No. 12-398

IN THE

Supreme Court of the United States

THE ASSOCIATION FOR MOLECULAR PATHOLOGY, *et al.*,

Petitioners,

v.

MYRIAD GENETICS, INC., *et al.*,

Respondents.

ON WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

BRIEF FOR THE BOSTON PATENT LAW ASSOCIATION AS *AMICUS CURIAE* IN SUPPORT OF RESPONDENTS

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THE BOSTON PATENT LAW ASSOCIATION'S INTEREST

The Boston Patent Law Association ("BPLA") is a nonprofit association of intellectual property attorneys and professionals who serve a broad range of clients that rely on the patent system, such as inventors, corporations, investors, universities, and research hospitals. These clients operate in an equally broad range of industries, including life sciences, high-tech, and traditional manufacturing.

The BPLA is concerned that denying patent eligibility to personalized medicine inventions, such as those at issue in this case, will hinder the development of better diagnostics and therapies, cripple the biotechnology industry, and discourage innovation generally.

Pursuant to F.R.A.P. 29(a), the BPLA has received the consent of all parties to file this *amicus* brief.[1]

SUMMARY OF ARGUMENT

This Court has posed the question for review as whether "human genes" constitute patent eligible subject matter within the meaning of 35 U.S.C. § 101. Congress, however, has already recognized that isolated human

1. This brief is solely the work of the BPLA and reflects its consensus view but not necessarily the view of any individual member or client. The BPLA's counsel in this matter contributed their time in preparing this brief *pro bono*. The BPLA funded all printing and other costs incurred in submitting this brief. No party or their counsel funded or prepared this brief in whole or in part nor made any financial contribution intended to fund this brief.

"genes" are patent eligible and, given the opportunity during the recent debate on patent reform, declined to exclude so-called "gene patents" from patent eligibility under § 101.

Further, the United States Patent and Trademark Office has, for at least the last three decades, issued "gene patents," and the biotechnology industry and others have come to rely on them. Thus, any sweeping contraction of the scope of patentable subject matter in this area, which would unsettle the expectations of the public based on thirty years of Patent Office practice, should be left to Congress, which has already initiated an investigation of the impact of the *Myriad* case and genetic testing patents in general.

Rather, this Court would provide a great service to the public by clarifying the legal principles underlying a §101 analysis as applied to biological products, including by reaffirming the approach of *Chakrabarty* and other cases requiring consideration of the claimed product as a whole and application of the pragmatic "new and useful" test to distinguish products of human ingenuity from products of nature. Indeed the Court could go a long way toward improving the clarity and stability of the law in this area simply by overruling the pre-1952 Act decisions in *Funk Bros.* and *Brogdex*. Those cases conflict with the *Chakrabarty* approach and were based on erroneous principles.

Finally the Court should avoid answering the question presented by the Petitioner—namely, "are human genes patentable?"--due to the inherent problems in the continually evolving, ambiguous conceptual term

"gene." Answering this question, rather than a more proper question that focuses on the biochemical and structural terms used in actual patent claims, such as DNA structures or nucleic acid structures, will lead to confusion and ambiguity.

ARGUMENT

I. THIS COURT SHOULD DEFER TO CONGRESS'S RECOGNITION OF GENE PATENTS

The Leahy-Smith America Invents Act ("AIA") represented the most significant change to the United States patent system since 1952, aligning the U.S. with foreign patent jurisdictions by switching to a "first inventor to file" system and developing an expanded post-grant review procedure. In addition to these changes, Congress clarified the limits of § 101. Specifically, the U.S. Patent & Trademark ("USPTO") policy had been, and still is, that claims encompassing human organisms are patent ineligible. *See Manual of Patent Examining Procedure* ("MPEP") § 2105 (8th ed., Rev. 9, 2012). The USPTO, however, has for the last three decades issued "gene patents" claiming isolated nucleic acids or their use in diagnostic applications. *See* Eric J. Rogers, *Can You Patent Genes? Yes and No*, 93 J. Pat. & Trademark Off. Soc'y 19 (2010). As such, the USPTO did not consider that isolated genes constituted "human organisms" ineligible for patenting. Congress codified this USPTO policy and provided that any "claim directed to or encompassing a human organism" should be patent ineligible. *See* AIA § 33(a) (Pub. L. 112-29, § 33(a), 125 Stat. 284).

But that is as far as Congress went. In clarifying the limits of 35 U.S.C. § 101, Congress did not take the additional step of excluding isolated "genes," even though the question was certainly on everyone's mind. Indeed, the AIA was debated and enacted amidst ongoing controversy surrounding patents on isolated human "genes" and this *Myriad* litigation. In particular, Representative Dave Weldon, who proposed § 33(a), recognized that "the U.S. Patent Office has already issued patents on genes, . . . but it has not issued patents on claims directed to human organisms, including human embryos and fetuses. " 157 Cong. Rec. E1177-04 and 149 Cong. Rec. E2417-01.[2] Weldon further stated that his "amendment would not affect the former [patents on genes], but would simply affirm the latter." *Id*. In effect, Congress deferred to three decades of practice by the agency at the forefront of determining whether a patent application is directed to statutory subject matter, the USPTO. Thus, by recognizing the issue but declining to exclude genes when it clarified the scope of § 101, Congress effectively acknowledged that "genes" are patentable subject matter.

But Congressional involvement here is more than simply recognition. It has shown interest in the very subject matter at issue by requiring the USPTO to study the implications for health care of the whole category of patents of which the Myriad patent is a member--namely, genetic diagnostic testing patents. The study Congress has commissioned is a precursor to legislative fact-finding

2. Representative Weldon's testimony was previously presented in connection with the Consolidated Appropriations Act, 204, Pub. L. No. 108-199, 634, 118 Stat. 3, 101, and later resubmitted with regard to the AIA.

and potential legislation in at least the narrower area of genetic testing and perhaps in the whole area of "gene patents."

