No. 12-398

IN THE
Supreme Court of the United States

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 AMICUS CURIAE THE BIOTECHNOLOGY INDUSTRY ORGANIZATION IN SUPPORT OF RESPONDENTS

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TABLE OF CONTENTS

Page

TABLE OF CONTENTS—Continued

TABLE OF AUTHORITIES

CASES

TABLE OF AUTHORITIES—Continued

STATUTES AND REGULATIONS

OTHER AUTHORITIES

TABLE OF AUTHORITIES—Continued

Page(s)

TABLE OF AUTHORITIES—Continued

Page(s)

TABLE OF AUTHORITIES—Continued

Page(s)

TABLE OF AUTHORITIES—Continued

Page(s)

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INTEREST OF AMICUS CURIAE[1]

The Biotechnology Industry Organization (BIO) is the country's largest biotechnology trade organization, representing over 1100 companies, academic institutions, and biotechnology centers in all 50 States and

[1] No counsel for a party authored this brief in whole or in part, and no persons or entities, other than amici or their counsel, made a monetary contribution to the preparation or submission of this brief. Letters consenting to the filing of this brief are on file with the Clerk of the Court.

countries around the world. Myriad Genetics, Inc. is not a member of BIO.

BIO members undertake research and development of biotechnological healthcare, agricultural, environmental, and industrial products. BIO members range from start-up businesses and university spin-offs to Fortune 500 corporations. The vast majority of BIO's members are small companies that have yet to bring products to market or attain profitability, and thus rely heavily on venture capital and other private investment. Patents on isolated DNA molecules and other isolated molecules are frequently critical to a biotech company's ability to attract the investment necessary for development of therapeutic, diagnostic, environmental, renewable energy, and agricultural products. The question presented in this case is thus of great importance to BIO's members.

PRELIMINARY STATEMENT

This lawsuit was brought as a test case intended to elicit a sweeping new exception to the subject matter eligible for patent protection under 35 U.S.C. § 101. Petitioner, Harry Ostrer, argues that without such an exception Myriad's patents will block access to genetic testing.[2] But the composition-of-matter claims that remain in this suit do not have the preemptive effect that Ostrer alleges, and Ostrer's exaggerated allegations provide no basis for this Court to deviate from decades of precedent and PTO practice.

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[2] The Federal Circuit held that Ostrer is the only plaintiff with standing. Pet. App. 31a-39a. Because this Court declined to grant certiorari on whether the remaining plaintiffs have standing, Ostrer is the sole petitioner before this Court.

Ostrer made a deliberate strategic decision not to seek relief on all the grounds available to him. He could have asked for a declaration of non-infringement or challenged the validity of Myriad's patents under 35 U.S.C. §§ 102, 103, or 112. Instead, he chose to pursue a legal theory with the greatest potential impact on the greatest number of patents. This Court should not allow Ostrer's all-or-nothing litigation strategy to push it into adopting an overbroad and unnecessary rule.

The exception to the Patent Act that Ostrer proposes would create tremendous uncertainty for a wide range of inventions. Isolated DNA molecules are used for many purposes besides diagnostic testing, including the production of therapeutic proteins, DNA-based vaccines, food safety, agriculture, and industrial and environmental uses. Ostrer's rule would also chill investment in isolated molecules other than DNA, such as RNA, antibiotics, antibodies, and enzymes.

The biotechnology community has invested many billions of dollars in researching, developing, commercializing, patenting, and licensing such inventions, in direct reliance on the PTO's considered decisions to issue thousands of patents on isolated DNA and other isolated molecules over the last two decades. If any exception is to be made to the statute's scope and the PTO's longstanding practice, it should be made by Congress on a prospective basis, where competing policy interests can properly be weighed and accommodated. This is particularly true where, as here, Congress has already declined to create the exception that Ostrer seeks, and where such a change would make the United States the only developed country to take such a restrictive view of patent eligibility—a result with potentially grave consequences for America's global economic and scientific leadership in biotechnology.

SUMMARY OF ARGUMENT

Now that Myriad's diagnostic method claims have been invalidated, it is far from clear that Ostrer has standing to challenge the remaining composition-of-matter claims. The case is further complicated by conflicting claim construction arguments and unresolved factual disputes. The most prudent course would be for the Court to remand for resolution of these issues.

If the Court presses ahead, it should affirm the judgment of the Federal Circuit. Whether the subject matter of Myriad's composition-of-matter claims is eligible for patent protection is not an abstract question of policy for this Court to decide. Congress defined the boundaries when it enacted the broad language of 35 U.S.C. § 101. Ostrer has never disputed that isolated DNA molecules fall within the plain meaning of that provision. These molecules were "composed," "manufactured," and "improved" over what existed in nature. This transformation in form as a direct consequence of human intervention results in molecules with a significantly different character and use compared to genes within their native setting. For example, unlike native genes, DNA amplified and isolated in the lab is not packed around and bonded to scaffolding proteins such as histones that control its function and does not have the epigenetic modifications such as methylation that play a critical role in regulating the expression of native genes. As a result of these differences and others, isolated DNA works for applications that would not be possible with native DNA.

The broad "product of nature" exception that Ostrer asks this Court to adopt would have harmful consequences for the biotechnology industry. It would chill a wide range of important activities that benefit

society, including non-diagnostic uses of isolated human DNA, the untapped potential of isolated non-human DNA, the use of RNA molecules such as microRNA, and the invention and disclosure of other isolated molecules with natural analogues, such as therapeutic proteins and antibiotics. Complementary DNA (cDNA) patents are not sufficient to protect all of these innovations.

