C	Withdrawn			
CX-183C	Withdrawn			
CX-184	Number intentionally not used			
CX-185	Number intentionally not used			
CX-186	Number intentionally not used			
CX-187C	Withdrawn			
CX-188C	Withdrawn			
CX-189	Number intentionally not used			
CX-190C	Withdrawn			
CX-191C	Withdrawn			
CX-192C	Withdrawn			
CX-193	CV of Dr. James C. Liao	Background, validity, enforceability	Liao	3/19/08
CX-194	Number intentionally not used			
CX-195	List of items reviewed by Dr. James C. Liao	Background, validity, enforceability	Liao	3/19/08
CX-196C	Withdrawn			
CX-197C	Withdrawn			
CX-198C	Withdrawn			
CX-199C	Withdrawn			
CX-200C	Withdrawn			
CX-201C	Withdrawn			

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
CX-202C	Withdrawn			
CX-203C	Withdrawn			
CX-204C	Withdrawn			
CX-205C	Withdrawn			
CX-206C	Withdrawn			
CX-207C	Withdrawn			
CX-208C	Withdrawn			
CX-209C	Withdrawn			
CX-210C	Withdrawn			
CX-211C	Withdrawn			
CX-212C	Withdrawn			
CX-213C	Withdrawn			
CX-214C	Withdrawn			
CX-215C	Withdrawn			
CX-216C	Withdrawn			
CX-217C	Withdrawn			
CX-218C	Withdrawn			
CX-219C	Withdrawn			
CX-220C	Withdrawn			
CX-221C	Withdrawn			
CX-222C	Monthly Research Reports for 06/1994 (AHL 430694-99)	Validity, enforceability	Joint Motion of the Parties	3/26/08
CX-223C	Withdrawn			
CX-224C	Withdrawn			
CX-225C	Withdrawn			
CX-226	Number intentionally not used			
CX-227	Withdrawn			
CX-228	Withdrawn			
CX-229C	Withdrawn			
CX-230C	Withdrawn			

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
CX-231C	Rebuttal Witness Statement of James C. Liao, Ph.D.	Validity, enforceability	Liao	3/19/08
CX-232C	Rebuttal Witness Statement of Yuji Joe	Unclean hands, enforceability	Stipulation of the Parties	3/19/08
CX-233C	Rebuttal Witness Statement of Satoru Murao	Validity, enforceability	Stipulation of the Parties	3/19/08
CX-234C	Rebuttal Witness Statement of Yoshimi Kikuchi	Validity, enforceability	Kikuchi	3/14/08
CX-235C	Corrected Rebuttal Witness Statement of Hiroyki Kojima	Validity, enforceability	Kojima	3/19/08
CX-236C	Withdrawn			
CX-237	Kikuchi, et al., Biosc. Biotechnol. Biochem., 62 (6): 1267-1270, 1998	Validity	Kikuchi	3/19/08
CX-238C	Withdrawn			
CX-239	Transmissible Substrate-Utilizing Ability in Enterobacteria, Smith H.W. and Parsell Z., J. Gen. Microbiol. 1975; 87(1): 129-140	Validity	Kojima	3/19/08
CX-240C	Technology Research and Development Contract (GBT213396-213403)	Background, validity	Stipulation of the Parties	3/19/08
CX-241C	Withdrawn			
CX-242C	Withdrawn			
CX-243C	Withdrawn			
CX-244C	Withdrawn			
CX-245	Withdrawn			
CX-246C	Withdrawn			
CX-247C	Monthly Research Report for 12/1992 (AHL 430789) (see also JX-091C)	Validity, enforceability	Kojima	3/17/08
CX-248C	Excerpt from 4th Research Report No. 11529 at AHL 435987 (see also JX-127C)	Validity, enforceability	Kojima	3/19/08

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
CX-249C	Monthly Research Report for 12/1993 (AHL 430733) (see also JX-060C)	Validity, enforceability	Kojima	3/19/08
CX-250C	Excerpt from 10th Lysine Project Research Report No. 11819 at AHL 003173 (see also JX-051C)	Validity, enforceability	Kojima	3/19/08
CX – 251C	Excerpts of Dehui Wang depositions of August 29, 2007, August 30, 2007 and August 31, 2007	Unclean Hands; Obviousness	Stipulation of the Parties	3/19/08
CX – 252C	Excerpts of Weigang Li deposition of October 24, 2006	Unclean Hands; Obviousness	Stipulation of the Parties	3/19/08
CDX-001C	Withdrawn			
CDX-002C	Withdrawn			
CDX-003C	Withdrawn			
CDX-004C	Withdrawn			
CDX-005C	Withdrawn			
CDX-006	Withdrawn			
CDX-007	Withdrawn			
CDX-008C	Withdrawn			
CDX-009C	Withdrawn			
CDX-010C	Withdrawn			
CDX-011C	Withdrawn			
CDX-012C	Withdrawn			
CDX-013	'160 Patent Claims at Issue	Validity, enforceability	Liao	3/19/08
CDX-014	'698 Patent Claims at Issue	Validity, enforceability	Liao	3/19/08
CDX-015	Partial List of Journal Articles on Sucrose Utilization Gene	Validity, enforceability	Liao	3/19/08
CDX-016C	Excerpts from Deposition of Yoshimi Kikuchi	Validity, enforceability	Liao	3/19/08