Specifically, Congress mandated that the Director of the USPTO conduct a study "on effective ways to provide independent, confirming genetic diagnostic test activity where *gene patents* … exist." AIA at § 27(a) (emphasis added). This study, which is now being conducted, requires an examination of "the effect that providing independent second opinion genetic diagnostic testing would have on the *existing patent* and license holders of an exclusive genetic test." *Id.* at §27(b) (emphasis added). In mandating this study, Congress signaled a desire to understand the commercial and healthcare issues associated with access to genetic testing, as raised in the *Myriad* litigation, and at the same time implicitly acknowledged the continued existence of gene patents that relate to such testing.

Under these circumstances, if a major change is to be made in patentable subject matter—potentially upsetting the expectations of the public after thirty years of isolated gene patenting—such change ought to be made by Congress, not this Court. This Court has said as much on more than one occasion and has declined to alter Congress's policy decisions regarding intellectual property laws. *See, e.g.*, *Deepsouth Packing Co. v. Laitram Corp.*, 406 U.S. 518, 530 (1972) ("When Congress drafted § 271, it gave no indication that it desired to change either the law of combination patents as relevant here or the ruling of *Andrea*. Nor has it on any more recent occasion indicated that it wanted the patent privilege to run farther than it was understood to run for 35 years prior to the action of the Court of Appeals for the Fifth

Circuit"); *Sony Corp. v. Universal City Studios, Inc.*, 464 U.S. 417, 431 (1984) ("Sound policy, as well as history, supports our consistent deference to Congress when major technological innovations alter the market for copyrighted materials. . . . "). Thus, given the long period in which the USPTO and the public understood that the scope of patentable subject matter encompassed gene patents, if any change is to be made, it ought to be made by Congress.

But there is something this Court can and should do in deciding this appeal: take the opportunity to clarify the law regarding § 101 as it applies to products, the meaning of "manufacture" and "composition of matter" in § 101, and the product of nature doctrine. Confusion exists in this area, and a major reason for it is two precedents of this Court, *Funk Bros. v. Kalo* (1948) and *American Fruit Growers v. Brogdex* (1931), both decided before the 1952 Patent Act. As explained below, the BPLA urges this Court to overrule both cases so that the § 101 analysis will have the requisite logic, coherence, and practical wisdom of other relevant precedents, both from this Court and lower courts.

II. THE FACTS OF THIS CASE PROVIDE AN OPPORTUNITY TO CLARIFY WHEN BIOLOGICAL MATERIAL IS "NEW AND USEFUL" AND THUS PATENT ELIGIBLE UNDER §101

As argued below, the BPLA proposes an approach for evaluating § 101 eligibility in which the claimed biological product must be sufficiently different (new) from its natural state to confer a commercial, therapeutic, or diagnostic utility (use) not otherwise present absent the

inventor's ingenuity. This simple approach will encourage innovation and avoid results that are based on ideology or misinformation rather than science, logical legal analysis, and sound public policy.

A. This Court Should Rely on the *Chakrabarty* Approach

In order to construe § 101 as it applies to biological products, this Court need go no further than to refer to its analysis and approach in *Diamond v. Chakrabarty,* 447 U.S. 303 (1980). In that case, this Court set out a two-part approach for evaluating the patent eligibility of claimed biological products: 1) view the claimed invention as a whole, and 2) determine whether the claimed invention as a whole is "new and useful" compared to what is in nature. *Id.* at 309-310. This approach will answer the ultimate question of whether the claimed product is a patent-eligible "manufacture" or "composition of matter," the very question answered by the Court in *Chakrabarty* with respect to the genetically engineered oil-consuming bacteria.

1. The Claimed Invention Should Be Analyzed as a Whole, Taking into Account the Inventive Human Concept behind It

As part of its eligibility analysis under § 101, the *Chakrabarty* court viewed the claim as a whole when it compared the claimed product, bacteria genetically engineered to consume oil, with bacteria in nature:

> His claim is not to a hitherto unknown natural phenomenon, but to a nonnaturally occurring

> manufacture or composition of matter-a product of human ingenuity "having a distinctive name, character [and] use." . . .
>
> [t]he patentee has produced *a new bacterium* with markedly different characteristics *from any found in nature* and one having the potential for significant utility. His discovery is not nature's handiwork, but his own; accordingly it is patentable subject matter under § 101.

Id. 309-10 (emphasis added). Clearly this was a simple comparison between the claimed bacteria and the bacteria found in nature. There was no attempt to dissect the claimed product into the natural principles behind its creation and the application of those principles. It was also evident that the Court focused on the fact that a human conception ("ingenuity") lay behind the new product.

A year later, this Court reiterated that "[i]n determining the eligibility of respondents' claimed process for patent protection under § 101, their claims must be considered as a whole. It is inappropriate to dissect the claims into old and new elements . . . ." *Diamond v. Diehr,* 450 U.S. 175, 188 (1981) (emphasis added). The *Diehr* court then warned of the danger posed by dissection. Dissecting claims would "make all inventions unpatentable because all inventions can be reduced to underlying principles of nature which, once known, make their implementation obvious." *Id.* at 189, n. 12.

