IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

IMPOSSIBLE FOODS INC., *Plaintiff*, v. MOTIF FOODWORKS, INC., and GINKGO BIOWORKS, INC., *Defendants*.	§ § § § § § § § §	Civil Action No. 22-311-WCB **FILED UNDER SEAL**

CLAIM CONSTRUCTION ORDER

In this patent case, plaintiff Impossible Foods Inc. has asserted numerous claims from five patents against defendant Motif Foodworks, Inc.: U.S. Patent Nos. 9,943,096 ("the '096 patent"); 10,039,306 ("the '306 patent"); 10,863,761 ("the '761 patent"); 11,013,250 ("the '250 patent"); and 11,224,241 ("the '241 patent"). The asserted patents are generally directed to food products that are designed to mimic the taste of meat.[1]

The parties disagree about the proper construction of a number of claim terms from the asserted patents.[2] They have filed competing briefs outlining their positions with respect to each

[1] In this action, Impossible has also asserted claims from U.S. Patent Nos. 10,273,492 ("the '492 patent") and 10,689,656 ("the '656 patent"), which are directed to species of yeast used in the production of food products, against Motif and defendant Ginkgo Bioworks, Inc. On July 24, 2023, I severed the portion of the case involving Impossible's claims of infringement of the food product patents from the portion of the case involving Impossible's claims of infringement of the yeast patents. Dkt. No. 161 at 1. Accordingly, in this order I have not addressed the claim construction issues relating to the yeast patents. *See id.* at 2.

[2] In the parties' joint claim construction statement, Dkt. No. 94-1, the parties provided competing approaches for numbering the disputed claim terms. For simplicity, I have adopted Impossible's system of numbering the claim terms in the joint claim construction statement and the parties' briefing.

disputed term. Dkt. Nos. 106, 120, 142, 148. On August 9, 2023, I held a claim construction hearing. I address below each of the disputes identified in the parties' briefing and at the hearing.

A. "non-animal" / "free of animal" (Terms 1–4); "heme-containing protein" (Terms 5–6)

The first terms disputed by the parties ("non-animal" and "free of animal") relate to the provenance of the proteins contained in the claimed food products. Claims 14 and 27 of the '306 patent and claims 1 and 13 of the '250 patent recite "a non-animal heme-containing protein." Claims 1 and 22 of the '241 patent recite a food product that is "free of animal heme-containing protein." Claim 23 of the '241 patent recites a food product that is "free of animal products." Claim 1 of the '096 patent and claim 12 of the '761 patent recite products or compositions that "contain[] no animal products." The parties agree that the claim construction dispute regarding those terms should be resolved consistently across all the asserted patents.

The second term disputed by the parties ("heme-containing protein") is found in certain dependent claims that cover proteins having sequences identical to proteins that occur naturally in animals. Motif asserts that those dependent claims are indefinite because they are inconsistent with the proper construction of the term "non-animal," which is recited in the independent claims from which those claims depend.

The dispute regarding the "non-animal" and "free of animal" terms was previously raised to the court as the basis for a motion to dismiss filed by Motif. Motif argued that Impossible had failed to state a claim for infringement of the Food Product Patents[3] because Motif's products use a protein called "bovine myoglobin," which occurs naturally in cows but is produced by Motif using yeast. Dkt. No. 31 at 2. Impossible argued that the claims require merely that the protein be derived from a non-animal source, and therefore that Motif's products fell within the scope of

[3] The "Food Product Patents" are the '096, '306, '761, '250, and '241 patents.

the Food Product Patents' claims. *Id.* at 2, 4. I denied Motif's motion because the parties' positions presented a claim construction dispute not suitable for resolution at the pleading stage. *Id.* at 4.

The parties' positions in their claim construction briefs largely mirror the positions taken at the motion to dismiss stage of the case. At that stage, Motif argued that the terms at issue "cover only proteins that are not naturally present in animals." *Id.* Impossible argued that the terms at issue "cover any proteins that are not derived from an animal source, regardless of whether such proteins are chemically identical to those that are naturally present in animals." *Id.*

In its claim construction brief, Motif argues that the term "non-animal heme-containing protein" means "a heme-containing protein that does not have the amino acid sequence of any animal heme-containing protein," and that the term "free of animal heme-containing protein" means "free of any protein that has the amino acid sequence of any animal heme-containing protein." Dkt. No. 120 at 2. Impossible argues that those terms "cover any proteins that are not derived from an animal source, regardless of whether such proteins are chemically identical to those that are naturally present in animals." Dkt. No. 106 at 3.

Impossible's position is more persuasive, for three reasons.