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
CDX-017C	Withdrawn			
CDX-018	Comparison of small scale lab and large scale fermenter	Validity, enforceability	Liao	3/19/08
CDX-019	Test tube, Lab-Flask, S-Jar	Validity, enforceability	Liao	3/19/08
CDX-020	Lysine fermenters	Validity, enforceability	Liao	3/19/08
CDX-021	Glucose and Sucrose Molecular Structure	Validity, enforceability	Liao	3/19/08
CDX-022	Feedback regulation of amino acid biosynthesis pathways	Validity	Kikuchi	3/19/08
CDX-023	AEC and lysine molecular structures	Validity	Kikuchi	3/19/08
CDX-024	Glycolysis pathway	Validity	Kikuchi	3/19/08
CDX-025	Glucose and sucrose molecular structures	Validity	Kikuchi	3/19/08
CDX-026	Lysine biosynthesis pathway	Validity	Kojima	3/19/08
CDX-027	Lysine degradation pathway	Validity	Kojima	3/19/08
CDX-028	Chart showing rate limiting steps	Validity	Kojima	3/19/08
CDX-029	Lysine biosynthesis pathway showing rate determining steps	Validity	Kojima	3/19/08
CDX-030	Plasmid	Validity	Kojima	3/19/08
CDX-031	dapA gene sequence	Validity	Kojima	3/19/08
CDX-032	dapA gene sequence with mutations	Validity	Kojima	3/19/08
CDX-033	Feedback inhibition in lysine	Validity	Kojima	3/19/08
CDX-034	Feedback inhibition in lysine (2)	Validity	Kojima	3/19/08
CDX-035	dapA gene Mutations	Validity	Kojima	3/19/08
CDX-036	Rate limiting step 2	Validity	Kojima	3/19/08
CDX-037	Lysine and threonine production pathways	Validity	Kojima	3/19/08
CDX-038	Withdrawn			
CDX-039	Complainants' Demonstrative '160 v. '765 Comparasion		Webb	3/19/08

EXHIBIT NUMBER	DESCRIPTION/ TITLE	PURPOSE	SPONSORING WITNESS	ADMITTED
CDX-040	Complainants' Demonstrative "Claim Is Best Mode '160 Timeline"		Webb	3/19/08
CDX-041	Withdrawn		Webb	3/19/08
CDX-042	Complainants' Demonstrative "Hypotheticals 1-5"		Webb	3/19/08
CDX-043	Complainants' Demonstrative TA-325 v. W-3110		Webb	3/19/08
CDX-044	Complainants' Demonstrative "Effect of LDC Knockout"		Webb	3/19/08
CDX-045	Complainants' Demonstrative "Residual Sugar Calculation"		Webb	3/26/08
CPX-001	Withdrawn			
CPX-002	Withdrawn			
CPX-003	Withdrawn			

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.
Before The Honorable Charles E. Bullock

IN THE MATTER OF

CERTAIN L-LYSINE FEED PRODUCTS, THEIR METHODS OF PRODUCTION AND GENETIC CONSTRUCTS FOR PRODUCTION

Inv. No. 337-TA-571

RESPONDENTS' FINAL EXHIBIT LIST

Exh. No.	Description/Title	Purpose	Sponsoring Witness	Status
RX 001	'160 PCT Application	Invalidity, unenforceability	Kojima, Kawamura, Webb, or Somerville	Admitted 03/17/08
RX 002	'698 Japanese PCT Application	Invalidity, unenforceability	Kojima, Kikuchi, Webb, or Somerville	Admitted 3/13/08 and 03/17/08
RX 003C	Monthly Report 1/95 (AHL 430650-AHL 430656)	Invalidity, unenforceability	Subject of stipulation; Webb, Kojima, Kikuchi, or Kawamura	Admitted by Order No. 39 dated 3/27/08
RX 004C	Kikuchi Notebook 1/2 (AHL 002505-AHL 002626)	Invalidity, unenforceability	Webb or Kikuchi	Admitted 03/17/08
RX 005	Kikuchi et al., "Characterization of a Second Lysine Decarboxylase Isolated from *Escherichia coli*"	Invalidity, unenforceability	Webb or Kikuchi	Admitted 3/13/08 and 03/17/08
RX 006	Kikuchi doctoral dissertation (AHL 431052-AHL 431177)	Invalidity, unenforceability	Webb or Kikuchi	Admitted 3/13/08 and 03/17/08
RX 007C	Pages from monthly reports, 10/93 & 11/93 (AHL 500025, AHL 500024)	Invalidity, unenforceability	Subject of stipulation; Webb, Kojima, Kikuchi, or Kawamura	Admitted 03/19/08
RX 008C				WITHDRAWN
RX 009	Nagano et al., "High Expression of the Second Lysine Decarboxylase Gene, ldc, in Escherichia coli W 196 Due to the Recognition of the Stop Codon (TAG), which Corresponds to the 33th Amino Acid Residue..." (AHL 431040-AHL 431045)	Invalidity, unenforceability	Kikuchi, Webb, or Somerville	Admitted 3/13/08 and 03/17/08
RX 010C	Monthly Report 1991 (August) (AHL 430843)	Invalidity, unenforceability	Subject of stipulation; Webb, Kojima, Kikuchi, or Kawamura	Admitted by Order No. 39 dated 3/27/08
RX 011C				WITHDRAWN

Exh. No.	Description/Title	Purpose	Sponsoring Witness	Status
RX 012C				WITHDRAWN
RX 013C				WITHDRAWN
RX 014C				WITHDRAWN
RX 015C				WITHDRAWN
RX 016	GenBank Accession No. D49445	Invalidity	Webb, Somerville, Liao, or Blattner	Admitted 03/19/08
RX 017	GenBank Accession No. M96394	Invalidity	Webb, Somerville, Liao, or Blattner	Admitted 03/19/08
RX 018	Neil M. Ram, Ph.D., LSP, CHMM CV		Ram	Admitted 03/19/08
RX 019	Andrew C. Webb, Ph.D CV		Webb	Admitted 03/19/08
RX 020				WITHDRAWN
RX 021	Ronald L. Somerville, Ph.D CV		Somerville	Admitted 03/19/08
RX 022	Number intentionally not used.			
RX 023C				WITHDRAWN
RX 024C				WITHDRAWN
RX 025C				WITHDRAWN
RX 026	NCBI printout re GenBank accession number AY485150	Invalidity, unenforceability	Kojima, Kikuchi, or Webb	Admitted 3/13/08 and 03/17/08
RX 027	Doroshenko & Livshits, "Structure and mode of transposition of Tn2555 carrying sucrose utilization genes"	Invalidity, unenforceability	Kojima, Kikuchi, or Webb	Admitted 03/19/08
RX 028C	One page computer print-out from Ajinomoto database re AJ13036 (AHL 500001)	Invalidity, unenforceability	Kikuchi	Admitted 03/19/08
RX 029C				WITHDRAWN
RX 030C				WITHDRAWN
RX 031C				WITHDRAWN
RX 032C				WITHDRAWN
RX 033C				WITHDRAWN
RX 034C				WITHDRAWN
RX 035C				WITHDRAWN
RX 036C				WITHDRAWN
RX 037C				WITHDRAWN
RX 038C				WITHDRAWN
RX 039C	Monthly Report -Kazue Kawamura (AHL 430815)	Invalidity, unenforceability	Subject of stipulation; Webb, Kojima, Kikuchi, or Kawamura	Admitted 03/19/08
RX 040C				WITHDRAWN
RX 041C				WITHDRAWN
RX 042C				WITHDRAWN
RX 043C				WITHDRAWN
RX 044C				WITHDRAWN
RX 045C				WITHDRAWN
RX 046C				WITHDRAWN