This Court again reaffirmed *Diehr*'s anti-dissection rule in *Bilski* and emphasized the need to consider the invention as a whole. *Bilski v. Kappos*, 130 S.Ct. 3218, 3230 (2010). Thus, when an invention relates to appreciation

of a hitherto unappreciated natural principle, along with an insight that the natural principle can be applied, the appreciation of the natural principle and the application of it to a new and useful end must be considered as a whole--and not dissected into separate elements—when determining patent eligibility.

Although *Diehr* and *Bilski* involved process claims, the anti-dissection rule applies with equal force to product claims. All products are synthesized at some level from natural materials. If one were to dissect a product all the way to its natural components and the natural phenomena they embody, all products would become products of nature, and thus patent ineligible. Only when considering the invention as a whole can patent law encourage human ingenuity to utilize what is in nature and produce new and useful products from natural materials.

2. After Construing the Claim as a Whole, the Next Step Is to Ask Whether the Claimed Invention Is "New and Useful"

After considering the claimed subject matter as a whole, the *Chakrabarty* court determined that "[t]he patentee has produced a new bacterium with markedly different characteristics from any found in nature and one having the potential for significant utility." *Chakrabarty,* 447 U.S. at 310. In essence the Court was applying the "new and useful" requirement of §101. The product was new because it did not exist in nature, and it had a utility that also did not exist in nature, *i.e.*, the capability of breaking down multiple components of crude oil. Such a product qualified as either a "manufacture" or a "composition of matter" under §101. *Id.* at 309.

The Court's "new and useful" test in *Chakrabarty* is straightforward and practical. It has many far-reaching benefits in encouraging innovation in the area of biological products. For example, resting patent eligibility on the "new and useful wording of § 101 leaves undisturbed historical patent protection for purified biological products such as vitamins, hormones, and antibiotics.

Chakrabarty, of course, was not the first time that a court focused on the "new and useful" requirement of §101 for eligibility. There is a rich history in the lower federal courts of the application of this test to uphold some of the most important pharmaceutical and biopharmaceutical inventions of the last hundred years.

For example, in 1911, as a district judge, Judge Learned Hand upheld the product claims of a patent directed to a form of adrenalin. *See Parke-Davis & Co. v. H. K. Mulford Co.*, 189 Fed. 95 (S.D.N.Y. 1911), *aff'd in pertinent part*, 196 Fed. 496 (2nd Cir. 1912). Although, the claimed compositions of matter had been isolated from the natural environment, Judge Hand found the difference between adrenalin in its natural environment and the claimed composition to be a distinction not in degree, but in kind, because the invention resulted in the product becoming available for public use:

> Nor is the patent only for a degree of purity, and therefore not for a new "composition of matter." As I have already shown, it does not include a salt, and no one had ever isolated a substance which was not in salt form, and which was anything like Takamine's. . . . That was a

> distinction not in degree, but in kind. But, even if it were merely an extracted product without change, there is no rule that such products are not patentable. Takamine was the first to make it available for any use by removing it from the other gland tissue in which it was found, and, while it is of course possible logically to call this a purification of the principle, *it became for every practical purpose a new thing commercially and therapeutically.* That was a good ground for a patent.

Id. at 103 (emphasis added).

Judge Hand drew the line between "different substances" and "degrees of the same substance" based on practical utilitarian advantages that would not have been enjoyed but for the inventor's contribution. *Id.* ("That the change here resulted in ample practical differences is fully proved. . . . The line between different substances and degrees of the same substance is to be drawn rather from the common usages of men than from nice considerations of dialectic").

Although Judge Hand's application of the "new and useful" test was implicit, a decision after enactment of the 1952 Act was explicit in relying on the "new and useful" requirement of § 101 when upholding the patent eligibility of vitamin B12 fermentation products. *Merck & Co., Inc. v. Olin Mathieson Chem. Corp.*, 253 F.2d 156 (4th Cir. 1958). Judge Haynsworth, writing for the Court of Appeals, put the product of nature doctrine in its proper context, foreshadowing the pragmatic view of this Court in *Diehr* on the role of nature in anything man-made:

> There is nothing in the language of the Act which precludes the issuance of a patent upon a 'product of nature' when it is a 'new and useful composition of matter' and there is compliance with the specified conditions for patentability. All of the tangible things with which man deals and for which patent protection is granted are products of nature in the sense that nature provides the basic source materials. The 'matter' of which patentable new and useful compositions are composed necessarily includes naturally existing elements and materials.

Id. 161-62.

In *Merck*, the claimed vitamin B(12) preparations were "beyond question . . . of very great therapeutic and commercial importance" *Id.* at 160. The court's comparison of the claimed products with nature was straightforward and practical. As it existed in nature, the product had no or very little therapeutic or commercial value and thus no utility. Only when converted into the claimed compositions did the product acquire such utility. *Id. at* 161. Indeed, the *Merck* court emphasized that nothing in nature compared to the claimed product:

> The compositions of the patent here have all of the novelty and utility required by the Act for patentability. They never existed before; there was nothing comparable to them. If we regard them as a purification of the active principle in natural fermentates, the natural fermentates are quite useless, while the patented compositions are of great medicinal

> and commercial value. The step from complete uselessness to great and perfected utility is a long one. That step is no mere advance in the degree of purity of a known product. *From the natural fermentates, which, for this purpose, were wholly useless and were not known to contain the desired activity in even the slightest degree, products of great therapeutic and commercial worth have been developed.* The new products are not the same as the old, but new and useful compositions entitled to the protection of the patent. . . . It did not exist in nature in the form in which the patentees produced it and was produced by them only after lengthy experiments.