First, the disclosures in the specifications of the Food Product Patents refer exclusively to the sources from which the ingredients in the claimed food products and compositions are derived, rather than whether the ingredients are chemically distinct from ingredients that occur naturally in animals. *See, e.g.*, '096 patent, at col. 2, ll. 43–50 (describing a "plant-derived heme protein"); '306 patent at col. 9, ll. 50–53 (disclosing compositions that "are principally or entirely derived from non-animal sources" as well as those that are "substantially derived from animal sources . . . that are supplemented" with replicas "derived substantially or entirely from non-animal sources"); *id.* at col. 18, ll. 4–6 ("[I]solated and purified proteins can be derived from non-

animal sources such as plants, algae, fungi (e.g., yeast or filamentous fungi), bacteria, or Archaea."); '761 patent, at col. 4, ll. 32–35 ("In some embodiments, said one or more isolated and purified iron-containing proteins are not isolated from an animal. In some embodiments compositions of the invention do not contain any proteins from an animal."); *id.* at col. 4, ll. 47–51 (comparing "said one or more isolated and purified iron carrying proteins" to "a myoglobin protein derived from an animal source"). Motif has pointed to no disclosure in any of the Food Product Patents that suggests that the claims exclude compositions that are derived from non-animal sources but are nonetheless chemically identical to compositions that are naturally present in animals.[4]

Second, the dependent claims of the '096 and '241 patents strongly suggest that the asserted claims are intended to cover proteins that are naturally present in animals but were not derived from animals. For example, claim 2 of the '096 patent recites a composition in which "the heme-containing protein is selected from the group consisting of" several proteins, including "a myoglobin." As Impossible points out, several of the proteins recited in claim 2 are present in both plants and animals, including hemoglobin and myoglobin.[5] Dkt. No. 142 at 2–3. Moreover,

[4] At the claim construction hearing, Motif pointed to the following statement in the specification of the '306 patent: "Without being bound by theory, it is believed that by isolating and purifying non-animal proteins (e.g., plant proteins), consumables can be made with greater consistency and greater control over the properties of the consumable." '306 patent, col. 20, ll. 20–24. That statement does not mean, as Motif contends, that "non-animal proteins" are chemically equivalent to "plant proteins." In the following paragraph, the specification explains that "[t]he isolated and purified proteins can be isolated from one or more other components of a non-animal source." *Id.* at col. 20, ll. 32–33. And the specification adds that the proteins can be "recombinantly produced," by using, for example, "yeast cells." *Id.* at col. 20, ll. 64–67. As is the case throughout the asserted patents, the discussion in column 20 of the '306 patent focuses on the source of the protein, not its chemical makeup.

[5] Motif asserts in its briefing that myoglobin is "intrinsically an animal muscle protein." Dkt. No. 120 at 3 (emphasis omitted). However, the materials cited by Impossible make clear that myoglobin is not found exclusively in animals but may also be found in bacteria, plants, and fungi.

claim 3 of the '096 patent recites a composition "wherein the heme-containing protein comprises [an] amino acid sequence having at least 80% sequence identity to a polypeptide set forth in SEQ ID Nos: 1-26." Dependent claim 7 of the '241 patent includes an identical limitation. The specification of the '096 patent provides that a "heme-containing protein[]" can have at least 70% and up to 100% "sequence identity" with a number of proteins, including "*Bos taurus* (SEQ ID NO:18) myoglobin," i.e., myoglobin that naturally occurs in cattle. '096 patent, col. 10, ll. 7–41. That is, claim 3 of the '096 patent and claim 7 of the '241 patent cover a protein that has "at least 80% sequence identity" with *Bos taurus* myoglobin. The presence of those limitations in the dependent claims is a strong indication that the asserted claims are intended to cover proteins that have the same sequences as proteins that occur naturally in animals, as long as the subject proteins are not derived from an animal source.

Rather than looking to the dependent claims to inform the proper construction of the "non-animal" terms, Motif asserts that the dependent claims are indefinite because they cannot be reconciled with Motif's proposed construction of the independent claims. That is, Motif argues that it is impossible for the claimed proteins to have "no animal products," as Motif construes that term, but also to cover a protein that is chemically identical to one occurring in animals, e.g., *Bos taurus* myoglobin.

The problem with Motif's position regarding the dependent claims is that it assumes its conclusion. That is, Motif starts with the proposition that claim 1 of the '096 patent should be construed to exclude proteins identical to those naturally occurring in animals but having no animal provenance. Based on that assumption, Motif argues that the dependent claims, which include

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Dkt. No. 142-1, Exh. 14, at IF_0014526; *see also* '761 patent, col. 3, ll. 10–15 (referring to "ciliate myoglobins," i.e., myoglobins present in single-celled organisms).

proteins that are identical to proteins that occur naturally in animals, are inconsistent with the independent claim and therefore are indefinite. But if one does not begin with Motif's construction of claim 1, the anomaly goes away, and claims 2 and 3, rather than being indefinite, provide "powerful and direct support" for the proposition that claim 1 covers a protein that has no animal provenance but is identical to a protein that occurs naturally in animals. *See FG SRC LLC v. Xilinx, Inc.*, No. 20-601, Dkt. No. 104 at 6 (D. Del. Feb. 7, 2022).[6]

Third, in its internal documents and submissions to the U.S. Food and Drug Administration, Motif has described its own products, which include bovine myoglobin, as being "non-animal" and as containing "animal-free food ingredients." Dkt. No. 106-1, Exh. 3, at 8 (Motif presentation describing its "food ingredients" as "animal-free"); Dkt. No. 22-2, Exh. 8, at 3 (FDA submission describing Motif's products as containing "[y]east-derived heme protein (non-animal)"). That extrinsic evidence lends further support to the conclusion that a skilled artisan would understand terms such as "non-animal" and "free of animal products" as referring to the provenance of the composition rather than its chemical makeup.

To support its position regarding the "non-animal" terms, Motif points to the prosecution history of the '306 patent. In the course of prosecuting that patent, Impossible agreed to amend the claims to require that the "heme-containing protein" recited in the claims be "non-animal."