Exh. No.	Description/Title	Purpose	Sponsoring Witness	Status
RX 047C	Monthly Report 1992 (February and March 1992) (AHL 430809-430810)	Invalidity, unenforceability	Subject of stipulation; Webb, Kojima, Kikuchi, or Kawamura	Admitted by Order No. 39 dated 3/27/08
RX 048C	Monthly Report 1991 (October and November) (AHL 430828)	Invalidity, unenforceability	Subject of stipulation; Webb, Kojima, Kikuchi, or Kawamura	Admitted by Order No. 39 dated 3/27/08
RX 049C				WITHDRAWN
RX 050C				WITHDRAWN
RX 051C	Deposition designations, Atsushi Sasamori, 11/30/06 and 12/1/06	Unclean hands/ unenforceability		Admitted by Order No. 39 dated 3/27/08
RX 052C	Deposition designations, Yoshinari Shiroshita, 11/28-29/06	Unclean hands/ unenforceability		Admitted by Order No. 39 dated 3/27/08
RX 053C	Deposition designations, Julian Maxwell, 8/15/07	Unclean hands/ unenforceability		Admitted 03/17/08
RX 054C				WITHDRAWN
RX 055	Number intentionally not used.			
RX 056C	Ram Expert Report Appendix B	Cleaning Procedures/ Sampling	Ram	Admitted 03/19/08
RX 057C				WITHDRAWN
RX 058C				WITHDRAWN
RX 059C				WITHDRAWN
RX 060C				WITHDRAWN
RX 061	Number intentionally not used.			
RX 062C				WITHDRAWN
RX 063C	Strain development chart written by Dr. Kikuchi at deposition	Invalidity, unenforceability	Webb or Kikuchi	Admitted 3/13/08 and 03/17/08
RX 064C	Strain development chart (AHL 430404)	Invalidity, unenforceability	Webb or Kikuchi	Admitted 3/13/08 and 03/17/08
RX 065C				WITHDRAWN
RX 066C				WITHDRAWN
RX 067C				WITHDRAWN
RX 068C				WITHDRAWN
RX 069C				WITHDRAWN
RX 070C				WITHDRAWN
RX 071C				WITHDRAWN
RX 072C				WITHDRAWN
RX 073C				WITHDRAWN
RX 074C				WITHDRAWN
RX 075C				WITHDRAWN
RX 076C				WITHDRAWN
RX 077C				WITHDRAWN
RX 078C				WITHDRAWN
RX 079C				WITHDRAWN
RX 080C				WITHDRAWN
RX 081C				WITHDRAWN

Exh. No.	Description/Title	Purpose	Sponsoring Witness	Status
RX 082C				WITHDRAWN
RX 083C				WITHDRAWN
RX 084C				WITHDRAWN
RX 085	Number intentionally not used.			
RX 086	Number intentionally not used.			
RX 087C	Witness Statement of Wang Dehui (to be modified to reflect the stipulation)	~~Non-infringement, Importation,~~ Unclean hands, Cleaning procedures/Sampling	Wang	Admitted 03/19/08
RX 088C	Witness Statement of Ronald L. Somerville	Invalidity, unenforceability	Somerville	Admitted 03/14/08
RX 089C	Witness Statement of Andrew C. Webb	Invalidity, unenforceability	Webb	Admitted 03/19/08
RX 090C	Complainant Ajinomoto Heartland LLC's Responses to Respondent Global Bio-Chem Technology Group Company Limited's First Set of Interrogatories (Nos. 1-43), dated 6/16/06	Invalidity, unenforceability/ Unclean hands	Ajinomoto Webb Shiroshita	Admitted 03/19/08
RX 091C				WITHDRAWN
RX 092C				WITHDRAWN
RX 093C	Complainant Ajinomoto Co., Inc.'s First Supplemental Responses to Respondent Global Bio-Chem Technology Group Company Limited's First Set of Interrogatories (Nos. 1-43), dated 8/28/06	Invalidity, unenforceability/ Unclean hands	Ajinomoto Webb Shiroshita	Admitted 03/19/08
RX 094C				WITHDRAWN
RX 095C				WITHDRAWN
RX 096C				WITHDRAWN
RX 097C	Genealogy of host strains (AHL 008935 - AHL 008937)	Invalidity, unenforceability	Kojima, Kawamura, Kikuchi, Nakanishi, or Webb	Admitted 03/17/08
RX 098C				WITHDRAWN
RX 099C				WITHDRAWN
RX 100C				WITHDRAWN
RX 101C				WITHDRAWN
RX 102C				WITHDRAWN
RX 103C				WITHDRAWN
RX 104C				WITHDRAWN
RX 105C				WITHDRAWN
RX 106C				WITHDRAWN
RX 107C				WITHDRAWN
RX 108C				WITHDRAWN
RX 109C	Monthly Report – 8/95 (AHL 430612- AHL 430616)	Invalidity, unenforceability	Subject of stipulation; Webb, Kojima, Kikuchi, or Kawamura	Admitted by Order No. 39 dated 3/27/08
RX 110C				WITHDRAWN