Id. at 164 (emphasis added).[3]

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3. *Merck r*elied on *Parke-Davis* and also on two other cases that applied this "new and useful" approach to patentability. Both cases further support the proposition that patent eligibility can reside in making a substance therapeutically or commercially available to the public in a way that the natural form was not. *See Kuehmsted v. Farbenfabriken*, 179 Fed. 701, 705 (7th Cir. 1910) ("Hoffmann has produced a medicine [aspirin] indisputably beneficial to mankind--*something new in a useful art, such as our patent policy was intended to promote*. . . . though the difference between Hoffmann and Kraut be one of purification only--strictly marking the line, however, where the one is therapeutically available and the others were therapeutically unavailable--patentability would follow") (emphasis added) and *Union Carbide Co. v. American Carbide Co.*, 181 Fed. 106, 106-107 (2nd Cir. 1910) ("But patentable novelty in a case like the present may be founded upon superior efficiency; upon superior durability,. . . upon a lesser tendency to breakage and loss; upon purity, and, in connection with other things, upon comparative cheapness").

This "new and useful" approach thus presents a practical and clear way to determine whether a claimed biological product is patent-eligible as either a "manufacture" or a "composition of matter." But this test should not be confused with either the novelty requirement of 35 U.S.C. § 102 or the non-obviousness requirement of 35 U.S.C. § 103. The distinctiveness of these separate requirements is made clear by the wording of § 101 itself, which states that its requirements are "subject to the conditions and requirements of [Title 35]." The "new" requirement for biological products under § 101 is not with respect to the prior art but with respect to the corresponding product of nature, whether it was known or not.

B. *Funk Bros.* and *Brogdex* Cause Confusion and Should Not Factor into the Analysis Here

This Court's opinion in *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127 (1948), which was issued before the clarifying effect of the codification of the patent laws in 1952, is at odds with the anti-dissection approach of *Chakrabarty*, *Diehr*, and *Bilski*. This Court should thus overrule *Funk Bros.* to eliminate needless confusion in the application of § 101.

The *Funk Bros.* court erred by dissecting the claim to come to the wrong result about a new and useful product made by human intervention. The claimed product at issue in *Funk Brothers* was a package of combined mutually non-inhibitive strains of *Rhizobium* bacteria capable of inoculating different crops:

> An inoculant for leguminous plants comprising a plurality of selected mutually non-inhibitive strains of different species of bacteria of the genus Rhizobium, said strains being unaffected by each other in respect to their ability to fix nitrogen in the leguminous plant for which they are specific.

Id. at 128.

The majority opinion dissected the product claim into two elements: (1) the discovery of the fact that there are mutually non-inhibitive strains of *Rhizobium* bacteria; and (2) the application of this discovery to combine the selected strains into a single package capable of inoculating different crops. *Id.* at 131. The Court then held that the discovery of compatible strains is a discovery of "some of the handiwork of nature and hence is not patentable," and the application of that discovery is obvious because it is a simple packaging step. *Id.*

In light of *Chakrabarty*, *Diehr*, and *Bilski*, it is clear that the *Funk Brothers* court erred in dissecting the claim into the discovery element and the application element and then analyzing patent eligibility of each element separately. The Court then compounded this error by treating the discovery of the non-inhibitive property as if it were *prior art* to the application of it. Although referring to the discovery as part of the "storehouse of knowledge," in point of fact the mutually non-inhibitive property of certain strains had been *unknown* until the inventors discovered it. Essentially, the *Funk Brothers* majority required a non-obvious application of a hitherto unknown law of nature for a product claim to be patent-eligible, even

when the discovery of the law of nature itself was part of the invention as a whole and itself "ingenious." *Id.* at 131.

The product claimed in *Funk Brothers* (*i.e.*, the combination of several previously unknown compatible strains) when considered as a whole was animated by a human conception of a new and useful product based on components that the art did not know existed--namely, the existence of compatible strains from different *Rhizobium* species. That conception, based on human ingenuity, led to selection and isolation of such hitherto unknown compatible strains and packing them into a single package, which was a new and useful human-made product markedly different from any then-known product. That product was "markedly different" from the prior art materials because there was no knowledge of the possibility of an effective package of mixed strains in the prior art due to the inhibiting effect. *Id.* at 129-130. Although the non-inhibitive strains may have performed the same function as the inhibiting ones, an effective package of mixed strains *did not exist in nature* before the invention and resulted from an inventive human conception. *Id.*

Further, that product, a single package of combined different strains, was "new and useful" because it allowed farmers to inoculate different crops with a single package of combined strains in a simple step and it helped the dealers and manufacturers to reduce inventories. Such a "new and useful" human-made product is not a product of nature, but a patent eligible "composition of matter" and "manufacture." The inventors were not being rewarded by a patent for the discovery of a law of nature but rather for the invention of a new and useful product.

It is important to recognize that *Funk Brothers* was decided before the requirement of non-obviousness was codified in section 35 U.S.C. § 103 in 1952. Although the general concept of obviousness had always been employed by the courts in deciding patent cases since at least *Hotchkiss v. Greenwood,* 52 U.S.(11 How.) 248 (1850), it was not as clear until 1952 that the obviousness analysis was distinct from a patent eligibility analysis. Understandably, the Court in *Funk Bros.* tended to confuse the two concepts. But since 1952 there have been two separate statutory provisions, § 101 for patent eligibility and § 103 for patentability based on nonobviousness. This Court in *Diehr* made clear that § 101 and § 103 require separate inquiries. 450 U.S. at 189-91.

Thus the Court in *Funk Bros.* had erroneously applied a dissection approach to the claim and then incorrectly combined a non-obviousness standard with the standard for patent eligibility when it incorrectly treated a hitherto unknown principle as prior art. Unless this Court overrules *Funk Bros.* as to its dissection approach, its conflation of eligibility and obviousness, and its result, it will continue to confuse the law of patent eligibility and specifically the product of nature doctrine.