[6] In its briefing and at the claim construction hearing, Motif relied on the Federal Circuit's decision in *TVnGO Ltd. (BVI) v. LG Electronics Inc.*, 861 F. App'x 453 (Fed. Cir. 2021). In that case, the Federal Circuit held that the asserted claims were invalid as indefinite because the dependent claims were "irreconcilably inconsistent" with the independent claims. *Id.* at 459. The court acknowledged, however, that dependent claims can be "valuable sources of enlightenment as to the meaning of a claim term." *Id.* at 460 (quoting *Phillips v. AWH Corp.*, 415 F.3d 1303, 1323 (Fed. Cir. 2005) (en banc)). In this case, the dependent claims are inconsistent with the independent claims only under Motif's proposed construction of the disputed terms. If Motif's proposed construction is not assumed to be correct, the dependent claims are strong evidence that Impossible's proposed construction is the better construction.

Dkt. No. 120-1, Exh. 6, at 3. At the same time, Impossible removed references to certain specific compounds, including myoglobin, from one of the dependent claims. *Id.* In Motif's view, the amendment is an admission that the deleted proteins are not "non-animal" proteins. Dkt. No. 120 at 7. It follows, according to Motif, that proteins occurring naturally in animals are outside the scope of the claims regardless of their source. As Impossible points out, however, the amendment deleted proteins that are found in both plants and animals (e.g., myoglobin and peroxidase) and retained proteins that are found in both plants and animals (e.g., hemoglobin). *See* Dkt. No. 120-1, Exh. 6, at 3. The amendment made during prosecution of the '306 patent thus does not support Motif's contention that the amendment amounted to an admission that "non-animal" proteins are those that are chemically distinct from proteins found in animals.

For the above reasons, I will adopt Impossible's proposed constructions of the terms labeled 1–4 in the joint claim construction statement. Those terms will be construed to cover all proteins that were not synthesized inside an animal, with no limitation as to the similarity of those proteins to those naturally occurring in animals. It follows that the terms labeled 5 and 6 in the joint claim construction statement are not indefinite.

B. Limitations Specifying Compounds (Terms 7–14)

Each of the asserted patents includes claims reciting certain compounds as limitations; the parties dispute the scope of those limitations. Claim 1 of the '250 patent is generally representative for purposes of the parties' dispute. That claim recites as follows:

> 1. A meat replica matrix comprising:
>
> one or more plant proteins;
>
> a sugar selected from glucose, ribose, sucrose, fructose, xylose, maltodextrin, and combinations thereof;
>
> at least one sulfur compound selected from methionine, cysteine, and thiamine; and

> 0.01%-5% (by weight of the meat replica matrix) of a non-animal heme-containing protein,
>
> wherein, upon cooking of the meat replica matrix, at least two volatile compounds are generated that are associated with a beef-like aroma.

'250 patent, cl. 1.[7] The parties' dispute centers on the "sugar" and "sulfur compound" limitations. In particular, the parties disagree about (1) whether the "sulfur compound" limitation may be satisfied by a large molecule (e.g., a protein) containing, for example, a sulfur-containing amino acid such as cysteine; and (2) whether the compounds must be added to the meat replica matrix "as a flavor precursor."

With respect to the first point, Impossible asserts in its infringement contentions that the "sulfur compound" element of the claim is satisfied because a sulfur compound is included in the proteins that Impossible identifies as representing the "plant proteins" limitation of the claim. Dkt. No. 120-1, Exh. 20, at 30, 32.[8] That is, Impossible argues that the plant proteins contain amino acids such as cysteine, and therefore the proteins satisfy the "sulfur compound" limitation of the claim. Motif argues that Impossible's contention reflects an improper interpretation of the claim language. Instead, Motif asserts, the "compound" terms should not be interpreted to "read on much larger compositions that comprise [sulfur-containing] compounds as part of their building blocks." Dkt. No. 120 at 18.

The problem for Impossible is that both the claims and the patent specifications draw a distinction between "proteins" and "sulfur compounds." For example, claim 1 of the '250 patent

[7] Other asserted claims, such as claim 1 of the '761 patent, recite sugar and sulfur compounds without limiting the particular compounds that may be selected. '761 patent, cl. 1 (reciting, *inter alia*, "a muscle replica comprising . . . at least one sugar compound and at least one sulfur compound"). That difference in the claim language does not impact my construction of the disputed claim limitations.

[8] The infringement contentions refer to claim 14 of the '306 patent, but the limitations of that claim are equivalent, for purposes of the present dispute, to the limitations of claim 1 of the '250 patent.

recites "plant proteins" and a "sulfur compound" as separate elements of the claim. And in discussing the makeup of skeletal muscle, the specification of the '761 patent explains that skeletal muscle typically consists of, *inter alia*, 19 percent protein and "2.3 percent other soluble *non-protein* substances," such as "sulfur compounds." '761 patent, col. 34, ll. 19–27 (emphasis added). It is clear in view of those disclosures that a protein, which is itself a complex organic compound, is not a "sulfur compound" as that term is used in the asserted claims. Accordingly, the "sulfur compound" limitation must be satisfied by a compound that is present separately from a protein.[9]