Exh. No.	Description/Title	Purpose	Sponsoring Witness	Status
RX 111C	Complainants Ajinomoto Co., Inc. and Ajinomoto Heartland L.L.C.'s Supplemental Responses to Respondent Global Biochem Technology Group Company Limited's Fourth Set of Interrogatories (No. 64), dated 11/30/07	Invalidity, unenforceability	Ajinomoto or Webb	Admitted 03/19/08
RX 112C				WITHDRAWN
RX 113C				WITHDRAWN
RX 114C	E-Mail, Subject: After the Next Action (AHL212948 – AHL212950)	Unenforceability / Unclean hands	Ajinomoto, Sasamori	Admitted 03/19/08
RX 115C	Agreement in the form of a letter that GBT will disclose to Ajinomoto information not available to the general public (AHL433969 – AHL433970)	Unenforceability / Unclean hands	Ajinomoto, Sasamori	Admitted 03/17/08
RX 116C	(Letter) Would like to visit manufacturing facilities in Changchun for a better understanding of operations, re potential cooperation (AHL433971)	Unenforceability / Unclean hands	Ajinomoto, Sasamori	Admitted 03/17/08
RX 117C	Test of GBT's bacteria in August 2005, (Excerpts) (AHL421917 – AHL421985)	Unenforceability / Unclean hands	Ajinomoto, Sasamori	Admitted 03/17/08
RX 118C	Plant photos forwarded by K. Mulville in e-mail dated 7/19/07	Unenforceability / Unclean hands	Ajinomoto, Sasamori	Admitted 03/17/08
RX 119C	Itinerary for 4–7 Sept 2005 Ajinomoto visit (AHL433941 – AHL433942)	Unenforceability / Unclean hands	Ajinomoto, Sasamori	Admitted 03/19/08
RX 120C	Japanese language document with English translation. Document appears to be a draft which served as the basis of the 9/16/2005 meeting memo (Translator's note) (Translation, AHL433949A-AHL433949E)	Unenforceability / Unclean hands	Ajinomoto, Sasamori	Admitted 03/17/08
RX 121C	Japanese language document with English translation. GBT Plant Inspection Results Summary (Technical Aspects) (AHL433950 – AHL433951E)	Unenforceability / Unclean hands	Ajinomoto, Sasamori	Admitted 03/17/08
RX 122C	Japanese language document with English translation. Gallop Project Study Team Meeting Agenda, Bates Number (AHL435926- AHL435929E)	Unenforceability / Unclean hands	Ajinomoto, Sasamori	Admitted 03/17/08
RX 123C	Japanese language document with English translation. Memo on Meeting with Global Bio-Chem Technology Group (AHL433943 – AHL433945D)	Unenforceability / Unclean hands	Ajinomoto, Sasamori	Admitted 03/17/08
RX 124C	Japanese language document with English translation. Summary of Inspection of Global Bio-Chem Technology Group (Main Points) (GBT209748 – GBT209748C)	Unenforceability / Unclean hands	Ajinomoto, Sasamori	Admitted 03/17/08
RX 125C	Ajinomoto Response to GBT Fifth Set of Interrogatories (7/27/07)	Unenforceability / Unclean hands	Ajinomoto, Sasamori	Admitted 03/17/08
RX 126C	Ajinomoto Heartland LLC October Newsletter (AHL294644-AHL294648)	Unenforceability / Unclean hands	Ajinomoto, Sasamori	Admitted 03/17/08

Exh. No.	Description/Title	Purpose	Sponsoring Witness	Status
RX 127C				WITHDRAWN
RX 128C	Japanese language document with English translation. Management Conference Report Materials; Global Bio-Chem Technology Group (GBT) Inspection Report (AHL433938 – AHL433939D)	Unenforceability / Unclean hands	Ajinomoto, Shiroshita	Admitted 03/19/08
RX 129C	E-mail Subject: Samples of GBT Lysine (AHL 241941)	Unclean hands/ unenforceability	Ajinomoto, Maxwell	Admitted 03/17/08
RX 130C	E-mail Subject: RE: Samples of GBT Lysine (purchased from Wholesale Feed in Iowa) (AHL 291516 – AHL 291517)	Unclean hands/ unenforceability	Ajinomoto, Maxwell	Admitted 03/19/08
RX 131C	Analysis of Dahe Samples	Unclean hands/ unenforceability	Ajinomoto, Shiroshita	Admitted 03/17/08
RX 132C	Email subject re September visit to facilities in Changchun and Dehui (AHL433972)	Unclean hands/ unenforceability	Ajinomoto, Sasamori	Admitted 03/17/08
RX 133C	Japanese language document with English translation. Gallop Project Kick-Off Meeting – Minutes, Bates Number (AHL435917 – AHL435925J)	Unclean hands/ unenforceability	Ajinomoto, Sasamori	Admitted 03/17/08
RX 134C	Letter, subject re: Visit to Changchun and Dehui production sites (AHL433973)	Unclean hands/ unenforceability	Ajinomoto, Sasamori	Admitted 03/17/08
RX 135C	E-mail Subject: FW: PCR Analysis in USA (AHL 415915A)	Unclean hands/ unenforceability	Ajinomoto, Maxwell	Admitted 03/17/08
RX 136C	Japanese language document with English translation. Minutes of Gallop Study Team Meeting, (AHL435930 – AHL435932D)	Unclean hands/ unenforceability	Ajinomoto, Sasamori	Admitted 03/17/08
RX 137C	Japanese language document with English translation. Regarding Gallop Project (AHL433954 – AHL433955C)	Unclean hands/ unenforceability	Ajinomoto, Sasamori	Admitted 03/17/08
RX 138C	E-mail Subject: FW: PCR Analysis in USA (AHL 415890A – AHL 415891A)	Unclean hands/ unenforceability	Ajinomoto, Maxwell	Admitted 03/19/08
RX 139C	Japanese language document with English translation. E-Mail, Subject: Gallop Project Update (Confidential) (AHL433956)	Unclean hands/ unenforceability	Ajinomoto, Shiroshita	Admitted 03/17/08
RX 140C	E-mail Subject: Strategy Meeting (AHL 296290)	Unclean hands/ unenforceability	Ajinomoto, Maxwell	Admitted 03/19/08
RX 141C	Japanese language document with English translation. Gallop Project Update (Confidential) (AHL433957 – AHL433957C)	Unclean hands/ unenforceability	Ajinomoto, Sasamori	Admitted 03/17/08

