United States Court of Appeals for the Federal Circuit

AJINOMOTO CO., INC., AJINOMOTO HEARTLAND INC.,
Appellants

v.

INTERNATIONAL TRADE COMMISSION,
Appellee

CJ CHEILJEDANG CORP., CJ AMERICA, INC., PT CHEILJEDANG INDONESIA,
Intervenors

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CJ CHEILJEDANG CORP., CJ AMERICA, INC., PT CHEILJEDANG INDONESIA,
Appellants

v.

INTERNATIONAL TRADE COMMISSION,
Appellee

AJINOMOTO CO., INC., AJINOMOTO HEARTLAND INC.,
Intervenors

2018-1590, 2018-1629

Appeals from the United States International Trade Commission in Investigation No. 337-TA-1005.

Decided: August 6, 2019

JOHN D. LIVINGSTONE, Finnegan, Henderson, Farabow, Garrett & Dunner, LLP, Atlanta, GA, argued for Ajinomoto Co., Inc., Ajinomoto Heartland Inc. Also represented by MARTIN DAVID WEINGARTEN; CHARLES E. LIPSEY, Reston, VA; MAREESA ARNITA FREDERICK, CORA RENAE HOLT, BARBARA RUDOLPH, Washington, DC.

HOUDA MORAD, Office of General Counsel, United States International Trade Commission, Washington, DC, argued for appellee. Also represented by SIDNEY A. ROSENZWEIG, DOMINIC L. BIANCHI, WAYNE W. HERRINGTON.

JAMES F. HALEY, JR., Haley Guiliano LLP, New York, NY, argued for CJ CheilJedang Corp., CJ America, Inc., PT CheiJedang Indonesia. Also represented by STEVEN PEPE, Ropes & Gray LLP, New York, NY; MATTHEW RIZZOLO, Washington, DC.

Before DYK, MOORE, and TARANTO, *Circuit Judges*.

Opinion for the court filed by *Circuit Judge* TARANTO.

Opinion concurring in part and dissenting in part filed by *Circuit Judge* DYK.

TARANTO, *Circuit Judge*.

Ajinomoto Co., Inc. and Ajinomoto Heartland Inc. (collectively, Ajinomoto) filed a complaint against CJ CheilJedang Corp., CJ America, Inc., and PT CheilJedang Indonesia (collectively, CJ) with the International Trade Commission, alleging that CJ was importing certain

products that infringed Ajinomoto's U.S. Patent No. 7,666,655. CJ used several strains of *Escherichia coli* bacteria to produce L-tryptophan products, which it then imported into the United States. The Commission determined that CJ's earlier strains did not infringe but that CJ's two later strains did. The Commission also found that the relevant claim of the '655 patent is not invalid for lack of an adequate written description.

Ajinomoto appeals the Commission's claim construction underlying the determination of no infringement by the earlier strains. CJ cross-appeals aspects of the determination of infringement by the later strains and the rejection of the invalidity challenge. We affirm.

I

A

The '655 patent claims *E. coli* bacteria that have been genetically engineered to increase their production of aromatic L-amino acids, such as L-tryptophan, during fermentation, as well as methods of producing aromatic L-amino acids using such bacteria. *See* '655 patent, col. 2, lines 40–45. In particular, the '655 patent identifies a specific gene in the *E. coli* genome, the *yddG* gene, that encodes a membrane protein, the YddG protein. *Id.*, col. 2, lines 46–48. That protein transports aromatic L-amino acids out of the bacterial cell and into the surrounding culture medium, where they can be collected. *See id.*, col. 7, lines 11–16. When *yddG* gene activity in bacteria is enhanced so that more YddG protein is produced, the bacteria show increased production of, and increased resistance to, aromatic L-amino acids. *Id.*, col. 2, lines 49–57.[1]

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[1] The specification defines a bacterium's "resistance" to an amino acid as its ability "to grow on a minimal medium containing" the amino acid on "which unmodified or

The '655 patent describes three ways to enhance the activity of the *yddG* gene. First, plasmids containing additional copies of the *yddG* gene can be introduced into the bacterium. *Id.*, col. 2, lines 50–52; *id.*, col. 5, line 62, through col. 6, line 2. Second, additional copies of the *yddG* gene can be inserted into the bacterial chromosome. *Id.*, col. 2, lines 52–54; *id.*, col. 6, lines 3–6. Third, a stronger "promoter" than the one native to the *E. coli yddG* gene can be used. *Id.*, col. 2, lines 54–57; *id.*, col. 6, lines 12–15.[2]

Claim 20, the only claim of the '655 patent still asserted when the Commission issued its decision, claims "[a] method for producing an aromatic L-amino acid, which comprises cultivating the bacterium ***according to any one of*** claims 9–12, 13, 14, 15–18, or 19." *Id.*, col. 24, lines

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the wild type, or the parental strain of the bacterium cannot grow," or its ability "to grow faster" on such a medium "than unmodified or the wild type, or the parental strain of the bacterium." '655 patent, col. 4, lines 49–56.

[2] A promoter is a nucleotide sequence within a DNA molecule, located adjacent to the nucleotide sequence that constitutes the gene to be expressed. The Lewin textbook cited by Ajinomoto shows a "typical promoter" around 41 nucleotides long. J.A. 6043; *see also* J.A. 6177 (article by Deuschle et al., cited at '655 patent, col. 6, lines 18–21, showing longer promoters). The promoter is the binding site for RNA polymerase, which initiates transcription (the first step in gene expression) by separating the two strands of DNA. The '655 patent's specification defines "[s]trength of promoter" with reference to the "frequency of acts of the RNA synthesis initiation." '655 patent, col. 6, lines 15–16.

The promoter is only one part of a gene's "expression regulation sequence," which controls expression of the gene. *See id.*, col. 3, line 14; *id.*, col. 5, line 2. Besides promoters, the "expression regulation sequence" can include, *e.g.*, operators, enhancers, terminators, and silencers.

4–6 (emphasis added). Of the claims in that list, claims 9 and 15 are the independent claims, and they are the two alternatives, under claim 20, of importance in this case.

Claim 9 recites:

> 9. A recombinant *Escherichia coli* bacterium, which has the ability to accumulate aromatic L-amino acid in a medium, wherein the aromatic L-amino acid production by said bacterium is enhanced by enhancing activity of a protein in a cell of said bacterium beyond the levels observed in a wild-type of said bacterium,
>
> **[1]** and in which said protein consists of the amino acid sequence of SEQ ID NO: 2
>
> **[2]** and said protein has the activity to make the bacterium resistant to L-phenylalanine, fluorophenylalanine or 5[-]fluoro-DL-tryptophan,
>
> **[3]** wherein the activity of the protein is enhanced by **[3a]** transformation of the bacterium with a DNA encoding the protein to express the protein in the bacterium, **[3b]** by replacing the native promoter which precedes the DNA on the chromosome of the bacterium with a more potent promoter, **[3c]** or by introduction of multiple copies of the DNA encoding said protein into the chromosome of said bacterium to express the protein in said bacterium.

Id., col. 22, lines 51–67 (paragraph breaks and bold numbering added). The Commission referred to limitation [1] as the "protein limitation," limitation [2] as the "resistance limitation," and limitation [3] as the "enhancement limitation." Claim 15 is materially identical to claim 9, except for the protein limitation. Whereas claim 9 identifies the claimed protein by a specific amino-acid sequence, claim 15 identifies it by reference to a corresponding DNA sequence—a protein "encoded by the nucleotide sequence

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