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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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Ex parte STEPHEN PATRICK O'HARA

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Appeal 2023-003678
Application 15/034,500
Technology Center 1600

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Before DONALD E. ADAMS, ULRIKE W. JENKS, and RACHEL H. TOWNSEND, *Administrative Patent Judges.*

TOWNSEND, *Administrative Patent Judge.*

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the Examiner's decision to reject claims to a composition comprising *Lactobacillus plantarum* 2830 and a galactooligosaccharide (GOS) as being directed to patent-ineligible subject matter. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

[1] "Appellant" refers to "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as PROBIOTIX HEALTH LIMITED. (Appeal Br. 3.)

STATEMENT OF THE CASE

Appellant's Specification notes that "[p]robiotics are bacteria which confer health benefits to a host." (Spec. 1.) "Typically, cultures of probiotic bacterial strains are consumed or administered to individuals in order to supplement the naturally occurring bacteria population of the gut." (*Id.*)

"Lactobacilli are common probiotics in d[ai]ry products." (Spec. 1.) "[I]t has been estimated that only 2% of Lactobacilli dose survives . . . in the gut."(*Id.*)

"Prebiotics are non digestible food ingredients that are selectively metabolised by colonic bacteria which contribute to improved health." (Spec. 1.) Prebiotics are "fermented by intestinal microflora and selectively stimulate[] the growth and/or activity of intestinal bacteria associated with health and well-being." (*Id.* at 2) "[T]heir use can promote beneficial changes within the indigenous gut microbial milieu and they can therefore help survivability of probiotics." (*Id.* at 1) GOS has been demonstrated to be a prebiotic. (*Id.*) Prior to the present invention "no prebiotic for Lactobacilli exist[ed]" (*Id.* at 2)

CLAIMED SUBJECT MATTER

Claims 1–3, 7, 9, 10, and 13 are pending on appeal. Claim 1, reproduced below, illustrates the claimed subject matter:

> 1. A composition comprising a strain of *Lactobacilli* having an elevated bile salt hydrolase activity and a galactooligosaccharide; wherein the strain is *Lactobacillus plantarum* 2830 (ECGC 13110402),
> wherein the galactooligosaccharide is produced by the strain by reverse β-galactosidase reaction,
> and wherein the composition further comprises an excipient and/or carrier compound;

the composition is in the form of a food stuff or a food additive;
the *Lactobacillus plantarum* 2830 is freeze-dried;
the composition further comprises at least one selected from: vitamins, minerals, phytochemicals and/or antioxidants; or a combination thereof.

REJECTION

The following rejection by the Examiner is before us on appeal:

Claims 1–3, 7, 9, 10, and 13 are rejected under 35 U.S.C. § 101 because the claimed invention is directed to a judicial exception (i.e., a law of nature, a natural phenomenon, or an abstract idea) without significantly more.

DISCUSSION

I. The Dispute

The Examiner found that claim 1 is drawn to a product of nature. (Final Action 6.) In particular, the Examiner noted that GOS is a natural product. (*Id.*). In addition, the Examiner noted that the *Lactobacillus* strain *Lactobacillus plantarum* 2830 "capable of producing galactooligosaccharides" is a natural product. (*Id.*) According to the Examiner, "regardless of the specific type of reaction used to produce the galactooligosaccharide," the claimed strain of *Lactobacillus* "can inherently produce galactooligosaccharides." (Ans. 18–19 (citing Gobinath et al., *Permeabilized probiotic Lactobacillus plantarum as a source of beta-galactosidase for the synthesis of prebiotic galactooligosaccharides*, 36 Biotech. Letter, 153–57, (2014).) According to the Examiner: "[t]he inventor did nothing to the strain which would change it genetically or structurally." (*Id.* at 8–9.) Thus, the Examiner concluded that "[t]he claims are just drawn

to natural products which are the strain itself and the galactooligosaccharides it produces." (Final Action 6.)