Exh. No.	Description/Title	Purpose	Sponsoring Witness	Status
RX 142C	Japanese language document with English translation. Gallop Study Team Meeting Minutes (AHL435933 - AHL435934C	Unclean hands/ unenforceability	Ajinomoto, Sasamori	Admitted 03/17/08
RX 143C	Japanese language document with English translation. E-mail, Subject: Gallop Meeting (AHL435916 – AHL435916C)	Unclean hands/ unenforceability	Ajinomoto, Sasamori	Admitted 03/17/08
RX 144C	Japanese language document with English translation. E-mail, Subject: Gallop Update (Confidential) (AHL433961-AHL433961B)	Unclean hands/ unenforceability	Ajinomoto, Sasamori	Admitted 03/17/08
RX 145C	AAN Strategy Meeting 2005 Manual (12/7-8/2005) Final (AHL179628 – AHL179647)	Unclean hands/ unenforceability	Ajinomoto, Sasamori	Admitted 03/19/08
RX 146C	E-mail Subject: RE: potential PCR lab (AHL 416650A)	Unclean hands/ unenforceability	Ajinomoto, Maxwell	Admitted 03/19/08
RX 147C	Preliminary Information Request List (AHL433964 – AHL433965)	Unclean hands/ unenforceability	Ajinomoto, Sasamori	Admitted 03/17/08
RX 148C	Japanese language document with English translation. E-mail, Subject: Gallop Project Update (Confidential) (AHL433952 - AHL433953D)	Unclean hands/ unenforceability	Ajinomoto, Sasamori	Admitted 03/17/08
RX 149C	Japanese language document with English translation. E-mail, Subject: Gallop Update (Confidential), (AHL433966 - AHL433967C)	Unclean hands/ unenforceability	Ajinomoto, Sasamori	Admitted 03/17/08
RX 150C	Japanese language document with English translation. Minutes of Gallop Study Team Meeting (AHL435940 - AHL435941C)	Unclean hands/ unenforceability	Ajinomoto, Sasamori	Admitted 03/17/08
RX 151C	Japanese language document with English translation. Gallop Project Study Team Meeting Materials (Confidential) (AHL435938 - AHL435939C)	Unclean hands/ unenforceability	Ajinomoto, Sasamori	Admitted 03/17/08
RX 152C	Ajinomoto Response to Interrogatory No. 42 (6/16/06)	Unclean hands/ unenforceability	Ajinomoto	Admitted 03/17/08
RX 153C	Ajinomoto Co., Inc. Annual Report 2006	Unclean hands/ unenforceability	Ajinomoto, Sasamori	Admitted 03/19/08
RX 154C	Monthly Director's Meeting Minutes April 7, 2006 (AHL436328- AHL436333)	Unclean hands/ unenforceability	Ajinomoto, Maxwell	Admitted 03/19/08
RX 155C	E-mail, Subject: Gallop final (AHL433978 - AHL433979D)	Unclean hands/ unenforceability	Ajinomoto, Sasamori	Admitted 03/17/08
RX 156C	Japanese language document with English translation. Explanation Concerning Lysine Product Sample (Crystal Lysine) (GBT209749A –GBT209750A)	Unclean hands/ unenforceability	Ajinomoto, Shiroshita	Admitted 03/17/08
RX 157C	Japanese language document with English translation. Declaration of Masahiro Yamada with respect to project at Ajinomoto Co., Ltd. for purchasing Global Bio-Chem (GBT209746 - GBT209747C)	Unclean hands/ unenforceability	Ajinomoto, Sasamori	Admitted 03/19/08

Exh. No.	Description/Title	Purpose	Sponsoring Witness	Status
RX 158C	Ajinomoto Co., Inc. Summary of the First Half of the Fiscal Year Ending March 31, 2007 and Outlook	Unclean hands/ unenforceability	Ajinomoto, Sasamori	Admitted 03/19/08
RX 159C	Consolidated Results First Half of the FY Ending March 31, 2007 (Interim FY 2006)	Unclean hands/ unenforceability	Ajinomoto, Sasamori	Admitted 03/19/08
RX 160	Tabor, C. W., and Tabor, H., "Polyamines in Microorganisms," *Microbiol. Rev.* 49:81-99 (1985)	Invalidity	Webb, Somerville, Liao, or Blattner	Admitted 03/19/08
RX 161				WITHDRAWN
RX 162				WITHDRAWN
RX 163	U.S. Patent No. 4,346,170	Invalidity	Kojima, Somerville, or Webb	Admitted 03/17/08
RX 164	U.S. Patent No. 4,278,765	Invalidity	Somerville, Webb, or Kojima	Admitted 03/17/08
RX 165				WITHDRAWN
RX 166C				WITHDRAWN
RX 167				WITHDRAWN
RX 168	GBT's Notice of Deposition to Ajinomoto	Invalidity, unenforceability/ Unclean hands	Kojima, Kikuchi, Maxwell, Shiroshita, Sasamori	Admitted 03/19/08
RX 169C				WITHDRAWN
RX 170C	"Mutation Analysis of the Feedback Inhibition Site of Aspartokinase III of *Escherichia coli* K-12 and its Use in L-Threonine Production" by Ogawa-Miyata, Kojima, & Sano (AHL 431046 - AHL 431051)	Invalidity	Kojima	Admitted 03/19/08
RX 171				WITHDRAWN
RX 172				WITHDRAWN
RX 173C				WITHDRAWN
RX 174	Number intentionally not used.			
RX 175C				WITHDRAWN
RX 176C				WITHDRAWN
RX 177C	FDA documents (AHL 422073 - AHL 422095)	Invalidity, unenforceability	Webb, Kojima, Kawamura, or Nakanishi	Admitted 3/14/08 and 03/17/08
RX 178C				WITHDRAWN
RX 179C				WITHDRAWN
RX 180C				WITHDRAWN
RX 181C				WITHDRAWN
RX 182C				WITHDRAWN
RX 183C				WITHDRAWN
RX 184C				WITHDRAWN
RX 185C				WITHDRAWN
RX 186C				WITHDRAWN
RX 187C				WITHDRAWN
RX 188C				WITHDRAWN
RX 189C				WITHDRAWN
RX 190				WITHDRAWN