Of course, it could be argued that *Diehr sub silentio* overruled *Funk Bros*. But because *Diehr* addressed process claims and *Funk Bros.* dealt with a product claim, it would be far better if this Court now expressly overruled *Funk Bros.* [4]

4. It is true that the Court in *Chakrabarty* did not overrule *Funk Bros*. but merely distinguished it. But if the Court in *Chakrabarty* had applied the same test to the claimed package

The other precedent of concern is *American Fruit Growers, Inc. v. Brogdex Co.*, 283 U.S. 1 (1931), which is based on a dubious analogy to tariff cases and thus, like *Funk Bros.*, should also be overruled. In *Brogdex*, this Court found that the product claim at issue, a borax-coated orange that is resistant to blue mold decay, was not a "manufacture" under the patent laws. That claim read as follows: "Fresh citrus fruit of which the rind or skin carries borax in amount that is very small but sufficient to render the fruit resistant to blue mold decay." *Id.* at 6. Under the approach outlined above, however, this Court would have reached a different result.

The *Brogdex* court started the patent eligibility analysis by asking whether the claimed subject matter was an article of manufacture. *Id.* at 11. The Court then relied on *Century Dictionary*'s definition of "manufacture":

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in *Funk Bros.* that it applied to Dr. Chakrabarty's bacteria, it could not have reached the same result as was reached in *Funk Bros*. The basis for the *Chakrabarty* distinction was the finding in *Funk Bros.* that the strains operated in the package the same way they operated in nature. But many patentable combinations involve components that operate in the combination the same way they have always operated alone. The *Funk Bros.* majority made the wrong comparison when it compared a component of the claimed combination with that component in nature. The comparison should have been of the claimed product *as a whole* with what was in nature. Based on that comparison, no such product existed in nature, and the claimed product produced a new and useful result. In terms of *Chakrabarty,* the package of different mutually non-inhibitive strains was "markedly different" from individual mutually non-inhibitive strains in nature and it provided "significant utility" to the vendor and the farmer.

> the production of articles for use from raw or prepared materials by giving to these materials *new forms, qualities, properties, or combinations*, whether by hand labor or by machinery; also anything made for use from raw or prepared materials.

Id. (*emphasis added*).

There is nothing wrong with that definition in determining whether the claimed product was an article of manufacture. But the Court then concluded that the claimed subject matter was not an article of manufacture and thus not patent eligible. *Id.* The Court reasoned that the addition of borax to the rind of an orange does not "produce from the raw material an article for use which possesses a new or distinctive form, quality, or property;" and that the product "remains a fresh orange, fit only for the same beneficial uses." *Id.*

That analysis was erroneous for at least four reasons. First, the use of borax to prevent blue mold decay of oranges was prompted by an inventive human conception, and the end product, a borax-coated orange, was made according to that inventive human concept.

Second, the claimed product was a human-made product markedly different from any natural product. The manufacturing process of such borax-coated oranges required immersion of fresh oranges in a solution of borax or boric acid and thus required human manipulation. The end product, a borax-coated orange, had a new property—resistance to blue mold decay—that natural oranges did not have.

Third, due to its new blue mold resistance, the borax-coated orange had new utilities, such as longer shelf life.

Fourth, the claimed product was a new combination of an orange and the chemical borax. The combination does not exist in nature but was artificially made. Therefore, the claimed product, a borax-coated orange, was a human-made product having new and useful qualities and properties and thus should have qualified as an article of "manufacture" under the *Century Dictionary*'s definition.

Nonetheless, the *Brogdex* court invalidated the claim, likely based on its reliance on the holdings of two tariff classification cases--*Hartranft v. Wiegmann*, 121 U.S. 609 (1887) and *Anheuser-Busch Brewing Ass'n v. United States*, 207 U.S. 556 (1908)--as guidelines for how to apply the definition of "manufacture" to the facts before it. There was nothing wrong with the Court's phrasing of the test used in the tariff cases when it concluded that "manufacture" requires transformation of raw material into a new and different article "having a distinctive name, character, or use." *Id.* at 12-13. Even under this definition, a borax-coated orange qualifies as an article of manufacture because it has a distinctive character and use compared to a natural orange, as discussed above. But the Court was strongly influenced by the holdings in the *Hartranft* and *Anheuser-Busch* cases that shellac-treated shells and treated corks were not "manufactures" for the purposes not of patent law but rather of tariff classifications.

The policy goals and purposes of patent law are quite different from those for tariff classifications. Patent law encourages human ingenuity, which is quite different

from goods classifications for tariff purposes. The policy behind tariff regulation and classification is "to secure a just, impartial, and uniform appraisement of imported merchandise" and "assessment of duties thereon at the various ports of entry." 19 U.S.C. § 1502. Therefore, tariff classifications focus more on the nationwide and even global uniformity of classifications as promoting fairness in assessments rather than the actual accuracy of the classifications in an absolute sense. Determination of patent eligible subject matter under § 101, on the other hand, requires a focus on whether human inventive conception is responsible for a new and useful end product that does not exist in nature. The tariff classification cases cannot properly inform the meaning of patent eligible subject matter under § 101.

Mere structural difference between the raw material and the end product of manufacture should not be the focus of patent eligibility analysis under § 101. An article of manufacture should be *patent eligible* so long as there is an inventive human conception behind the manufacture that leads to a new and useful end product.