Ostrer's assertions regarding the scope and preemptive effect of Myriad's composition-of-matter claims are unsupported and based on an overly broad reading of the claims, presented for the first time in this Court. The Court should not accept Ostrer's construction of those claims nor allow Ostrer's exaggerated assertions about the preemptive effect of patents on isolated DNA molecules to drive its decision. The patent system is a carefully crafted bargain, and the sweeping change proposed by Ostrer is certain to have unintended consequences. Those consequences and the reliance interests of the industry should be given heavy weight in the Court's analysis.

ARGUMENT

I. THE COURT SHOULD REMAND FOR ADDITIONAL PROCEEDINGS ON STANDING AND CLAIM CONSTRUCTION

The briefing and procedural posture of this case have left the Court in a difficult situation. Before the Court can reach the merits, it must first decide whether Ostrer, the one petitioner found to have standing, still has standing to pursue this case. That requires the Court to consider not only the impact of its recent decision in *Clapper* v. *Amnesty International USA*, 133 S. Ct. 1138 (2013), but also serious questions about whether Ostrer's contemplated course of conduct would even infringe Myriad's remaining claims. Ostrer has studi-

ously avoided any factual explanation of the testing he wishes to undertake. Further, as discussed below, Myriad's broad diagnostic method claims have already been invalidated, and the composition-of-matter claims that remain present little or no obstacle to genetic testing. *See infra* pp. 30-31. Thus, it is far from clear that a live case or controversy remains.

The situation is further complicated by the fact that even at this late date there is no agreement on what Myriad's claims actually cover. Many of Ostrer's assertions about the preemptive effect of Myriad's claims are based on claim construction arguments that were never made below and, in fact, contradict arguments that Ostrer made in the district court. *See infra* p. 31. The Court has also been presented with conflicting scientific arguments, many of which depend on questionable claim constructions. *See, e.g.*, Lander Br. 12-18 (referring to fragments of DNA in the body as "isolated"). And because the case arises on summary judgment, the Court must work its way through all of these disputes without resolving any issues of material fact.

In the face of this daunting task, the most prudent course would be for the Court to remand the case to the district court for further proceedings on standing and claim construction, along with the resolution of any factual disputes. The issues addressed in this case are too important to be decided without a record of the testing that Ostrer wants to conduct, a clear understanding of what Myriad's claims actually cover, and proper fact-finding on disputed issues.

II. ISOLATED DNA MOLECULES ARE PATENTABLE SUBJECT MATTER

If the Court reaches the merits, it should affirm the judgment of the Federal Circuit.

A. Congress Defined The Scope Of Patent-Eligible Subject Matter Broadly To Include Anything Composed Or Manufactured By Humans

This Court has cautioned that "courts should not read into the patent laws limitations and conditions which the legislature has not expressed." *Diamond* v. *Chakrabarty*, 447 U.S. 303, 308 (1980) (internal quotation marks omitted). Strikingly, Ostrer and his amici barely mention the text of 35 U.S.C. § 101 and engage in no meaningful analysis of the words that Congress chose to define the subject matter that is eligible for patent protection if all the other requirements of patentability are met.

Section 101 states: "Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title." Rather than asking whether Myriad's DNA claims are drawn to "products of nature," the statute in the first instance requires this Court to determine whether they are drawn to new and useful articles of "manufacture," or "composition[s] of matter," or "improvement[s] thereof." *See also* PTO, *Utility Examination Guidelines*, 66 Fed. Reg. 1092, 1095 (Jan. 5, 2001).

This was precisely the approach taken by this Court in *Chakrabarty*. *Chakrabarty* stated that the question before the Court was "a narrow one of statu-

tory interpretation" that required the Court to determine whether the claimed "micro-organism constitute[d] a 'manufacture' or 'composition of matter' within the meaning of the statute." 447 U.S. at 307. The Court began its textual analysis by noting that the term "manufacture" refers to materials given "new forms, qualities, properties, or combinations," while "composition of matter" means "all compositions of two or more substances" or "composite articles." *Id.* at 308 (internal quotation marks omitted). The Court further noted that "[i]n choosing such expansive terms as 'manufacture' and 'composition of matter,' modified by the comprehensive 'any,' Congress plainly contemplated that the patent laws would be given wide scope." *Id.*

Chakrabarty's discussion of the line between patent-eligible and patent-ineligible subject matter followed naturally from this textual analysis. The Court noted that Chakrabarty's claims were drawn "not to a hitherto unknown natural phenomenon, but to a nonnaturally occurring manufacture or composition of matter." 447 U.S. at 309. This Court's pronouncement that "a new mineral discovered in the earth or a new plant found in the wild is not patentable subject matter" similarly distinguished between "'manifestations of … nature'" that are untouched by human hands and the subject matter specified in 35 U.S.C. § 101, which includes anything with physical form that is composed, manufactured, or otherwise "'made by man.'" *Id.*[3]

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[3] Consistent with this distinction, in *Funk Brothers Seed Co.* v. *Kalo Inoculant Co.*, 333 U.S. 127, 131 (1948), each species of bacteria "infect[ed] the same group of leguminous plants which it always infected," "[n]o species acquire[d] a different use," and "[t]he combination of species produce[d] no new bacteria, no change in the six species of bacteria, and no enlargement of the range of their utility." "Each species ha[d] the same effect it always had"