Exh. No.	Description/Title	Purpose	Sponsoring Witness	Status
RX 191C	E-mail from Julian Maxwell to William Timmons, Mike@kindstrom-schmoll.com, 10/28/05: Cargill/GBT (AHL 292895 – AHL 292897)	Unclean hands/ unenforceability	Ajinomoto, Maxwell	Admitted 03/19/08
RX 192C				WITHDRAWN
RX 193C				WITHDRAWN
RX 194C				WITHDRAWN
RX 195C				WITHDRAWN
RX 196	Number intentionally not used.			
RX 197	10/13/06 Response to office Action in file history of U.S. Patent No. 7,179,623	Invalidity	Kojima, Kikuchi, Webb, or Somerville	Admitted 3/13/08 and 03/17/08
RX 198				WITHDRAWN
RX 199C				WITHDRAWN
RX 200C				WITHDRAWN
RX 201C				WITHDRAWN
RX 202				WITHDRAWN
RX 203C	Complainants' Answers to Respondents' Interrogatories Nos. 66-71	Invalidity, unenforceability	Ajinomoto	Admitted 3/13/08 and 03/17/08
RX 204C				WITHDRAWN
RX 205C				WITHDRAWN
RX 206C				WITHDRAWN
RX 207C				WITHDRAWN
RX 208C				WITHDRAWN
RX 209C				WITHDRAWN
RX 210C				WITHDRAWN
RX 211C				WITHDRAWN
RX 212	Number intentionally not used.			
RX 213	Number intentionally not used.			
RX 214	Number intentionally not used.			
RX 215	Number intentionally not used.			
RX 216	Number intentionally not used.			
RX 217	Number intentionally not used.			
RX 218	Number intentionally not used.			
RX 219	Number intentionally not used.			
RX 220	Number intentionally not used.			
RX 221	Number intentionally not used.			
RX 222	Number intentionally not used.			
RX 223	Number intentionally not used.			
RX 224	Number intentionally not used.			
RX 225	PTO assignment database information on the 765 patent showing its assignment/license to Ajinomoto	Invalidity, unenforceability	Any Ajinomoto witness; Webb, Somerville, or Kojima	Admitted 03/19/08
RX 226	Number intentionally not used.			
RX 227C				WITHDRAWN
RX 228C				WITHDRAWN
RX 229				WITHDRAWN
RX 230				WITHDRAWN
RX 231	Number intentionally not used.			

Exh. No.	Description/Title	Purpose	Sponsoring Witness	Status
RX 232	Boy, E., and Patte, J. C., "Multivalent Repression of Aspartic Semialdehyde Dehydrogenase in *Escherichia coli* K-12," *J. Bacteriol.* 112:84-92 (1972)	Invalidity	Webb, Somerville, Liao, or Blattner	Admitted 03/19/08
RX 233	U.S. Patent No. 3,580,810	Invalidity, unenforceability	Kojima or Webb	Admitted 03/19/08
RX 234				WITHDRAWN
RX 235	U.S. Patent No. 7,179,623	Invalidity	Kojima, Kikuchi, Webb, or Somerville	Admitted 3/13/08 and 03/17/08
RX 236C				WITHDRAWN
RX 237C				WITHDRAWN
RX 238C				WITHDRAWN
RX 239C				WITHDRAWN
RX 240C				WITHDRAWN
RX 241C				WITHDRAWN
RX 242C				WITHDRAWN
RX 243C				WITHDRAWN
RX 244	Kashiwagi, K. et al., "Coexistence of the Genes for Putrescine Transport Protein and Ornithine Decarboxylase at 16 min on *Escherichia coli* Chromosome," *J. Biol. Chem.* 266, 20922-7 (1991)	Invalidity	Webb, Somerville, Liao, or Blattner	Admitted 03/19/08
RX 245				WITHDRAWN
RX 246	Doroshenko, V. G. et al., "Structural and functional organization of the transposon Tn2555 carrying saccharose utilization genes," *Mol. Biol.* 22:645-658 (1988)	Invalidity	Webb, Somerville, Liao, or Blattner	Admitted 03/19/08
RX 247	Number intentionally not used.			
RX 248				WITHDRAWN
RX 249				WITHDRAWN
RX 250				WITHDRAWN
RX 251				WITHDRAWN
RX 252				WITHDRAWN
RX 253				WITHDRAWN
RX 254				WITHDRAWN
RX 255C	Witness statement of Neil M. Ram, Ph.D., LSP, CHMM	Remedy and bonding	Ram	Admitted 03/19/08
RX 256C	Witness Statement of Li Weigang	Unclean hands	Li	Admitted 03/19/08
RX 257C	10/2005 AHL Sales & Marketing report (AHL 193726-193733) (Formerly JX 181C)	Unclean hands/ Unenforceability	Sasamori Ajinomoto	Admitted 03/19/08
RX 258C	10/2005 AHL Newsletter (AHL 294644-294648) (Formerly JX 182C)	Unclean hands/ Unenforceability	Sasamori Ajinomoto	Admitted 03/19/08
RX 259C	11/2005 AHL Sales & Marketing report (AHL 193717-193725) (Formerly JX 183C)	Unclean hands/ Unenforceability	Sasamori Ajinomoto	Admitted 03/19/08
RX 260C	12/2005 AHL Sales & Marketing report (AHL 193710-193716) (Formerly JX 184C)	Unclean hands/ Unenforceability	Sasamori Ajinomoto	Admitted 03/19/08
RX 261	2006 Ajinomoto Investors' Guide (Formerly JX 185)	Unclean hands/ Unenforceability	Sasamori Ajinomoto	Admitted 03/19/08
RX 262C	04/2006 AHL Sales & Marketing Report (AHL 436193-436202) (Formerly JX 186C)	Unclean hands/ Unenforceability	Maxwell Ajinomoto	Admitted 03/19/08