With respect to the second point, Motif argues that the language "as a flavor precursor" should be added to the court's constructions of the "compound" terms because the patents' specifications "consistently explain that 'compounds' are flavorants added to foodstuffs to replicate natural meat's flavor/aroma." Dkt. No. 120 at 19. It is true that the specifications of the asserted patents disclose using sugar and sulfur compounds for the purpose of creating a meat-like flavor in the final food product. *See, e.g.*, '096 patent, col. 15, ll. 26–27 (identifying "cysteine and glucose" as flavor precursors); '306 patent, col. 80, ll. 10–50 (identifying compounds present in a "flavor precursor mix"). However, the Federal Circuit has repeatedly cautioned against importing limitations from the specification into the claims. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1323 (Fed. Cir. 2005) (en banc); *Apple Inc. v. Wi-LAN Inc.*, 25 F.4th 960, 969 (Fed. Cir. 2022); *Hill-Rom Servs., Inc. v. Stryker Corp.*, 755 F.3d 1367, 1371–73 (Fed. Cir. 2014). To adopt Motif's construction would be to do exactly that.

[9] I note that Impossible's infringement contentions identify the "plant protein" limitation of the claim being satisfied by a protein powder that is used in the production of Motif's food products. Dkt. No. 120-1, Exh. 20, at 5. If, for example, that protein powder were to also contain sulfur compounds that exist separately from the protein molecules themselves, those compounds could plausibly serve as a basis for satisfying the "sulfur compound" limitation.

Motif also argues that an amendment made by Impossible during prosecution amounts to a disclaimer of compounds that are not used as flavor precursors. In the application that resulted in the '306 patent, Impossible originally sought claims that covered any sugar and any sulfur compound, rather than a limited subset of such compounds. Dkt. No. 120-1, Exh. 21, at 3. The examiner rejected those claims as not satisfying the written description requirement of 35 U.S.C. § 112. The examiner noted that there was insufficient support in the patent for claiming "*any* combination of sugars and sulfur compounds." *Id.* She added, however, that there was support for claiming "sugars including monosaccharides, sugar alcohols," and other categories of sugar compounds, as well as "sulfur compounds including methionine, cysteine and thiamine, when used in combination as part of a flavor precursor mix." *Id.* Impossible then amended the claims to recite specific categories of sugar and sulfur compounds. Dkt. No. 120-1, Exh. 22, at 10.

Motif argues that Impossible's amendment had the effect of disclaiming compounds that were not "used in combination as part of a flavor precursor mix." Dkt. No. 120 at 20. Contrary to Motif's argument, however, it is clear upon reading the file history of the '306 patent that the examiner's section 112 rejection was based on the breadth of the "compound" limitations. That is, the examiner did not believe that the specification supported a claim to any possible sugar or sulfur compound, but agreed that the specification could support a claim reciting certain compounds expressly identified in the specification. *See* Dkt. No. 120-1, Exh. 21, at 3. It is true that the examiner recognized that such compounds were described in the specification as being "part of a flavor precursor," *id.*, but Impossible did not incorporate that use limitation into its amended claims, Dkt. No. 120-1, Exh. 22, at 10. Presumably, if the examiner had felt that a use limitation were necessary to satisfy the written description requirement, she would have rejected Impossible's proposed amended claims on that ground, but she did not. Accordingly, I do not

interpret Impossible's amendment as a disclaimer of compounds not used as a flavor precursor.[10] The "compound" terms will therefore not be construed as being limited to compounds used as flavor precursors.

C. "replica" (Terms 15–17)

Claim 1 of the '761 patent, the only independent claim of that patent, requires, *inter alia*, a "muscle replica" and a "fat tissue replica," wherein the muscle and fat replicas "are assembled in a manner that approximates the physical organization of meat." The parties have three disputes regarding the "replica" terms: (1) whether the requirement that the replicas be assembled "in a manner that approximates the physical organization of meat" renders the claim indefinite; (2) whether the muscle replica and fat tissue replica must be "separate"; and (3) whether the replica may contain any of the actual material being replicated.

1. "approximates the physical organization of meat"

Motif argues that the claims of the '761 patent are invalid due to indefiniteness because a skilled artisan would not understand the "metes and bounds" of the claim limitation requiring the replicas to "approximate the physical organization of meat." Dkt. No. 120 at 11. Impossible argues that the specification provides sufficient guidance as to the scope of that limitation.

[10] For the first time in its sur-reply brief, and again at the claim construction hearing, Motif asserted that a declaration filed during prosecution of the application that became the '306 patent, the "Davis Declaration," amounted to a disclaimer of "trace sugars/sulfurs in plant material." Dkt. No. 148 at 6. Impossible relied on the Davis Declaration to show that a prior art food product contained "no more than 0.15 mM of sulfur-containing free amino acids," Dkt. No. 120-1, Exh. 22, at 18. At the same time, Impossible amended claims 1, 7, and 47 of the application to require a "sulfur compound." *Id.* at 10. The discussion of the Davis Declaration in conjunction with that amendment amounts to, at most, a disclaimer of food products containing only trace amounts of a sulfur compound. It does not bear on the intended use of the sulfur compound. Accordingly, the Davis Declaration does not support reading a "flavor precursor" limitation into the "compound terms."