In *J.E.M. Ag Supply, Inc.* v. *Pioneer Hi-Bred International, Inc.*, 534 U.S. 124 (2001), the Court reiterated the importance of focusing on the words chosen by Congress. The Court once again noted the breadth of the subject matter eligible for patent protection if the other requirements of the statute are met. *Id.* at 130-131. The Court further explained that even if *Chakrabarty* did not address the precise question before it, it remained highly relevant to "the question whether sexually reproduced plants fall within the subject matter of § 101" because "*Chakrabarty* broadly interpreted the reach of § 101." *Id.* at 131 n.2; *see also id.* at 131 ("The subject-matter provisions of the patent law have been cast in broad terms to fulfill the constitutional and statutory goal of promoting 'the Progress of Science and the useful Arts[.]'"); *id.* at 137 n.9 ("[T]he statutory terms 'manufacture or composition of matter' … have been interpreted broadly to evolve with developments in science and technology."). Notably, no one "dispute[d] that plants otherwise fall within the terms of § 101's broad language that includes 'manufacture' and 'composition of matter.'" *Id.* at 131-132.

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and "serve[d] the ends nature originally provided and act[ed] quite independently of any effort of the patentee." *Id.*

In addition, *Funk Brothers* turned on the conclusion that the combination of non-inhibitive species "fell short of invention." 333 U.S. at 131. In 1952, Congress eliminated that mode of analysis and replaced it with Section 103, which focuses on whether an invention was obvious to one of skill in the art at the time of invention. As explained by Judge Rich, one of the 1952 Act's principal drafters, "'[i]nvention' was that 'beautiful uncertainty in the law' from which the patent bar made its living—practicing what was essentially a mystery." Rich, *Why and How Section 103 Came To Be*, 14 Fed. Cir. B.J. 181, 187 (2004). "Section 103 was enacted as a much better tool for the job." *Id.* at 192.

The isolated DNA molecules at issue in this case likewise fall within the terms of the statute and exist only as a result of human intervention. These molecules were "compos[ed]," "manufacture[d]," and "improve[d]" over what existed in nature—not merely "discovered" or "found." This transformation in form as a direct consequence of human intervention gives the molecules new utility not shared by native DNA and brings them squarely within the scope of patent-eligible subject matter defined by Congress.

B. Isolated DNA Molecules Are New Compositions Of Matter Made By Human Ingenuity

An isolated DNA molecule is not merely "information" or abstract knowledge like a mathematical formula.[4] It is a molecule composed of specific nucleotide bases linked together through a sugar-phosphate backbone. Not only is that molecule chemically distinct from native DNA as a result of human intervention, but as a practical matter, isolated DNA is synthesized in a laboratory rather than extracted from a natural source.

1. Human DNA in its natural or "native" form exists as part of chromosomes within the nucleus of human cells. Chromosomes are complex, stable structures consisting of extremely long strands of DNA chemically bonded to numerous proteins (such as histones), which give the chromosome compact form, regulate gene function, and account for half the molecular mass of the chromosome. Watson et al., *Molecular Biology of the Gene* 135 (6th ed. 2008). Shorter sequences of nucleotides within each chromosome form functional units called "genes."

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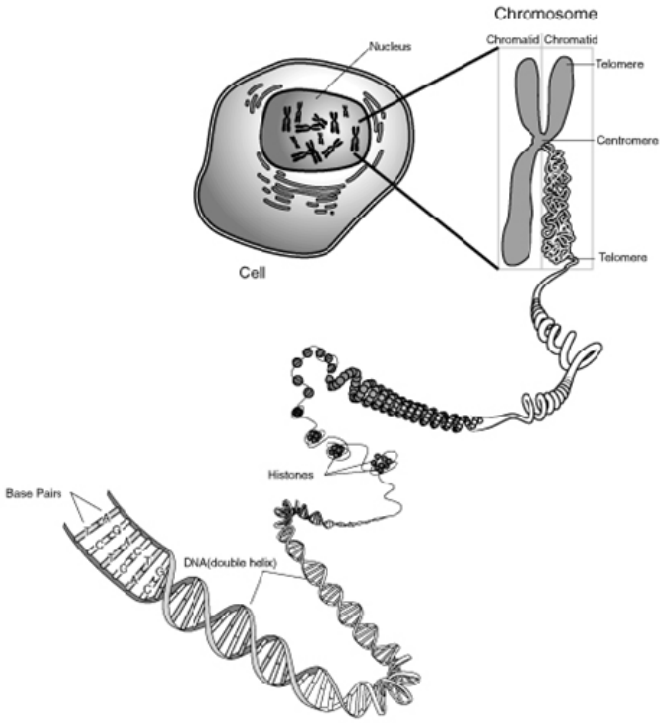
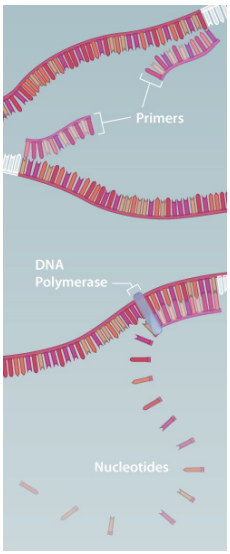
[4] The term "isolated DNA" as used in this section refers to an isolated DNA molecule that is separate from chromosomal proteins and from whole genome DNA extracted from the body.