Alternatively, the Examiner found that "[s]ecreted GOS is not structurally distinct from other GOS found in nature." (Ans. 11.)

The Examiner then determined that where the claim breadth "is to a composition comprising the strain and GOS. As discussed above, this combination is found in nature, for example, milk found in nature." (*Id.*) The Examiner stated that "raw milk has lactobacillus present" and noted "[t]he claims currently encompass all applications for that strain and its GOS." (*Id.* at 18)

The Examiner determined further that the limitations that the composition include an excipient or carrier compound and at least one of vitamins, minerals, phytochemicals, and antioxidants, do not render the composition claim patent eligible because they "do not amount to anything that would be considered significantly more." (Final Action 6–7.) The Examiner explained that the excipient or carrier is a medium in which the cells are suspended and can be water. (Ans. 17.) The Examiner noted that the addition of water does not change the structure and/or function of the composition. (*Id.*) The Examiner further noted that vitamins, minerals, phytochemicals, and antioxidants are also natural products that commonly exist in nature and "are either produced by microorganisms such as *Lactobacillus* or found in the medium surround such strains." (*Id.* at 18.) The Examiner, thus, concluded that these elements that would be present naturally along with the *Lactobacillus* strain claimed fail to add anything that would be considered significantly more. (*Id.*)

Regarding the limitation that the *Lactobacillus plantarum* 2830 is freeze dried, the Examiner found that "[t]here has been no evidence presented that [doing so] markedly alters the function and/or structure of the strain" from what is present in nature. (Ans. 15.)

Finally, regarding the limitation that the composition is in the form of a food stuff or a food additive, the Examiner found that labeling the composition as such "does not further limit the invention to a practical application" or amount to something significantly more than the judicial exception. (Ans. 17.) The Examiner so concluded because "the structure/function of the composition has not been altered in a way that would distinguish it from the natural product." (*Id.*)

The Examiner stated "the claims as a whole do not recite something markedly different than the judicial subject-matter eligibility exception of natural products." (Final Action 6.)

The Examiner urged that the claim is similar to those found patent ineligible in *Funk Brothers Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127 (1948) in that there is no evidence that putting together the bacterial strain "and the galactooligosaccharides that it produces" "gives a new emergent property, which would render them markedly different from the natural product." (Final Action 7.) The Examiner noted that in *Funk Brothers*, "the Supreme Court held that merely combining natural products was not enough to make the combination eligible, because each product continued to act independently when within the combination." (*Id.*)

The Examiner distinguished the claim on appeal from that found patent eligible in *Diamond v. Chakrabarty*, 447 U.S. 303 (1980), i.e., bacterium in which two exogenous plasmids were introduced resulting in a

bacterium expressing proteins that were exogenous to the bacterium. (Ans. 11.) The Examiner explained that the *Lactobacillus* strain claimed is a "structurally unaltered strain" that produces galactooligosaccharides using an enzyme process endogenous to the strain. (*Id.*) The Examiner concluded that "the strain and its product are all endogenous to a strain of bacteria found in nature." (*Id.*)

Appellant argues that the Examiner's conclusion that the claimed composition is a product of nature is erroneous. (Appeal Br. 6.) In particular, Appellant explains that the requirement that the GOS present in the composition is produced by the *Lactobacillus* strain by reverse β-galactosidase reaction renders the composition one that is not found in nature. (*Id.*) Appellant notes that

> As disclosed in the Specification, "[o]rdinarily, B-galactosidases would digest lactose. However, by changing the reaction conditions, in terms of Substrate and temperature, the enzyme acts reversibly and generates an oligosaccharide version of the lactose [galactooligosaccharides]."