The Supreme Court has explained that a patent is invalid for indefiniteness "if its claims, read in light of the specification delineating the patent, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014). The Court has recognized that the definiteness requirement "mandates clarity, while recognizing that absolute precision is unattainable." *Id.* at 910. In applying that standard, the Federal Circuit has instructed courts to examine whether the patent provides "objective boundaries" to a skilled artisan regarding the scope of the claims. *Niazi Licensing Corp. v. St. Jude Med. S.C., Inc.*, 30 F.4th 1339, 1347 (Fed. Cir. 2022)

The specification of the '761 patent alludes to the "physical organization" of meat at various points in the "Summary of the Invention" section, and then includes a single paragraph that provides more detail about the meaning of that term. That paragraph recites as follows:

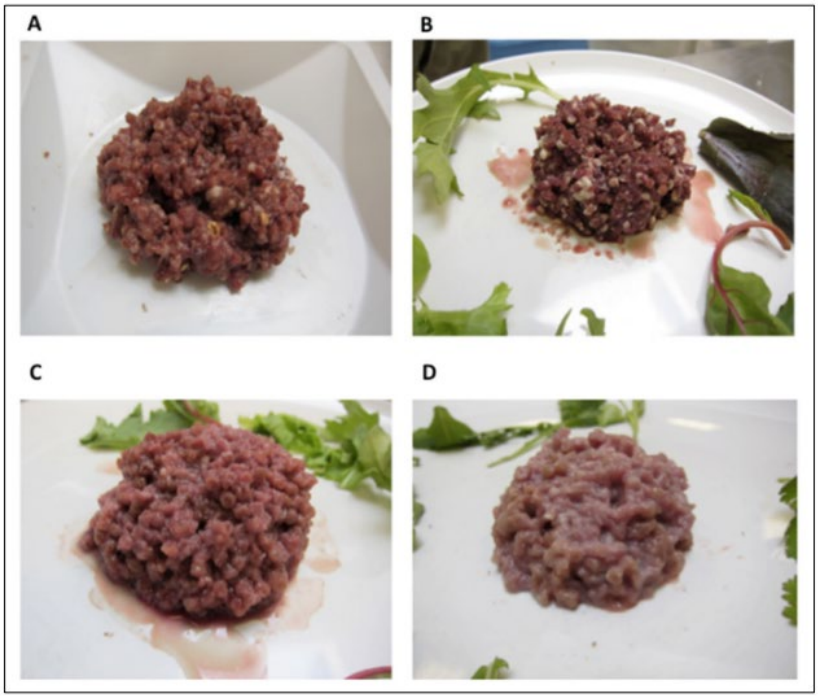
> The physical organization of the meat substitute product can be manipulated by controlling the localization, organization, assembly, or orientation of the muscle, fat, and/or connective tissue replicas described herein. In some embodiments the product is designed in such a way that the replicas described herein are associated with one another as in meat. In some embodiments the consumable is designed so that after cooking the replicas described herein are associated with one another as in cooked meat. In some embodiments, one or more of the muscle, fat, and/or connective tissue replicas are combined in a manner that recapitulate the physical organization of different cuts or preparations of meat. In an example embodiment, the replicas are combined in a manner that approximates the physical organization of natural ground meat. In other embodiments, the replicas are combined in a manner that approximates different cuts of beef, such as, e.g., ribeye, filet mignon, London broil, among others.

'761 patent, col. 23, ll. 24–41.

Essentially, that paragraph informs a skilled artisan that the "physical organization" of the meat refers to some combination of the "localization, organization, assembly, or orientation of the muscle, fat, and/or connective tissue replicas described herein," *id.* at col. 23, ll. 25–27, so as to approximate the physical form of "different cuts or preparations of meat," *id.* at col. 23, ll. 34–36. What is missing, however, is a disclosure of how the replicas could be combined for that purpose,

as well as an objective indication of how closely the replicas must approximate the physical organization of a particular cut of meat.[11]

Impossible argues that Figures 15 and 16 of the '761 patent provide that guidance to a skilled artisan. Those figures depict examples of meat products that were produced in accordance with the disclosures of the '761 patent specification. A colorized version of Figure 15 of the '761 patent is reproduced below.



Dkt. No. 106 at 8.

The problem for Impossible is that although Figures 15 and 16 provide examples of products that approximate the physical organization of meat, there is no objective boundary

[11] In fact, the specification of the '761 patent suggests that such a boundary exists without explaining what that boundary is. For example, the specification notes that prior art meat substitutes "fail[ed] to replicate the experience of cooking and eating meat," in part because those products had "a texture and mouthfeel that are more homogenous than that of equivalent meat products." '761 patent, col. 1, ll. 41–48. In other words, the inventors sought to develop a food product that better approximated the physical organization of meat. But there is no indication whether the physical organization of the prior art food products would resemble meat sufficiently to fall within the scope of the claims of the '761 patent.

defining how closely a particular product must mimic the physical organization of meat to fall within the scope of the claims.[12] For example, a wiffle ball or a white foam ball with stitches printed on it may be said to "approximate the physical organization" of a baseball, but so too might a sheet of paper that has been crumpled into a rough sphere. And as Motif's expert, Dr. Jerrad Legako, pointed out in his declaration, "the phrase 'physical organization of meat' is not a term of art with any specific or recognized meaning in the field of food science." Dkt. No. 122 ¶ 116. To be sure, the '761 patent specification explains that the replicas can be "manipulated" to mimic the physical organization of meat, but it contains no indication of what level of manipulation would be required to sufficiently approximate that physical organization to fall within the scope of the claims.[13] '761 patent, col. 23, ll. 24–41.