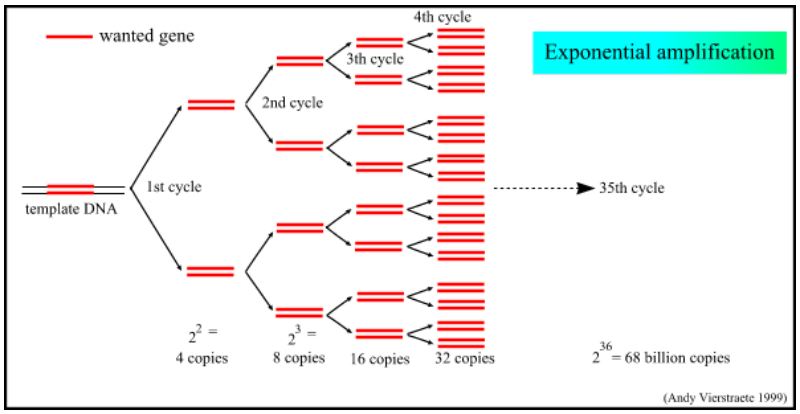
National Human Genome Research Institute, *Chromosome*, http://www.accessexcellence.org/RC/VL/GG/nhgri_PDFs/chromosome.pdf.

The notion that isolated DNA is cleaved and extracted from the human genome is inaccurate and is based on a misunderstanding of how DNA is isolated in the real world. It is true that raw, whole genome DNA can be extracted from a biological sample and cleaved into random fragments of DNA and that a gene of interest might constitute a vanishingly small fraction of this slurry of random DNA fragments, but this process does not result in the isolation of any particular gene. In fact, this sort of extraction and cleavage of genomic

human DNA pre-dates Myriad's patents by many years and cannot be what the claims mean by isolated DNA.



Moreover, in order to study or use any particular DNA sequence it is necessary to isolate it from the mix, and this isolation invariably entails amplifying the gene of interest (typically a million-fold or more) using laboratory techniques that synthesize new DNA molecules using genetically engineered recombinant cells or cell-free biochemical methods such as polymerase chain reaction (PCR). *See* Genetic Science Learning, *PCR Virtual Lab*, http://learn.genetics.utah.edu/content/labs/pcr (PCR diagram at right). This process yields new and separate chemical compounds that were never extracted from nature and exist only because of human intervention.



Vierstraete, *Principle of the PCR*, http://users.ugent.be/~avierstr/principles/pcr.html.

Isolated DNA molecules differ significantly from naturally-occurring DNA contained in larger chromosomes in multiple ways. *First*, isolated DNA molecules are typically much smaller than a full chromosome. For example the BRCA1 gene in its native form appears on human chromosome 17, which contains about 80 million base pairs. National Library of Medicine, *Chromosome 17*, http://ghr.nlm.nih.gov/chromosome/17. An isolated molecule with the same sequence as the BRCA1 gene, however, consists of only about 80,000 nucleotide pairs selected from this larger set. National Library of Medicine, *BRCA1*, http://ghr.nlm.nih.gov/gene/BRCA1.

Second, the complex spatial organization of native DNA, which is packed around and bonded to scaffolding proteins such as histones, dynamically affects its function and configuration. *See* Watson 192. Isolated DNA molecules are separated from the larger set of structures that make up the chromosome, eliminating these effects and—importantly—opening the molecules to a broader range of uses.

Third, native genes are covalently bonded to other DNA in the chromosome through phosphodiester bonds between the 5' phosphate group and the 3' hydroxyl group of adjoining nucleotides. *See* Watson 104. Isolated DNA is separated from other nucleotides, again opening it to new uses.

Fourth, in a human chromosome, the nucleotide subunits of native genes are extensively modified in a manner that regulates gene expression. *See* Watson 626-629. These "epigenetic" modifications, particularly methylation of cytosines, are lost during the synthetic processes inherent in the isolation of genes, rendering the isolated gene chemically and structurally distinct from any native gene.

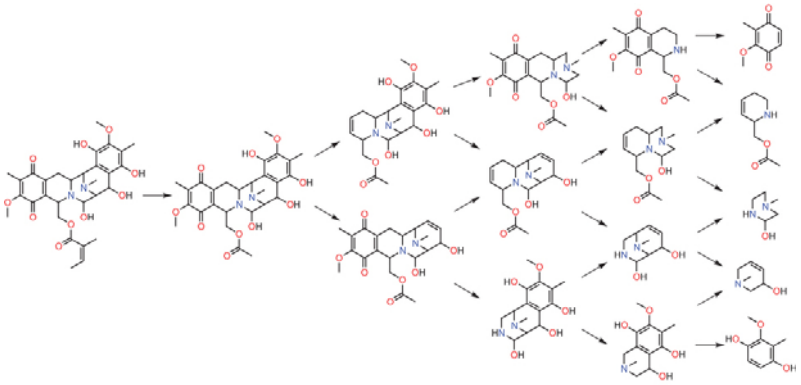
2. The distinction between native and isolated DNA is even starker in the case of cDNA. cDNA molecules consist solely of exons, nucleotide stretches that contribute directly to the production of proteins. *See* Watson 415. cDNA does not occur naturally in the body; indeed, even the nucleotide sequence of a cDNA molecule has no analogue in native chromosomal DNA, where the nucleotide sequences are interrupted by introns. For example, the naturally-occurring BRCA1 and 2 genes each contain more than 70,000 nucleotides, while the exons that make up their corresponding cDNA molecules together have fewer than 16,000. Thus, the structure of the claimed isolated cDNA molecules differs substantially from that of the natural BRCA genes.[5]