(*Id.*(citing Spec. ¶ 58).) In other words, argues Appellant, "the claimed GOS is created by Lactobacillus plantarum only under artificial conditions that enable the strain to act in an unnatural way." (Reply Br. 4.) In short, "*Lactobacillus* GOS is a product of a reaction that does not occur in nature." (*Id.* at 5.) Appellant points out "the function of at least one component of the strain is altered to produce the galactooligosaccharide." (Appeal Br. 7.) Appellant notes "[t]he strain is then combined with the non-natural galactooligosaccharide" which strain "has an 'optimized metabolism' to metabolize it" because the GOS was "generated by [that] specific strain." (*Id.*)

Appellant argues that, prior to modifying the reaction conditions to get the claimed *Lactobacillus* strain to produce GOS by reverse β-galactosidase, no prebiotic for *Lactobacilli* existed. (*See, e.g.,* Spec. 2:6, Appeal Br. 5, Reply Br. 5–6.) Thus, explains Appellant, the claimed composition includes a specific GOS that is not present in nature and the claim is thus directed to a non-natural combination, i.e., a man-made combination of *Lactobacillus plantarum* 2830 and GOS produced by the strain by reverse β-galactosidase reaction. (Appeal Br. 8.) Appellant further argues that "[a]s will be appreciated by one of skill in the art, *Lactobacillus* GOS would have a unique structure as compared to GOS of other species." (Reply Br. 4.) In particular, Appellant notes that "GOS can be created at different polymer lengths and bond orientations to yield widely different structures that are unique to the species that created it." (*Id.*)

Appellant further notes that "it will be appreciated that there is variability in GOS produced by different processes." (*Id.*) Appellant explains

> As stated in the present specification, "[t]he GOS prebiotic generated by a specific strain has optimised metabolism not just to produce the GOS, but also to metabolise it" (page 13, lines 7-8 of the as-filed Specification). The only way in which a particular GOS composition can be a selective prebiotic for a given strain is if it was structurally distinct from other GOS compositions.

(*Id.* at 4–5.) In light of the foregoing, Appellant urges that "the Examiner's assertion that 'secreted GOS is not structurally different from other GOS found in nature' is wrong." (*Id.* at 5.)

Appellant further explains that the use of the GOS made by the reverse enzyme reaction as claimed in combination with the strain that makes the GOS by that process "provides an advantage" over the

combination of the specific strain of bacteria combined with a different GOS, and provides evidence demonstrating that. (Appeal Br. 8.) In particular, Appellant notes that because the GOS produced as required by the claim is specific for the strain, the strain metabolizes it in an optimum manner. (*Id.*) The demonstration of this, explains Appellant, is provided for in "Exhibit B, which was presented to the Office November 17, 2020." (*Id.*) Appellant notes that the composition that includes *L. plantarum* and the GOS made according to the reverse enzyme reaction by *L. plantarum* (which Appellant refers to as a "specific galactooligosaccharide") achieves higher cholesterol reduction than a composition that includes *L. plantarum* and GOS obtained from a bifidobacterium. (*Id.* at 8–9.)

Appellant makes additional arguments as to why additional ingredients recited in the claim renders the claim a non-natural product and "ensure the claims are eligible." (*Id.* at 9–10.) We need not address them in arriving at our conclusion that the Examiner's rejection is in error.

II. Framework for Analysis

35 U.S.C. § 101 defines patent-eligible subject matter. An invention is patent-eligible if it claims a "new and useful process, machine, manufacture, or composition of matter." 35 U.S.C. § 101. The Supreme Court, however, has carved out exceptions to what would otherwise appear to be within the literal scope of § 101, e.g., "[l]aws of nature [and] natural phenomena" such as products of nature that are considered "building blocks of human ingenuity." *Alice Corp. v. CLS Bank Int'l*, 573 U.S. 208, 216 (2014) (internal quotations omitted) (citing *Ass'n for Molecular Pathology v. Myriad Genetics, Inc.*, 569 U.S. 576, 590 (2013) and *Mayo Collaborative Servs. v.*

Prometheus Labs, Inc., 566 U.S. 66, 89 (2012)). "[T]he 'manifestations of laws of nature' are 'part of the storehouse of knowledge,' 'free to all men and reserved exclusively to none.'" Manual of Patent Examiner Procedure ("MPEP") § 2106.04 (b) (quoting *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127, 130 (1948)). "When a law of nature or natural phenomenon is claimed as a physical product, the courts have often referred to the exception as a 'product of nature.'" MPEP § 2106.04(b)(II).