The *Brogdex* court stopped its patent eligibility analysis after the inquiry on the subject matter category of "manufacture" but failed to address another patent eligible category—"composition of matter." The claimed product, a borax-coated orange, is a combination of fresh orange and the chemical borax, and readily falls within the category of "composition of matter." So even on that basis, the *Brogdex* court should have reached a different conclusion. By relying on the factual holdings of tariff cases, *Brogdex* created a shaky foundation for understanding the laws on patent eligible subject matter.

Therefore, this Court should overrule *Brogdex* and dispel the confusion that it has caused and will otherwise continue to cause.

C. For Purposes of § 101, the Process Should Not Be Confused with the Product

Perhaps relying on this Court's opinion in *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 132 S. Ct. 1289 (2012), Petitioner and its *amici* have conflated the process of making a product with patent claims directed to the product itself so as to confuse the § 101 analysis here. But the focus of a product claim should be on the product, viewed as a whole.

The conflation is two-fold. First, Petitioner and its *amici* have conflated the process used to make a product with the resulting product itself. The errant arguments are focused on the methods of producing isolated DNA and whether those methods amount to conventional or routine activity.[5] This is the wrong focus because it mixes apples (the process for making a product) with oranges (the separately claimed product itself). The process used for making a product, regardless of whether it is conventional, routine, or innovative, should not play a role in the determination of the patent eligibility of the product. The process for isolating DNA, while important for understanding the invention, should not be given weight in the analysis for patent eligibility.

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5. Indeed, in his dissenting opinion below, Judge Bryson framed the question as "we are required to decide whether the process of isolating genetic material from a human DNA molecule makes the isolated genetic material a patentable invention." *Ass'n for Molecular Pathology v. U.S.P.T.O.*, 689 F.3d 1303, 1348 (Fed. Cir. 2012).

This Court has long considered the methods used for preparing a product as immaterial to the novelty or non-obviousness of a product. *See, e.g.*, *General Electric Co. v. Wabash Appliance Corp.*, 304 U.S. 364, 373 (1938) ("A patentee who does not distinguish his product from what is old except by reference, express or constructive, to the process by which he produced it, cannot secure a monopoly on the product by whatever means produced"). The lower courts have also held that the process for preparing a product is not relevant to its validity. *See, e.g.*, *In re Pilkington*, 411 F.2d 1345, 1348 (C.C.P.A. 1969) ("Patentability of a claim to a product does not rest merely on a difference in the method by which that product is made. Rather, it is the product itself which must be new and unobvious"). Likewise, consideration of the process of manufacture must be kept out of the eligibility analysis for products under § 101 as well.

An analysis under § 101 that gives weight to the process for synthesizing a claimed product from a starting material can lead to inconsistent and absurd results. Simple processes that can be considered conventional or routine can transform products of nature into end-products with markedly different characteristics. There are numerous examples of transforming a natural product into a patentable, human-made product by applying simple steps such as mere application of heat. For example: (1) cracking of petroleum to produce acetylene and ethylene accomplished by mere application of heat[6]; (2) Curing natural rubber sap also accomplished by the application

6. Green, MM. and Wittcoff, HA., *Organic Chemistry Principles and Industrial Practice*, 2003

of heat.[7] An analysis that considers the process used in transforming natural products can render unpatentable many of the end products that have markedly different characteristics from natural products. An analysis that gives any weight to the process of converting the natural product to a different end product may incorrectly render transformed products unpatentable.

Second, this "conventional or routine activity" approach is taken out of context from *Prometheus*, which, as applied by Petitioner, appears to dissect the process claim at issue there into its component parts. But a closer reading of P*rometheus* shows that it has not resurrected the incorrect dissection analysis of *Funk Bros.* in its approach to the process claims there. The representative claim ended in a "wherein" clause that plainly was a statement of the law of nature. *Id.* It is not dissection to look at a claim and point out that all that it is doing is telling physicians to use that law. On the other hand, *Funk Bros.* clearly applied a dissection approach when it struck down a new and useful product nowhere found in nature. Further, *Prometheus* cites *Diehr* for the proposition that a court must view the claimed subject matter as a whole when analyzing validity under § 102 or § 103. That proposition is, of course, correct. But *Prometheus* overlooked the fact that in declaring this rule, *Diehr* was specifically referring to § 101, not § § 102 or 103.

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7. Curing rubber and cracking petroleum have been important subjects of litigation in several cases before this Court: *See Diamond v. Diehr*, 450 U.S. 175 (1980); *Universal Oil Products Co. v. Globe Oil & Refining Co.*, 322 U.S. 471 (1944); *Corona Cord Tire Co. v. Dovan Chemical Corp.*, 276 U.S. 358 (1928); *Sinclair Refining Co. v. Jenkins Petroleum Process Co.*, 289 U.S. 689 (1933); *Standard Oil Co. v. United States*, 283 U.S. 163 (1931).

The § 101 ineligibility of the *Prometheus* claims was that they were simply statements of a natural correlation with an admonition to apply it. *See Prometheus*, 132 S. Ct. at 1297-98. But this analysis has no bearing on the analysis of biological products. Unlike process claims, which are a series of steps, a product claim is a tangible thing. It cannot be a statement of anything. The questions under § 101 for such a product are quite practical—can the claimed product, viewed as a whole, be found in nature, and is the claimed product new and useful in a way that the products of nature are not.

Product claims cover tangible substances and do not pose the difficulties associated with process claims in comparing them with a product of nature for patent eligibility. While the process claims from the long line of cases considered by this Court involved the difficult separation of laws of nature from the additional process steps, the products represent tangible substances that can be directly compared with a product of nature. The difficulty in analyzing process claims and separating a natural law or principle from the process claim has been well recognized by this Court. In contrast, compositions, manufactures, and machines are tangible, observable things which can be easily compared. "A machine is a thing. A process is an act, or a mode of acting. The one is visible to the eye, -- an object of perpetual observation. The other is a conception of the mind, seen only by its effects when being executed or performed." *Tilghman v. Proctor* 102 U.S. 707, 728 (1880). Similar to claims involving machines, the product claims represent tangible things, visible in the aggregate, and observable in the structural level through well-established techniques.