3. The United States agrees that cDNA is not a product of nature but downplays the significance of creating isolated genomic DNA by saying that "[i]solated DNA is simply naturally occurring DNA that has been extracted from its cellular environment and separated from extraneous material." U.S. Br. 20. Dismissing these structural changes as insignificant, however, would set a dangerous precedent for biology and chemistry. Judge Lourie noted that generally speaking "a covalent bond is the defining boundary be-

[5] Ostrer argues (at 51) that naturally-occurring "pseudogenes" within an organism's chromosomal DNA contain identical nucleotide sequences to cDNA molecules. But the record does not support that conclusion. One witness stated that nucleotide sequences in pseudogenes differed from cDNA sequences by at least 10 percent. JA658-659. Another referenced an example where only a portion of BRCA1 cDNA was contained in the chromosomal DNA as a pseudogene. JA675. And in both examples, the pseudogene sequences—unlike cDNA—remain fixed portions of the larger chromosomal sequence, not freestanding molecules.

tween one molecule and another." Pet. App. 48a. To equate an isolated DNA molecule with genomic DNA in the body would invite other attempts to equate distinct molecules merely because the structure of one might be found within the larger structure of the other.

For example, the diagram below shows just a few of the distinct molecules "contained" within the larger structure of Renieramycin P, a toxic molecule that naturally exists in certain marine sponges.



Over et al., *Natural-Product-Derived Fragments for Fragment-Based Ligand Discovery*, 5 Nature Chemistry 21, 22 fig.1 (2013).

Each of the molecules depicted is no more or less an extract from the natural molecule than isolated DNA is from native DNA. Characterizing isolated DNA as a product of nature would therefore create tremendous uncertainty by blurring the lines that have traditionally separated one molecule from another. It would also encourage attempts to recharacterize molecules long thought to be patentable subject matter as mere extracts of larger molecules in nature.

4. All of these structural differences easily distinguish isolated DNA molecules from the parade of hor-

ribles that Ostrer and his amici offer regarding the patenting of coal, gold, and kidneys. The mechanical extraction of these products from their natural environment does not involve the same degree of transformation that is achieved through the creation of isolated DNA molecules. Coal, gold, and kidneys start out relatively distinct from the environments in which they are found, particularly when compared to the task of selecting a small set of nucleotides from an otherwise vast chromosome. Removing them from their natural environments does not involve the same type of transformation to their three-dimensional structure that occurs when a DNA molecule is created without the histones and other scaffolding proteins that exist in the chromosome. Nor does their extraction break the same type of bonds that link native DNA.

The extraction of coal, gold, and kidneys also differs from the creation of isolated DNA in that the end product is simply the thing that has been removed from nature. By contrast, isolated DNA is typically a collection of new molecules that were replicated million-fold in the lab. The better analogy would thus be the production of "cloned" coal, "amplified" gold, or a "replicated" kidney produced in the lab from chemical building blocks.

Finally, it is important to note that examples like coal, gold, and kidneys obscure more than they illuminate because our instincts about these examples tend to be colored by the fact that these substances have been known for millennia or would be obvious. Both these reasons provide independent grounds for denying patent protection, *see infra* pp. 17-18, and the Court should not allow them to skew its analysis of the broad terms that Congress chose to define patent-eligible subject matter.

C. Isolated DNA Molecules Have New And Distinctive Properties And Uses Compared To Naturally-Occurring DNA

Isolated DNA and cDNA molecules have a significantly different character and use compared to genes within their native setting. In their natural form, genes are trapped in chromosomes and the other components of a cell. They are essentially inaccessible and under the control of the physiology of the organism in which they reside. Isolating a DNA molecule, in addition to creating a whole new chemical composition that does not exist in nature, imparts new utilities and functions unavailable from native DNA.

This enlarged range of utility flows not only from the fact of isolation but from the chemical changes that occur when DNA is synthesized in a laboratory, a process that does not reproduce the chemical and structural "epigenetic" modifications characteristic of native DNA, such as the spatial organization of native DNA around scaffolding proteins and the methyl groups on cytosine bases that play an integral role in the regulation of gene expression. *See supra* p. 13; Watson 192, 626-629. These differences are some of the reasons why isolated DNA works for applications that would not be possible with native DNA.

D. Section 101 Is A Blunt Instrument And There Are Other Tools For Limiting The Scope Of Patent Claims

The fact that isolated molecules derived from nature are patent-eligible subject matter does not mean that every such molecule can be validly patented. Section 101 plays an important screening function to prevent patents on things such as abstract ideas that do not fall within Section 101's plain terms. But after

meeting that "threshold test," a claimed invention must also be "novel, see § 102, nonobvious, see § 103, and fully and particularly described, see § 112." *Bilski* v. *Kappos*, 130 S. Ct. 3218, 3225 (2010).