The Supreme Court has established a two-step framework for "distinguishing patents that claim laws of nature, natural phenomena, and abstract ideas from those that claim patent-eligible applications of those concepts." *Alice*, 573 U.S. at 217. "First, we determine whether the claims at issue are directed to" a patent-ineligible concept. *Id.* If so, "we consider the elements of each claim both individually and 'as an ordered combination' to determine whether the additional elements 'transform the nature of the claim' into a patent-eligible application." *Id.* (quoting *Mayo*, 566 U.S. at 78–79).

The United States Patent and Trademark Office ("PTO") issued the 2019 Revised Patent Subject Matter Eligibility Guidance ("Guidance"), indicating how the PTO would analyze patent eligibility under the Supreme Court's two-step framework. 84 Fed. Reg. 50–57 (January 7, 2019).[2]

Under the Guidance, in determining what concept the claim is "directed to," we first look to whether the claim recites any judicial exceptions, including laws of nature, natural phenomena, and/or abstract

[2] The Office issued further guidance on October 17, 2019, clarifying the Guidance. USPTO, October 2019 Update: Subject Matter Eligibility (the "October 2019 Update").

ideas. (Guidance, 84 Fed. Reg. at 53–54.) ("Step 2A, Prong One"). If it does, then we look to whether the claim recites additional elements that integrate the recited judicial exception into a practical application. (*Id.* at 54–55 (citing MPEP § 2106.05(a)–(c), (e)–(h)).) ("Step 2A, Prong Two").

Only if a claim (1) recites a judicial exception and (2) does not integrate that exception into a practical application, i.e., it is found to be "directed to" a judicial exception, do we then look to whether the claim contains an "'inventive concept' sufficient to 'transform'" the claimed judicial exception into a patent-eligible application of the judicial exception. Guidance, 84 Fed. Reg. at 56; *see also Alice*, 573 U.S. at 221 (quoting *Mayo*, 566 U.S. at 82).

Claims alleged to be patent-ineligible because they recite products of nature are properly analyzed under the framework of the Guidance. *See* Guidance, 84 Fed. Reg. at 54 n.20 ("This notice does not change the type of claim limitations that are considered to recite a law of nature or natural phenomenon. For more information about laws of nature and natural phenomena, including products of nature, *see* MPEP 2106.04(b) and (c).") (Emphasis omitted.)

Applying the Guidance, we do not agree with the Examiner's conclusion that the claims on appeal are directed to patent-ineligible subject matter.

STEP 2A, Prong One:

In Step 2A, Prong One of the Guidance, we evaluate whether claim 1 recites a judicial exception, i.e., whether it sets forth or describes a product of nature in accordance with the guidance in MPEP § 2106.04 (b) and (c).

Guidance, 84 Fed. Reg. at 54; October 2019 Guidance, available at *https://www.uspto.gov/PatentEligibility*.

a. Product of Nature Analysis

We agree with the Examiner that claim 1 can be interpreted in two different manners. (*See, e.g.*, Ans. 11 ("breadth of the claims encompasses the strain comprising endogenous GOS present in the strain produced using an enzyme process endogenous to the strain" and "the breadth of the claims also encompasses the strain and secreted GOS").) One interpretation is that the composition includes *Lactobacillus plantarum* 2830 and GOS produced by the strain by reverse β-galactosidase reaction as a separate compound from the bacterium. The second interpretation is that the composition includes *Lactobacillus plantarum* 2830 and the GOS produced by the strain by reverse β-galactosidase reaction is within the strain.