This Court has long recognized the difficulties in separating the law of nature from the process embodying it. "The line between a patentable "process" and an unpatentable "principle" is not always clear. Both are "[conceptions] of the mind, seen only by [their] effects when being executed or performed." *Parker v. Flook*, 437 U.S. 584, 589 (1978) (citation omitted). A product on the other hand is directed to visible, observable things that can be compared to a product of nature to determine the differences in their character, name, and use. The Court should thus affirm the standard for patent eligibility for products outlined in *Chakrabarty*, holding that a product that is different from the natural product (*e.g.*, by having a significant utility not present in the natural product) is patent eligible. 447 U.S. 303, 309-10.

III. THE MEANING OF "GENES" IS AMBIGUOUS AND THUS A DECISION THAT SIMPLY REFERS TO PATENT ELIGIBILITY OF "GENES" WILL BE UNCLEAR

The BPLA has, to this point, discussed what it believes are the correct legal principles underlying the §101 analysis. The remaining challenge is framing the question properly. As framed by Petitioner, the question for this appeal is "Are human genes patentable?" This question, however, should not be answered because, even with the legal principles clarified, it will lead to confusion and overly broad rulings that do not take into account the different concepts that can be encompassed by the word "gene." Because claims and claims alone define a patented invention, the BPLA suggests that the question be rephrased in terms that will keep the focus on the invention *as claimed*, by using words that are actually

found in patent claims, such as DNA structures or nucleic acid structures--terms that describe actual biochemical materials, not vague, continually changing concepts such as "genes."

A. A "Gene" Is a Concept; DNA Is a Molecule

To frame the question properly, one must first define "gene." The concept has evolved with time, from functional to chemical and back to functional again.[8] Indeed, the word "gene" is used differently by scientists, policy researchers, and science writers. For example, the term "gene" may encompass the concept of a unit of information or instructions, as specified by a sequence of nucleotides. The term "gene" may encompass a naturally occurring nucleic acid molecule or set of nucleic acid molecules that interact(s) with other naturally occurring molecules, *e.g.*, proteins, in coordinated ways in a cell to produce proteins and other nucleic acids that are important to the life of the cell or organism within which the cell resides. The term "gene" may encompass a nucleic acid molecule or set of nucleic acid molecules that have been isolated from their natural context and that take on one or more new structural or functional properties in isolation from their natural environment. The term "gene" may encompass a synthetic nucleic acid molecule (*e.g.*, chemically synthesized under controlled chemical conditions engineered by humans), which may or may not represent a naturally occurring nucleic acid molecule. It is not surprising that the general public and even those skilled in the art are not clear on the concept.

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8. *See* Gerstein, M.B., et. al.. W*hat is a gene, post-ENCODE? History and updated definition*, 2007 Genome Res. 17, 660-681 (also available at http://genome.cshlp.org/content/17/6/669.full, last visited March 13, 2013).

A 1909 definition of "gene," predating the discovery of the double helix molecular structure for deoxyribonucleic acid "DNA" by nearly fifty years, relies on functional, not chemical language. For example, Wilhelm Johannsen, the Danish botanist who coined the term, defined "gene" as "special conditions, foundations and determiners which are present [in gametes] in unique, separate and thereby independent ways [by which] many characteristics of the organism are specified." Johannsen, W., *Elemente der exakten Erblichkeitslehrek*, Jena. 124 (1909), *quoted in* Nils Roll-Hansen, *The Crucial Experiment of Wilhelm Johannsen*, 4 Biol. Philos. 303, 303-329 (1989).

Once the DNA molecule was characterized, definitions moved to the realm of chemistry. For example, *The Random House Dictionary of the English Language*, (2d ed., 1987) defines "gene" as "the basic linear unit of heredity; a linear sequence of nucleotides along a segment of DNA that provides the coded instructions for synthesis of RNA, which, when translated into protein, leads to the expression of hereditary character."

Since then, it has become clear that the protein coding regions in humans are not "linear units." The protein coding regions, called exons, are separated by non-protein coding regions, called introns. The exons are not all in a line with the introns that separate them, or even necessarily close to one another. Researchers were surprised by the sheer quantity of non-protein coding introns ("junk DNA") relative to protein coding exons because only about one percent of the DNA appeared to code for protein. *See* Lander, E.S., *et al.*, *Initial sequencing and analysis of the human genome*. 409 Nature 860, 860–921 (2001). *See also* J. Craig Venter *et al.*, *The sequence of the human*

genome, 291 Science 1304, 1304-1351 (2001). Now scientists are discovering that the so-called "junk DNA" may affect the operation of the exons, further confusing the meaning of "gene." *See* Gina Kolata, *Bits of Mystery DNA, Far From 'Junk,' Play Crucial Role*, New York Times (Sept. 5, 2012) (available at http://www.nytimes.com/2012/09/06/science/far-from-junk-dna-dark-matter-proves-crucial-to-health.html?pagewanted=all&_r=0, last visited on March 13, 2013).

Nearly one hundred years after Johannsen, Gerstein *et al.*, in their paper entitled "What is a gene, post-ENCODE? History and an updated definition," propose a return to defining "gene" by reference to a function:

> A gene is a union of genomic sequences encoding a coherent set of potentially overlapping functional products. Our definition side steps the complexities of regulation and transcription by removing the former altogether from the definition and arguing that final, functional gene products (rather than intermediate transcripts) should be used to group together entities associated with a single gene. It also manifests how integral the concept of biological function is in defining genes.