The Federal Circuit has rejected claims to isolated DNA molecules on grounds of anticipation, obviousness, lack of utility, and failure to comply with the requirements of 35 U.S.C. § 112. *E.g.*, *In re Gleave*, 560 F.3d 1331 (Fed. Cir. 2009) (patent to antisense DNA sequences denied as anticipated by prior art); *In re Kubin*, 561 F.3d 1351 (Fed. Cir. 2009) (affirming PTO's obviousness rejection of a patent on a DNA molecule); *Regents of Univ. of Cal.* v. *Eli Lilly & Co.*, 119 F.3d 1559 (Fed. Cir. 1997) (claim to a vertebrate cDNA sequence encoding insulin invalid for lack of written description); *In re Fisher*, 421 F.3d 1365 (Fed. Cir. 2005) (rejecting claims to expressed sequence tags—short DNA molecules of unspecified cellular function—for lack of sufficient utility).

Many of Ostrer's arguments are not addressed to the issue of patent-eligible subject matter at all but rather to these other doctrines. For example, Ostrer's allegation (at 14) that Myriad's claims "reach all uses of multiple compositions … whether or not Myriad or anyone else has identified those compositions" is a classic written description argument under 35 U.S.C. § 112. *See Ariad Pharm., Inc.* v. *Eli Lilly & Co.*, 598 F.3d 1336, 1350 (Fed. Cir. 2010) (en banc) (the "specification does not satisfy the written description requirement if it fails to support the scope of the genus claimed"). The same is true of Ostrer's argument (at 15) that another claim "reaches any BRCA2 gene with harmful mutations regardless of whether another geneticist is the one who finds the mutation."

Ostrer's assertion (at 16) that "[f]ifteen (15) nucleotide sequences from the BRCA1 gene can be found in virtually every other gene in the body" is likewise misdirected. If that is true and the 15-nucleotide claims are as open-ended as Ostrer contends, Ostrer presumably could have brought an anticipation or obviousness challenge under 35 U.S.C. § 102 or § 103 long ago based on the prior isolation of molecules covered by the claims.

Ostrer made a deliberate strategic decision not to assert grounds of invalidity that would be specific to the challenged claims alone. Instead, his theory of the case is designed to make it impossible for the Court to invalidate these claims without also invalidating large numbers of other patents in areas that have nothing to do with diagnostic testing. The Court should not allow that strategic choice to pressure it into creating a sweeping exception to the scope of patent-eligible subject matter.

III. The Broad Product Of Nature Exception That Ostrer Seeks Would Chill Innovation

A broad "product of nature" exception would have harmful consequences for the biotechnology industry and would chill a wide range of important activities that benefit society. Although this case has focused on the use of isolated human DNA for diagnostic purposes, the rule that Ostrer proposes could interfere with non-diagnostic uses of isolated human DNA, the untapped potential of isolated non-human DNA, and the invention and disclosure of other isolated molecules with natural analogues, such as therapeutic proteins and antibiotics. Ostrer's rule would also put the United States out of step with other major industrialized na-

tions, which permit patents on isolated nucleic acids. *See* Institute of Professional Representatives Br. 3.

A. Ostrer's Proposed Rule Would Impact Non-Diagnostic Uses Of Isolated DNA

Isolated DNA molecules have been critical in developing a broad range of therapeutic, agricultural, food safety, and industrial technologies:

Therapeutic Proteins. Recombinant proteins are used to treat many diseases and conditions, including cancer, diabetes, growth deficiency, rheumatoid arthritis, hemophilia, and hepatitis. For example, Amgen's pioneering work with erythropoietin revolutionized the treatment of anemia. Twenty-five percent of renal patients on dialysis required regular blood transfusions before Amgen isolated the DNA that codes for erythropoietin and made it therapeutically available. Jelkmann, *Molecular Biology of Erythropoietin*, 43 Internal Med. 649, 649 (2004). Amgen's development and marketing of its therapeutic, Epogen®, virtually eliminated the need for such transfusions. Amgen's patent on the isolated DNA molecule for erythropoietin, U.S. Patent No. 4,703,008, has been critical in protecting this breakthrough. *E.g.*, *Amgen, Inc.* v. *Chugai Pharm. Co.*, 927 F.2d 1200 (Fed. Cir. 1991). Among other things, that patent claimed: "'A purified and isolated DNA sequence consisting essentially of a DNA sequence encoding human erythropoietin.'" *Id.* at 1204.

Synthetic insulin is another success story. Insulin is a hormone that regulates blood sugar levels; diabetes results when the body stops producing insulin (type 1) or can no longer respond to it (type 2). Doctors once relied on insulin taken from the pancreases of slaughtered cows or pigs to treat diabetes. Genentech identi-

fied the DNA molecules necessary to produce and assemble synthetic human insulin in bacterial host cells. *See* Press Release, Genentech, *First Successful Laboratory Production of Human Insulin Announced* (Sept. 6, 1978). Unlike pig and cow insulin, synthetic insulin does not cause allergic reactions in human patients and is available in abundant quantities.

Human growth hormone (HGH) is a third vivid example of the advances made possible by isolated DNA molecules. The hormone used to be extracted from the pituitary glands of human cadavers. It was only after scientists synthesized HGH in a lab, using isolated DNA molecules to express the protein in bacterial cultures, and disclosed this invention to the world that HGH became available for wider therapeutic applications. *See, e.g.*, U.S. Patent No. 4,898,830 (claiming "[a] DNA molecule consisting of DNA encoding amino acids 1-191 of human growth hormone"). Recombinant HGH is now used to treat a variety of childhood and adult growth disorders. *E.g.*, Schambelan et al., *Recombinant Human Growth Hormone in Patients with HIV-Associated Wasting*, 125 Annals Internal Med. 873, 873 (1996).