There can be no question that under either interpretation Appellant's claimed composition includes at least one product derived from nature, i.e., *Lactobacillus plantarum* 2830.

The Examiner also contends that the GOS is derived from nature as well. While it is true that the claimed GOS is made by an enzymatic process of the *Lactobacillus plantarum* 2830, there is a dispute as to whether that makes the claimed GOS a product of nature subject to analysis under 35 U.S.C. § 101. Appellant urges that it is not. (Appeal Br. 5.) Appellant's Specification explains that the β-galactosidase naturally present in the claimed bacterium strain would, in its natural condition, ordinarily digest lactose, not generate an oligosaccharide. (Spec. 9:1–5.) While the bacterium has the capability of generating an oligosaccharide from lactose via the β-galactosidase that is endogenous to it, the reaction conditions must be

manipulated to something that is not present in nature in order for that to occur. (*Id.*; *see also* Reply Br. 6 ("the creation of GOS requires unnaturally high concentrations of lactose that are not present in nature").)

The Examiner asserts that Gobinath provides evidence that *Lactobacillus plantarum* and GOS made thereby exist together in nature. We do not agree. Gobinath teaches that permeabilized *L. plantarum* was used in the experiments to synthesize GOS. (*See, e.g.*, Gobinath 153, 156.) However, Gobinath describes experiments in which lactose concentration and temperature were manipulated to achieve GOS synthesis via transgalactosylation via endogenous β-galactosidase instead of hydrolysis of the saccharide carbon source. (*Id.*) The Examiner has not established with evidence that permeabilized *L. plantarum* exists in nature or that natural temperature conditions and lactose concentrations in nature would result in the presence of *L. plantarum* and the GOS made via its endogenous β-galactosidase together in the bacterium, much less outside of it.

In addition to the foregoing, the Examiner has not established that any GOS that may exist in nature is the same as the GOS made by reverse β-galactosidase reaction in *L. plantarum*. Appellant explains that "GOS can be created at different polymer lengths and bond orientations to yield widely different structures that are unique to the species that created it" and that this would have been appreciated by one of skill in the art. (Reply Br. 4.)

In light of the foregoing, although we agree with the Examiner that the claimed bacterial strain is a product of nature, we do not agree that the GOS produced by that claimed bacterial strain by reverse β-galactosidase reaction is "naturally produced by a natural strain" or that the claimed strain and the claimed GOS "are naturally occurring in combination" (Ans. 8).

What the Examiner refers to as a "new environment" that results in the production of GOS by reverse β-galactosidase reaction is an environment manipulated by man to achieve a particular function of the bacteria that is not natural to it, i.e., producing GOS by reverse β-galactosidase reaction. Consequently, we are not simply faced with, as the Examiner has suggested (*see* Final Action 7), a claim composition in which two natural products are combined.

The evidence of record establishes that there is no naturally occurring composition that includes *Lactobacillus plantarum* 2830 and GOS made by reverse β-galactosidase reaction by that bacterial strain either as part of the strain or as a separate component of the composition. Nevertheless, the composition does recite a product of nature, i.e., *Lactobacillus plantarum* 2830. Thus, we turn now to the next step in the analysis, whether the claimed nature- based composition has markedly different characteristics.

b. Markedly Different Characteristics Analysis

"Where the claim is to a nature-based product produced by combining multiple components . . . , the markedly different characteristics analysis should be applied to the resultant nature-based combination, rather than its component parts." MPEP § 2106.04(c)(I)(A). Markedly different characteristics can be expressed as the product's structure, function, and/or other properties, and are evaluated based on what is recited in the claim on a case-by-case basis. *See* MPEP § 2106.04(c)(II).

The analysis compares the claimed mixture to the appropriate counterpart. Here, the appropriate counterpart is the claimed bacterial strain by itself.