Accordingly, the claims of the '761 patent "fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention," and those claims are therefore invalid for indefiniteness. *See Nautilus*, 572 U.S. at 901. Because the claims of the '761 patent are invalid for indefiniteness, I need not address the remaining disputes regarding the "replica" terms.

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[12] An objective boundary could be established by, for example, evidence that a skilled artisan would understand what it means to "approximate" the physical organization of meat. As discussed with respect to the "aroma" terms below, in responding to Motif's indefiniteness arguments regarding the aroma limitations Impossible cited an expert declaration and various pieces of literature to support its contention that a skilled artisan could objectively determine whether a particular compound is "associated" with a beefy or meaty aroma. Impossible has made no such showing with respect to whether a particular composition "approximates the physical organization of meat."

[13] The only other evidence cited by Impossible in support of its position that the limitation is not indefinite is Motif's petition for *inter partes* review ("IPR") of the '761 patent. Impossible argues that the petition shows that "Motif and its expert were able to understand the scope of [the term] with reasonable certainty for purposes of Motif's unsuccessful IPR petition." Dkt. No. 106 at 10. Of course, in an IPR proceeding, the Patent Trial and Appeal Board is not permitted to invalidate claims for indefiniteness, so it is unsurprising that Motif did not contend that the term was indefinite in its IPR petition. *See Samsung Elecs. Am., Inc. v. Prisua Eng'g Corp.*, 948 F.3d 1342, 1350–51 (Fed. Cir. 2020).

D. "a concentration of at least 1.5 mM" (Term 21)

Claim 1 of the '241 patent is a product-by-process claim that recites "[a] meat-like-food product" produced by the method specified in the claim. '241 patent, cl. 1. The claim recites "one or more plant proteins" that are combined with multiple other substances, including "a compound selected from [a group of compounds and mixtures thereof] in a concentration of at least 1.5 mM." *Id.* The parties disagree about whether the concentration is measured before or after the compound is combined with the plant protein to form the "meat-like-food product" and, relatedly, whether the concentration limitation has patentable weight.[14]

A close examination of the '241 patent makes clear that the concentration recited in claim 1 is measured after the compound is added to the claimed food product. It is true that the general structure of the claim, which recites three ingredients that are all combined together with one or more plant proteins, would suggest that the recited concentration refers to the concentration of the compound prior to its being combined with the other ingredients. *See* '241 patent, cl. 1. However, two considerations lead me to conclude that the opposite is the better reading of the claim language. First, the specification uses concentrations to refer to the amount of certain compounds present in a final food product. *See, e.g.*, *id.* at col. 20, ll. 7–15 (describing "[r]eplica burgers" and "[c]ontrol burgers" having compounds present in various concentrations on the order of millimoles). Second, during prosecution of the '241 patent, Impossible sought to distinguish a prior art food product on

[14] In the parties' joint claim construction statement and at the hearing, the parties disputed whether the concentration must be measured "in a liquid composition." Dkt. No. 94-1 at 9. That dispute appears in substance to refer to whether the concentration must be measured before the compound is added to the food product (e.g., as a liquid additive) or after the food product exists in solid form. That dispute is resolved below. Moreover, to the extent that Motif contends that a skilled artisan would not understand how to measure the concentration of an ingredient in a food product, Impossible's evidence makes clear that a skilled artisan would readily be able to do so. *See* Dkt. No. 143 ¶¶ 112–18; Dkt. No. 142-1, Exh. 16 ¶¶ 18–27.

the ground that the product "contain[ed] no more than 0.15 mM" of the recited compounds. Dkt. No. 143 ¶ 117 (citing Dkt. No. 142-1, Exh. 16 ¶ 27). That distinction strongly supports the inference that Impossible intended for the concentration to be measured relative to the end food product, i.e., after the compound is combined with the other ingredients. Although claim 1 is inartfully drafted, the best reading of that claim is that the concentration limitation is measured relative to the final food product.

I next turn to whether the concentration limitation has patentable weight. The Federal Circuit has held that "[i]f the product in a product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 697 (Fed. Cir. 1985). That is, "[t]he patentability of a product does not depend on its method of production." *Id.*; *see also Amgen Inc. v. F. Hoffman-La Roche Ltd*, 580 F.3d 1340, 1366–67 (Fed. Cir. 2009) (collecting cases). The operative question in determining whether a process or source limitation has patentable weight is whether it "result[s] in a new product." *Amgen*, 580 F.3d at 1367. One way of answering that question is to determine whether the limitation provides "structural and functional differences" in the product that are not present in the prior art. *See id.*

In this case, because I have concluded that the concentration limitation of claim 1 of the '241 patent is measured relative to the end food product, the concentration limitation is structural; it recites a specific characteristic of the claimed product rather than a process step that is not entitled to patentable weight. Accordingly, contrary to Motif's contention, the concentration limitation does not lack patentable weight.

E. "food flavor additive composition" (Term 22)

As stated in its preamble, claim 1 of the '096 patent is directed to a "food flavor additive composition." The claim recites (1) that the food flavor additive composition comprises compounds from each of three groups of compounds; (2) that the food flavor additive composition contains no animal products; and (3) that cooking the food flavor additive composition results in the production of at least two volatile compounds having a meat-associated aroma. Motif argues that the term "food flavor additive composition" should be construed to mean "a composition that modulates a food product's flavor and/or aroma when added to the food product."[15] Dkt. No. 120 at 16. Impossible argues that the term should be given its plain and ordinary meaning.