Vaccination. By using DNA that encodes only certain proteins from the surface of a virus or bacteria, biotechnology innovators have been able to manufacture vaccines carrying a lower risk of infection and improved vaccine stability. *See* World Health Organization, Technical Report Series No. 941, *Guidelines for Assuring the Quality and Nonclinical Safety Evaluation of DNA Vaccines* 58 (2007). Vaccines that use small pieces of DNA to trigger antibody production also have the potential to provide immunization against microbes for which no vaccine is currently available. BIO, *Guide to Biotechnology* 37 (2008). The technology

is still in its nascent stages, but the field is developing rapidly. There are currently over 40 clinical trials evaluating DNA vaccines for diseases such as HIV, influenza, hepatitis, malaria, and cancer. Ferraro et al., *Clinical Applications of DNA Vaccines: Current Progress*, 53 Clinical Infectious Diseases 296, 298 (2011).

Agriculture. Researchers continue to work on ways to feed more people at lower cost and with less environmental impact by identifying and using genetic markers associated with natural resistance to insects and diseases, resistance to environmental stresses such as drought and temperature fluctuations, and improved characteristics such as lower nutrient use and higher yield. Considerable investment is still required to unlock the full potential of DNA-based agriculture. For example, important genomes, such as the cow and chicken genomes, were not sequenced until 2004. *Guide to Biotechnology* 49. The corn genome, only the third of any major crop to be sequenced, was not completed until 2008. *Id.* 14.

Food Safety and Health. The importance of DNA-based inventions to the food supply does not end on the farm. "[R]esearchers are now using genomic technologies to drive improvements in food processing, food safety, and quality assurance." Brown & van de Ouderaa, *Nutritional Genomics: Food Industry Applications From Farm to Fork*, 97 Brit. J. Nutrition 1027, 1029 (2007). DNA technology holds great promise in combating foodborne illness, a major public health issue affecting millions of people each year. *See* Marchelli et al., *DNA Analyses in Food Safety and Quality*, *in Detection of Non-Amplified Genomic DNA* 25, 36 (Spoto & Corradini eds., 2012). DNA probes to detect harmful or lethal microorganisms in the food supply offer significant benefits over conventional detection methodology.

See Brown & van de Ouderaa, 97 Brit. J. Nutrition at 1030-1031. Biotechnology is also providing improved food products with health benefits to populations with limited healthcare options or challenging living conditions. For example, the addition of human milk components to livestock milk has the potential to benefit milk safety and production as well as animal health. *See* Maga et al., *Production and Processing of Milk from Transgenic Goats Expressing Human Lysozyme in the Mammary Gland*, 89 J. Dairy Sci. 518, 518 (2006).

Industrial and Environmental Biotechnology. Patents on isolated DNA molecules are also important for industrial, energy, and environmental applications. DNA-encoded biocatalysts, such as enzymes, can decrease energy use, replace harsh chemicals in industrial processing, and produce biofuels and green plastics without the use of petroleum, helping to reduce dependence on "dirty" energy sources and mitigate global climate change. *See* Shi, *Biotechnology: Healing, Fueling, and Feeding the World*, 9 Revs. Envtl. Sci. Biotech. 311, 311 (2010).

Engineering Tools. The laboratory techniques used to manufacture large quantities of proteins themselves rely on other isolated DNA molecules to promote and regulate the expression of the desired protein in a host cell. Isolated DNA molecules have thus become critical engineering tools.

Unforeseeable Discoveries. Just as important as the DNA-based research already in progress are the unforeseen discoveries that might never occur without strong patent protection to encourage investment of private capital.

Native DNA simply cannot be used in these applications. A rule that limits the patentability of isolated

DNA thus threatens to stifle research in a vast array of important fields.

B. cDNA Claims Are Inadequate To Protect Critical Inventions, Particularly Isolated Non-Human DNA And Isolated RNA Molecules

The United States and others urge this Court to draw a distinction between cDNA and isolated genomic DNA. One amicus even asserts that the "biotechnology industry would not be substantially affected" by a decision holding that only cDNA is eligible for patent protection. Lander Br. 27. Although cDNA is certainly an easy case, the assertion that patents on isolated genomic DNA are not important is simply wrong.

The effects of limiting patent eligibility to cDNA would fall particularly hard on non-human genetic research. Prokaryotes such as bacteria do not have introns. *See* Watson 136-143. The same is true for blue-green algae (a vast category of archaic bacteria) and many viruses. As a result, when an inventor creates an isolated DNA molecule inspired by one of the millions of unexplored genomes of these organisms, it is not possible to protect the invention with a cDNA patent because there are no introns for the inventor to exclude.