Exh. No.	Description/Title	Purpose	Sponsoring Witness	Status
RX 263	Article – Breeding of Phenylalanine-producing *Brevibacterium flavum* Strains by Removing Feedback Regulation of Both the Two Key Enzymes in Its Biosynthesis Authors: Shiio, Sugimoto & Kawamura	Background	Kawamura	Admitted 03/17/08
RX 264				WITHDRAWN
RX 265				WITHDRAWN
RX 266				WITHDRAWN
RX 267				WITHDRAWN
RX-268	GenBank Accession No. D49445 (printed 2/19/2008)			Admitted by Order No. 39 dated 3/27/08
RPX 1				WITHDRAWN
RPX 2				WITHDRAWN
RPX 3				WITHDRAWN
RPX 4				WITHDRAWN
RPX 5C				WITHDRAWN
RPX 6				WITHDRAWN
RPX 7C				WITHDRAWN
RPX 8C				WITHDRAWN
RDX-1C	Unclean hands timeline	Unclean hands	Ajinomoto, Maxwell, Shiroshito, Sasamori	Admitted 03/19/08
RDX-2C	Best mode/inequitable conduct timeline for claim 15 of '160 patent	Invalidity, unenforceability	Webb, Kojima, Kawamura, Kikuchi, Nakanishi, Murao	Admitted 03/19/08
RDX-3C	Number intentionally not used.			
RDX-4C	Best mode/inequitable conduct timeline for claim 22 of '160 patent	Unenforceability	Webb, Kojima, Kawamura, Kikuchi, Nakanishi, Murao	Admitted 03/19/08
RDX-5C	Best mode/inequitable conduct timeline for claim 13 of '698 patent	Unenforceability	Webb, Kojima, Kawamura, Kikuchi, Nakanishi, Murao	Admitted 03/19/08
RDX-6C				WITHDRAWN
RDX-7C				WITHDRAWN
RDX-8	Lysine Biosynthesis and Decomposition slides	Invalidity, unenforceability	Webb, Somerville	Admitted 03/19/08
RDX-9	Host Cells and Plasmids slides	Invalidity, unenforceability	Webb, Somerville	Admitted 03/19/08
RDX-10C				WITHDRAWN
RDX-11C				WITHDRAWN
RDX-12C				WITHDRAWN
RDX-13C				WITHDRAWN
RDX-14C				WITHDRAWN
RDX-15	'765 Patent Double-Patenting Chart	Invalidity	Webb, Somerville	Admitted 03/19/08
RDX-16C				WITHDRAWN
RDX-17C				WITHDRAWN

Exh. No.	Description/Title	Purpose	Sponsoring Witness	Status
RDX-18C	Importance of Host Strain Slides	Invalidity, unenforceability	Webb, Somerville	Admitted 03/19/08
RDX-19C	Number intentionally not used.			
RDX-20C	Lysine Production of Disclosed vs. Undisclosed Strains Slides	Invalidity, unenforceability	Webb	Admitted 03/19/08
RDX-21	AEC Selection Slides	Invalidity, unenforceability	Webb, Somerville	Admitted 03/19/08
RDX-22C				WITHDRAWN
RDX-23C				WITHDRAWN
RDX-24C				WITHDRAWN
RDX-25C				WITHDRAWN
RDX-26	Igarashi Figure 1	Invalidity	Webb, Somerville	Admitted 03/19/08
RDX-27C				WITHDRAWN
RDX-28C				WITHDRAWN
RDX-29C				WITHDRAWN
RDX-30C				WITHDRAWN
RDX-31C				WITHDRAWN
RDX-32C	RX 97 slides	Invalidity, unenforceability	Kojima, Kawamura, Kikuchi, Nakanishi, or Webb	Admitted 03/19/08
RDX-33C				WITHDRAWN
RDX-34C				WITHDRAWN
RDX-35C	'160 patent timeline document call-out slides (highlighting particular documents used to construct timelines)	Invalidity, unenforceability	Kojima, Kawamura, Webb, Somerville	Admitted 03/19/08
RDX-36C	'698 patent timeline document call-out slides (highlighting particular documents used to construct timelines)	Invalidity, unenforceability	Kojima, Kikuchi, Webb, Somerville	Admitted 03/19/08
RDX-37C				WITHDRAWN
RDX-38C				WITHDRAWN
RDX-39C				WITHDRAWN

Dated: April 4, 2008

Respectfully submitted,

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1. **Deposition Exhibit to Trial Exhibit Cross Reference**

   a. **Exhibits Entered by Stipulation or Agreement**

Deposition Exhibit Number	Trial Exhibit Number
RX 118	RX 115C
RX 119	RX 119C
RX 120	RX 120
RX 121	RX 123C
RX 122	RX 121
RX 123	RX 128C
RX 124	RX 139C
RX 126	RX 156C
RX 128	RX 131C
RX 130	RX 133C
RX 132	RX 137C
RX 133	RX 261
RX 134	RX 158C
RX 135	RX 159C
RX 136	RX 257C
RX 137	RX 259C
RX 138	RX 260C
RX 139	RX 145C
RX 140	RX 114C
RX 141	RX 116C
RX 142	RX 117C
RX 143	RX 124C
RX 145	RX 132C
RX 146	RX 134C
RX 147	RX 122C
RX 151	RX 126C
RX 151	RX 258C
RX 152	RX 153
RX 153C	RX 136C
RX 154C	RX 147C
RX 155C	RX 141C
RX 156C	RX 142C
RX 161C	RX 143C
RX 163C	RX 144C
RX 166C	RX 148C
RX 167C	RX 149C
RX 168C	RX 150C
RX 169C	RX 151C
RX 170C	RX 155C
RX 173C	RX 157C

RX 196C	RX 154C
RX 197C	RX 262C
RX 200C	RX 191C
RX 201C	RX 140C
RX 202C	RX 129C
RX 203C	RX 130C
RX 205C	RX 138C
RX 206C	RX 135C
RX 208C	RX 146C
RX 216C	RX 125C
RX-114	RX-168
RX-115	RX-090C
RX-117	RX-093C

b. Deposition Exhibits Referenced at Hearing

Deposition Exhibit Number	Trial Exhibit Number
RX 001	JX 1
RX 002	JX 2
RX 008	RX 2
RX 011	JX 11C
RX 031	JX 15C
RX 051	JX 51C
RX 064	RX 64C
RX 76	JX 50C
RX 82	JX 82 C

2. RX Exhibit Replaced by Duplicative JX Exhibit

Respondents' Exhibit RX-36 was among exhibits made defunct by a joint exhibit (JX) agreed to and admitted on the final day of hearing March 19, 2008, specifically, JX-199C.