Appellant argues that the combination of the *L. plantarum* strain with the GOS made by reverse β-galactosidase reaction of the *L. plantarum* strain does not exist in nature and that the combination "forms a synbiotic that creates a highly selective environment for the probiotic." (Appeal Br. 5–6.) The Examiner does not respond to this markedly different characteristic argument because the Examiner erroneously concluded that GOS made by *L. plantarum* is a natural product.

As noted above, under one interpretation, the claim includes *L. plantarum* and GOS within it made by reverse β-galactosidase reaction of the *L. plantarum*. For the reasons discussed above, we conclude that such a composition is markedly different from *L. plantarum* that exists in nature because GOS would not be present in *L. plantarum* in its natural environment. That is, there is a structural difference between *L. plantarum* in its natural environment and the claimed composition.

Under a second interpretation, the claim includes *L. plantarum* and GOS made by reverse β-galactosidase reaction of the *L. plantarum* together with the *L. plantarum.* As noted above, Appellant argues that this "forms a synbiotic that creates a highly selective environment for the probiotic." (Appeal Br. 6.) Appellant's argument however is not supported by any evidence demonstrating a marked difference in characteristic between *L. plantarum* without GOS made by reverse β-galactosidase reaction of the *L. plantarum*. The Specification states that the following experiment was undertaken "4. Compare survival and growth of lactobacilli in the absence and presence of the prebiotic in a series of 'gut model' experiments that test the probiotics and synbiotics." (Spec. 9.) However, there is no data demonstrating what the results of such testing were. Consequently, there is

not sufficient evidence of record to establish a markedly different characteristic.

In light of this, we turn to Step 2A Prong Two of the analysis to determine whether the claim as a whole integrates the recited judicial exception into a practical application.

STEP 2A, Prong Two:

A claim that integrates a judicial exception into a practical application will apply, rely on, or use the judicial exception in a manner that imposes a meaningful limit on the judicial exception, such that the claim is more than a drafting effort designed to monopolize the judicial exception. We find such integration under the interpretation of the claim that includes *L. plantarum* and GOS made by reverse β-galactosidase reaction of the *L. plantarum* being together with but not as part of the *L. plantarum*. In particular, as noted above, Appellant explains that "GOS can be created at different polymer lengths and bond orientations to yield widely different structures that are unique to the species that created it." (Reply Br. 4) Thus, Appellant notes that "[a]s will be appreciated by one of skill in the art, *Lactobacillus* GOS would have a unique structure as compared to GOS of other species." (Reply Br. 4.)

Moreover, Appellant provides evidence that the use of the GOS from *L. plantarum* in combination with the strain that makes the GOS by that process "provides an advantage" over the combination of the specific strain of bacteria combined with a different GOS, namely "Exhibit B, which was presented to the Office November 17, 2020." According to the publication "Development of a Targeted Synergistic Synbiotic for Lactobacillus plantarum LP-LDL," GOS from crude cell extracts of *L. plantarum* LP-LDL

when combined with *L. plantarum* LP-LDL significantly reduced cholesterol in the human faecal microbiome batch culture which was not observed when GOS from Bifidobacteria was used. In light of the description in Gobinath, we understand that the GOS from crude cell extracts of *L. plantarum* were produced by a reverse β-galactosidase reaction.

For the foregoing reasons, we conclude that the combination of elements integrates the judicial exception into a practical application.

As such, under either interpretation of the claim, we conclude that the claimed invention is more than a product of nature, and we reverse the Examiner's rejection of the claims 1–3, 7, 9, 10, and 13 under 35 U.S.C. § 101 as being directed to a judicial exception.

DECISION SUMMARY

The following table summarizes our decision:

Claim(s) Rejected	35 U.S.C. §	Reference(s)/ Basis	Affirmed	Reversed
1–3, 7, 9, 10, 13	101	Eligibility		1–3, 7, 9, 10, 13

REVERSED