Motif points out that Impossible's infringement contentions make clear that in Impossible's view there are "multiple, unrelated ingredients in Motif's end food products" that together constitute a food flavor additive composition "simply by virtue of being present in the patty." *Id.* at 17 & n.6 (citing Dkt. No. 120-1, Exh. 18, at 1–17) (emphases omitted). Motif disagrees, and argues that a "food flavor additive composition" must be distinct from the food product itself.

Impossible argues that Motif's construction is incorrect because it creates a "temporal requirement for when the [food flavor additive composition] becomes a [food flavor additive composition]." Dkt. No. 142 at 6–7. Specifically, Impossible contends that, under Motif's construction, a composition is a "food flavor additive composition" when "only the three recited

[15] In the joint claim construction statement, Motif proposed construing the term to mean a "composition added to a food product to modulate flavor and/or aroma." Dkt. No. 94-1 at 9. In its claim construction answering brief, Motif clarified its proposed construction to indicate that Motif was not attempting to import a method step (i.e., that the composition must actually be added to a food product) into a composition claim; instead, Motif explained, the term refers to "a composition that modulates a food product's flavor and/or aroma **when** added to the food product." Dkt. No. 120 at 16 (emphasis in original).

components are present and the (non-existent) method step of 'adding' the [composition] to some other food has not happened yet." *Id.* at 7.

Motif's proposed construction is plainly correct. As the specification of the '096 patent explains, a "flavor additive composition" is one that is "add[ed] to another consumable food product before, during, or after its cooking process." '096 patent, col. 3, ll. 32–37. That is, in order to be a "food flavor additive composition," the composition must be one that can be added to a food product to modulate the product's flavor and/or aroma. It is not sufficient that the three recited compounds are present in the end food product. Nor do the claims require that the food flavor additive composition actually be added to a food product; an infringing composition need only be a composition comprising the three recited compounds, not containing any animal products, and capable of producing, when cooked, at least two volatile compounds having a meat-associated aroma.

F. "aroma" (Terms 23–25)

The asserted claims of the '096 and '241 patents recite compositions or food products, respectively, the cooking of which "results in the production of at least two volatile compounds which have a meat-associated aroma." Similarly, the asserted claims of the '306 and '250 patents recite a "meat replica matrix" or methods for producing such a matrix, where the matrix generates "at least two volatile compounds . . . that are associated with a beef-like aroma" upon cooking. The preambles of claims 14 and 27 of the '306 patent further state that those claims are directed to "method[s] for making a meat replica matrix having a beef-like aroma." Impossible argues that the "aroma" terms should be given their plain and ordinary meanings. Motif argues that the terms render the asserted claims of the '096, '241, '306, and '250 patents indefinite. The parties also dispute whether the preambles of the asserted claims of the '306 patent are limiting.

Motif asserts that the "aroma" terms are indefinite because the patent specifications do not "provide clarity about which [compounds] are 'associated' with 'meat' or 'like' 'beef.'" Dkt. No. 120 at 21. Moreover, Motif's expert, Dr. Legako, stated in a declaration that the phrases "meat-associated aroma" and "beef-like aroma" do not "have a singular ordinary meaning in the field of food and meat science." Dkt. No. 122 ¶ 126.

Impossible disagrees, arguing that the intrinsic evidence and literature in the field both "discuss compounds that contribute to a 'beef-like' or 'meat-associated' aroma." Dkt. No. 142 at 9. In particular, Impossible points to a declaration submitted during prosecution of the '241, '096, and '306 patents that identified 28 compounds that "possess meaty aromas," including two compounds that are "well-known to possess meaty sensory characteristics and to be important and potential odorants and cooked meat." Dkt. No. 142-1, Exh. 20 ¶ 15; *see also* Dkt. No. 106-1, Exh. 10 ¶ 12. Impossible and its expert, Dr. Paul Sarnoski, also identified scientific literature identifying compounds that were associated with meat-associated and/or beef-like aromas. Dkt. No. 143 ¶¶ 141–43 (citing Dkt. No. 143-1, Exh. F, at IF_0014028; and Dkt. No. 142-1, Exh. 22, at 243–44). Based on those materials, a skilled artisan would likely be able to ascertain whether a particular compound is associated with a meat or beef-like aroma.

In his declaration, Dr. Legako acknowledged that "meat and beef flavors and aromas have been discussed for decades in food science and meat science literature." Dkt. No. 122 ¶ 127. His opinion, however, was that "there is no set definition delineating a consensus as to what th[o]se terms encompass." *Id.* He cited two examples of references that appear to identify compounds that are sufficiently "meaty" or "beeflike" for purposes of the specific contexts of those references. *Id.* ¶¶ 128–29. In view of those references, Dr. Legako concluded that "what qualifies as sufficiently 'beef-like' or 'meat-associated' may differ from one paper to the next." *Id.* ¶ 130.