Prior RX No.	Current JX No.
RX-36C	JX-199C

IN THE MATTER OF CERTAIN L-LYSINE FEED PRODUCTS, THEIR METHODS OF PRODUCTION AND GENETIC CONSTRUCTS FOR PRODUCTION

337-TA-571

CERTIFICATE OF SERVICE

I, Marilyn R. Abbott, hereby certify that the attached **ORDER** was served upon, **Juan S. Cockburn, Esq.,** Commission Investigative Attorney, and the following parties via first class mail and air mail where necessary on August 15, **2008**.

Marilyn R. Abbott, Secretary JNG
U.S. International Trade Commission
500 E Street, S.W., Room 112A
Washington, DC 20436

FOR COMPLAINANT AJINOMOTO HEARTLAND LLC:

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IN THE MATTER OF CERTAIN L-LYSINE FEED PRODUCTS, THEIR METHODS OF PRODUCTION AND GENETIC CONSTRUCTS FOR PRODUCTION

337-TA-571

FOR RESPONDENTS GLOBAL BIO-CHEM TECHNOLOGY GROUP COMPANY LIMITED; CHANGCHUN DACHENG BIO-CHEM ENGINEERING DEVELOPMENT CO., LTD.; CHANGCHUN BAOCHENG BIO-CHEM DEVELOPMENT CO., LTD.; CHANGCHUN DAHE BIO TECHNOLOGY DEVELOPMENT CO., LTD. & BIO-CHEM TECHNOLOGY (HK) LIMITED

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UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C. 20436

In the Matter of	
CERTAIN L-LYSINE FEED PRODUCTS, THEIR METHODS OF PRODUCTION AND GENETIC CONSTRUCTS FOR PRODUCTION	Investigation No. 337-TA-571

NOTICE OF COMMISSION DECISION NOT TO REVIEW AN INITIAL DETERMINATION TERMINATING THE INVESTIGATION IN PART

AGENCY: U.S. International Trade Commission.

ACTION: Notice.

SUMMARY: Notice is hereby given that the U.S. International Trade Commission has determined not to review an initial determination ("ID") (Order No. 17) issued by the presiding administrative law judge ("ALJ") partially terminating the above-captioned investigation by granting complainant's motion to withdraw claims 1, 2 and 22 of U.S. Patent No. 6,040,160 and claims 13, 16-19 and 21-22 of U.S. Patent No. 5,827,698.

FOR FURTHER INFORMATION CONTACT: Christal A. Sheppard, Esq., Office of the General Counsel, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone (202) 708-2301. Copies of non-confidential documents filed in connection with this investigation are or will be available for inspection during official business hours (8:45 a.m. to 5:15 p.m.) in the Office of the Secretary, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone (202) 205-2000. General information concerning the Commission may also be obtained by accessing its Internet server at *http://www.usitc.gov*. The public record for this investigation may be viewed on the Commission's electronic docket (EDIS) at *http://edis.usitc.gov*. Hearing-impaired persons are advised that information on this matter can be obtained by contacting the Commission's TDD terminal on (202) 205-1810.

SUPPLEMENTARY INFORMATION: This investigation was instituted on May 31, 2006 based on a complaint filed by Ajinomoto Heartland LLC ("Heartland") of Chicago, Illinois. 71 Fed. Reg. 30958. (May 31, 2006). The complaint, as amended and supplemented, alleges violations of section 337 of the Tariff Act of 1930 (19 U.S.C. § 1337) in the importation into the United States, the sale for importation, and the sale within the United States after importation of

certain L-lysine feed products and genetic constructs for production thereof by reason of infringement of claims 13, 15-19, and 21-22 of U.S. Patent No. 5,827,698 ("the '698 patent") and claims 1, 2, 15, and 22 of U.S. Patent No. 6,040,160 ("the '160 patent"). The complaint further alleges that an industry in the United States exists as required by subsection (a)(2) of section 337. Global Bio-Chem Technology Group Company Ltd. of Hong Kong; Changchun Dacheng Bio-Chem Engineering Development Co., Limited; Changchun Baocheng Bio-Chem Development Co., Ltd; Changchun Dahe Bio Technology Development Co. Ltd., all of China, and Bio-Chem Technology (HK) Limited of Hong Kong were named respondents in the investigation. *Id.* On June 29, 2006, complainant Heartland filed a motion to amend the complaint to add its parent company, Ajinomoto, Inc., as a complainant. The motion was granted. No petitions for review were filed and the Commission determined not to review that ID.

On April 30, 2007, the ALJ issued an ID extending the target date of this investigation by twelve months to July 30, 2008 (26 months), and the deadline for his final ID to March 31, 2008. No petitions for review were filed and the Commission did not review this determination.

On August 10, 2007, the ALJ issued the subject ID (Order No. 17) terminating this investigation in part, pursuant to Commission Rule 210.21(a)(1), with respect to claims 1, 2, and 22 of the '160 patent and claims 13, 16-19, and 21-22 of the '698 patent. No petitions for review of the ID were filed, and the Commission has determined not to review the ID.

The authority for the Commission's determination is contained in section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), and in sections 210.21, 210.42 of the Commission's Rules of Practice and Procedure (19 C.F.R. §§ 210.21, 210.42).

By order of the Commission.

Marilyn R. Abbott
Secretary to the Commission

Issued: August 29, 2007

CERTAIN L-LYSINE FEED PRODUCTS, THEIR METHODS OF PRODUCTION AND GENETIC CONSTRUCTS FOR PRODUCTION **337-TA-571**

CERTIFICATE OF SERVICE

I, Marilyn R. Abbott, hereby certify that the attached **NOTICE OF COMMISSION DECISION NOT TO REVIEW AN INITIAL DETERMINATION TERMINATING THE INVESTIGATION IN PART** has been served by hand upon the Commission Investigative Attorney Juan S. Cockburn, Esq., and the following parties as indicated, on August 30, 2007.

Marilyn R. Abbott

Marilyn R. Abbott, Secretary
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