Mark B. Gerstein, *et al. What is a Gene Post-Encode? History and Updated Definition*, 17 Genome Res. 660, 660 (2007). Thus, "gene" is an evolving concept.

Deoxyribonucleic acid ("DNA"), on the other hand, is a tangible molecule. Petitioners have conflated the biochemical and quotidian meanings of DNA, elevating its

status, and then assigned it to an out of date understanding of "gene." The Court must not rule on a concept, namely, a "gene," which is evolving with every experiment. The Court should be mindful, as are biologists working on the ENCODE Project Consortium and the International Human Epigenome Consortium, that DNA *in vitro* (*i.e.*, engineered or isolated into a useful form) is not and does not behave like DNA *in vivo*. See The Encode Project Consortium, *An Integrated Encyclopedia of DNA Elements in the Human Genome*, 489 Nature 57, 57-74 (2012). This understanding will free the Court to consider the patent eligibility of various aspects of isolated DNA on their merits.

B. The Term "Gene Patents" Is Likewise Unclear

As described above, the definition of genes has evolved greatly over the past century. It is not surprising, therefore, that a definition of "gene patent" is elusive. Indeed, "gene patents are the subject of considerable debate and yet, like the term 'gene' itself, the definition of what constitutes a gene patent is fuzzy." Kyle Jensen and Fiona Murray, *Intellectual Property Landscape of the Human Genome*, Science, 310, 239 (2005).

In February 2012, and pursuant to its charge under the AIA to investigate the commercial and healthcare implications of "gene patents," the USPTO held a public hearing on genetic diagnostic testing. During this hearing, one commentator, Thomas Kowalski, pointed out that patent law lacks a clear definition of the term "gene patent":

> On the lack of definitions, is a gene patent supposed to be those patents that claim isolated nucleic acid molecules or only isolated DNA? That is, for example what about claims to RNA? The Manual of Patent Examining Procedure, MPEP, is a guide for examiners. In Section 2163, the MPEP states that a gene comprising SEQ ID No. 1 requires a determination of what the claim covers as a whole, and a conclusion that specific structures such as a promoter, a coding region, or other elements are included. In other words, the term "gene" contains more than merely sequences that encode a protein.
>
> For example, a gene can contain a promoter region, a region of DNA that facilitates transcription of a coding region. There are patent claims to promoters. Are these gene patents? Also, there is DNA encoding what is known as a leader sequence or a signal sequence that is an extension of a protein that facilitates transport of a protein out of a cell and is cleaved from the protein. There are patent claims to signal sequences or leader sequences. Are these gene patents?
>
> The term "gene patents," to me, is unclear…

http://www.uspto.gov/aia_implementation/120216genetic_transcript.pdf

The Court should thus adjudicate without the confusing use of the term "gene patent," focusing instead on what is actually claimed, such as isolated DNA and other molecules.

C. The Court's Analysis Should Not Be Directed to "Genes" but Rather To Useful Nucleic Acids or DNA

As illustrated above, the term "gene" is an imprecise term that encompasses different aspects. But strong arguments can be made that, if by a "gene" one means "a nucleic acid isolated from its natural environment" (e.g., removed from a cell, excised from a chromosome, and/or placed in a vector), then such a nucleic acid could meet the "new" prong of the "new and useful" requirement, to the extent that it is a composition produced through human intervention.

Isolated DNA is not only new (*i.e.*, different from the native DNA) but also "*markedly different*" if its differences are sufficient to confer on it a practical commercial, therapeutic, or diagnostic utility or advantage that is not otherwise present in the unadulterated, or native, state. Such an isolated DNA would be characterized as "markedly different" because it would have distinctive name, character, and use.

By way of example, isolated DNA produced synthetically as primers may be reacted under controlled conditions with polymerase enzymes to generate millions of copies of nucleic acids from a single template nucleic acid. This DNA amplification technology – referred to as polymerase chain reaction – relies on such isolated DNAs and has a broad range of commercial uses, including in DNA sequencing for diagnostics and basic research, genetic fingerprinting (for forensic sciences, paternity testing, pathogen detection, etc.), creating constructs for

gene therapy, and other areas. Under the test posed in Section II above, therefore, this product would be patent eligible.

Thus, consistent with the 'new and useful' test proposed above, strong arguments can be made for patent eligibility of a nucleic acid molecule that is chemically synthesized (*e.g.*, a full length nucleic acid or synthetic probes or primers), amplified in a test tube (for example by PCR or other *in vitro* amplification technique involving human engineering), or amplified in a cell (for example in a vector or other cellular amplification technique involving human engineering), even if it has a specific naturally occurring nucleotide sequence--if the nucleic acid molecule is useful in a way that the naturally occurring molecule was not.

CONCLUSION

For the reasons detailed above, the Boston Patent Law Association respectfully submits that this Court should defer to Congress and rule in a manner that is consistent with the 'new and useful' standard as discussed herein, taking the opportunity to clarify the proper approach for analyzing the patentability of biologic products under the "new and useful" test. Finally, because of the ambiguity in the meaning of "genes," and therefore "gene patents," a decision that simply refers to patent eligibility of "genes" would be unintentionally broad sweeping and might effectively disqualify many worthy patentable inventions and forestall development of many worthy biological products. The Court should resist the call to make an overarching and unintentionally broad pronouncement on "gene patents" because the term itself is ambiguous and will lead to further confusion.

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