The problem for Motif is that, as Dr. Legako acknowledges, there are references that "in some cases" provide a delineation of compounds that are associated with a meat or beef aroma that is not specific to the context of a particular study. *Id.* ¶ 127. Two examples would appear to be the materials cited by Dr. Sarnoski, which on their face are not limited to any particular context or study, but instead generally identify compounds that are associated with particular aromas. *See* Dkt. No. 142-1, Exh. 22, at 243–44 (a book chapter authored by Motif's expert, Robert McGorrin, identifying "Character-Impact Flavor Compounds in Meats and Fish"); Dkt. No. 143-1, Exh. F, at 30–31 (identifying 25 compounds that have been "reported to possess a meaty odour" in the literature). A skilled artisan would look to references such as those in searching for an objective identification of compounds that are associated with a meat or beef aroma. The fact that some other references may identify compounds associated with "meaty" or "beefy" aromas in a way that is context-dependent does not render the claims indefinite.

Motif also contends that the terms "meat-associated" and "beef-like" are subjective because they do not provide an objective boundary for how similar to meat or beef a particular aroma must be.[16] That contention is unpersuasive. In the context of the asserted claims, it is clear that the use of the words "associated" and "like" are intended to convey that the aromas do not derive from actual meat or beef, but rather occur in a non-animal-based product. Dkt. No. 143 ¶ 135. The question for a skilled artisan is whether there are compounds that are associated with

[16] The Federal Circuit's decision in *In re Walter*, 698 F. App'x 1022 (Fed. Cir. 2017), cited by Motif, is inapposite. In that case, the court held that the term "block-like" rendered the claims at issue indefinite because there was no "accompanying guidance in the intrinsic record for determining its scope." *Id.* at 1026. In particular, the court focused on the fact that the prosecution history described the term "in different and often inconsistent ways." *Id.* at 1027. Here, there is substantial guidance in the prosecution history and in the relevant art on which a skilled artisan could rely in ascertaining the scope of the claims.

a meaty or beefy aroma present in the claimed composition or food product.[17] Whether a particular compound has that association is a factual question that can be objectively resolved with reference to the pertinent literature or the knowledge of a skilled artisan. Accordingly, the "aroma" terms are not indefinite.[18]

As to the preambles of claims 14 and 27 of the '306 patent, which recite "method[s] for making a meat replica matrix having a beef-like aroma," the parties disputed in their joint claim construction statement whether those preambles are limiting. Dkt. No. 94-1 at 9. However, the parties' briefs do not discuss the issue of whether the preambles are limiting in any detail. Nonetheless, it is clear that the preambles of those claims are not limiting.

Generally, the preamble to a claim does not limit the scope of the claim. *See Georgetown Rail Equip. Co. v. Holland L.P.*, 867 F.3d 1229, 1236 (Fed. Cir. 2017). However, a preamble may be limiting if it recites essential structure or steps, or is necessary to give life, meaning, and vitality to the claim. *See Catalina Mktg. Int'l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002); *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305 (Fed. Cir. 1999). For example, the Federal Circuit has held that a preamble is limiting when the preamble "supplies the

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[17] Along the same lines, Motif argued in its sur-reply brief and at the claim construction hearing that a skilled artisan may have trouble defining whether certain food products are properly classified as "meat." *See* Dkt. No. 148 at 6 n.2. For example, Motif suggests that adherents of different religions might reach different conclusions about whether fish is meat. That suggestion, raised belatedly, does not bear significantly on the question whether the "aroma" terms are indefinite. If the question whether the claim term "meat" includes fish (or other substances) becomes relevant in the course of this litigation, the term can be construed at that time.

[18] I note that this conclusion is consistent with the findings of the European Patent Office ("EPO") in an opposition decision regarding similar claims. In that decision, the EPO rejected the argument that "the taste and smell of a meat substitute are a subjective perception only and cannot be assessed with sufficient accuracy by the skilled person working in the field of food science and technology without undue burden." Dkt. No. 120-1, Exh. 23, at 10. Although the EPO invalidated the claims at issue, it did so on the ground that the specification did not offer a "clear and complete teaching . . . on how the claimed technical effect can be achieved" (i.e., there was insufficient enablement). *Id.* at 9.

only structure of the claimed device" and the body of the claim "simply describes the actions taken by the invention." *SIMO Holdings, Inc. v. Hong Kong uCloudlink Network Tech. Ltd.*, 983 F.3d 1367, 1375–76 (Fed. Cir. 2021). On the other hand, "a preamble is not limiting where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention." *Arctic Cat Inc. v. GEP Power Prod., Inc.*, 919 F.3d 1320, 1328 (Fed. Cir. 2019) (cleaned up).

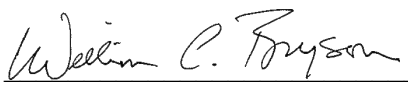
The preambles of claims 14 and 27 of the '306 patent plainly fall into the latter category. The preambles do not provide essential steps to the claimed methods, nor do they give "life, meaning, and vitality" to the claims. *Catalina*, 289 F.3d at 808. Rather, they simply "state a purpose or intended use" for the claimed methods. *See Arctic Cat*, 919 F.3d at 1328. Accordingly, those preambles are not limiting.

* * * * *

I note that many of the parties' materials regarding claim construction have been filed under seal. Accordingly, in an abundance of caution, this order has been filed under seal. Within three business days of the issuance of this order, the parties are directed to advise the court by letter whether they wish any portions of the order to remain under seal, and if so which portions. Any request that portions of the order should remain under seal must be supported by a particularized showing of need to limit public access to those portions of the order.

IT IS SO ORDERED.

SIGNED this 15th day of August, 2023.



WILLIAM C. BRYSON
UNITED STATES CIRCUIT JUDGE