Research into the possible applications of isolated prokaryotic DNA has already yielded critical advances. The enzyme most commonly used to perform PCR was derived from a prokaryotic bacterium found in hot springs, *Thermus aquaticus*. Watson 380 fig.12-2. That foundational discovery—which made PCR practical as a laboratory technique, ushering in the modern era of molecular biology—was protected by a patent claiming the DNA sequence required to express a form of the enzyme. U.S. Patent No. 5,405,774. Prokaryotic

DNA has also been used to detect infectious diseases and to study bacteria that live in the human body. Finally, prokaryotes often serve as host cells to produce a desired protein, and prokaryotic DNA has become an important engineering tool to regulate or promote protein expression. Placing limits on patenting these regulatory elements would affect the ability to manufacture proteins from isolated DNA molecules of any origin

This field is still in its early stages. As of 2008, less than one percent of the world's microorganisms had been cultured and characterized. *Guide to Biotechnology* 64. Private investment will be critical to that effort and to identifying, isolating, and developing the innovative polynucleotides that will change the way we grow our food, fuel our cars, care for our environment, and even treat illness. A rule limiting patent eligibility to cDNA could cut off that research in its infancy.

cDNA claims are also insufficient to protect important inventions involving other nucleic acids, such as RNA, as well as the developing area of research focusing on gene regulation by intronic sequences. For example, microRNA (miRNA) is a small RNA molecule that does not encode proteins but plays a critical role in regulating gene expression. miRNAs have been linked to cancer, obesity, and heart disease in animal models. Clinical studies testing the use of miRNA as a therapeutic agent are currently underway, but without patent protection, it would be difficult to attract the necessary investment to fund this promising platform.

C. Ostrer's Rule Would Also Threaten A Wide Range Of Other Types Of Isolated Molecules

Just as it is important for the Court to look beyond human DNA and to consider not only diagnostic uses

but also therapeutic, agricultural, and industrial uses, it is also important for the Court to consider the impact that Ostrer's proposed rule would have on the incentives to invent other molecules. Without patent protection, many new and useful compositions of matter that are isolated or derived from natural sources would never be discovered, disclosed, and commercialized. For example:

Sirolimus, also known as rapamycin, is a macrocyclic compound produced by the bacterium *Streptomyces hygroscopicus* NRRL 5491, which was first discovered in a soil sample from Easter Island. The inventor disclosed the discovery, deposited a sample of the bacterium, and applied for and obtained a patent on purified sirolimus as a novel antifungal and antibiotic compound. *See* U.S. Patent No. 3,929,992. The compound was subsequently developed as a powerful immunosuppressant for clinical use, and today RAPAMUNE® (sirolimus) is used to prevent organ rejection in kidney transplant patients. Sirolimus was also found to display cytostatic (antiproliferative) activity outside the immune system, and coronary stents with sirolimus-eluting coatings, such as Cordis's CYPHER® Stent, were developed to prevent endothelial growth around the newly placed stent. Semisynthetic derivatives of sirolimus have also been developed in an effort to use sirolimus's cell growth-arresting properties to treat cancer.

Tacrolimus is a compound with immunosuppressive properties that is used to help prevent the rejection of transplanted organs. Tacrolimus is produced by the bacterium *Streptomyces tsukubaensis*, which was first discovered in a soil sample in Japan. After isolating and applying for a patent on the compound, the inventors published their discovery and deposited samples of *Streptomyces tsukubaensis* No. 9993. On Janu-

ary 16, 1990, the PTO issued U.S. Patent No. 4,894,366 on tacrolimus. In 1994, the FDA approved the patent owner's commercial product Prograf®, which is used to prevent organ rejection in people who have received kidney, liver, or heart transplants. The '366 patent has now expired, and at least four companies have launched generic versions of Prograf®.

Aplidine, also known as dehydrodidemnin B, is a chemical compound that was first extracted from a sea squirt, *Aplidium albicans*. After isolating the compound, its inventors patented aplidine for use as a novel antitumor agent. U.S. Patent No. 5,834,586. The isolation of aplidine permitted it to be produced synthetically, and it is now in clinical trials as a treatment for several different types of cancer. *See* PharmaMar, *Products: Aplidin*®, http://pharmamar.com/aplidin.aspx. In 2004, the FDA granted Aplidin® orphan drug status for its potential use in treating multiple myeloma, a plasma cell cancer. 21 U.S.C. §§ 360aa *et seq.*; 21 C.F.R. pt. 316. Orphan drug status is a recognition that research and development of new treatments for this disease, given its rarity, would otherwise be prohibitively expensive. Uncertainty regarding the patentability of purified aplidine as an antitumor agent would have only exacerbated this problem.

Exenatide is a chemical compound first purified from a hormone found in the saliva of Gila monsters. It was developed and patented in 1993 by Dr. John Eng for use as a novel treatment for diabetes. U.S. Patent No. 5,424,286. It is now approved by the FDA for that purpose in both twice-daily and weekly forms, under the brand names Byetta® and Bydureon®, respectively.

Phytase, an enzyme included in animal feed, significantly reduces the inability of some livestock to digest phytate in grain, which causes environmental pollution from fecal phosphate. Progress in this area has been facilitated by the invention of a phytase enzyme from the microbe *E. coli* and patent protection of isolated DNA. *See* U.S. Patent No. 6,190,897.

Glucoamylase, an enzyme from the fungus *Trichoderma reesei* that efficiently releases glucose sugars from carbohydrates, allows for better production of biofuels such as ethanol. *See* U.S. Patent No. 7,413,887.

Muromonab-CD3, a monoclonal antibody derived from mice, is used to prevent transplant rejection by suppressing the human immune system and was created using standard immunization and hybridoma techniques. The inventors patented the resulting antibody, muromonab-CD3. *See, e.g.*, U.S. Patent No. 4,361,549. After further investment and clinical trials, muromonab-CD3 became the first monoclonal antibody approved by the FDA, and it was commercialized as Orthoclone OKT3®.

It is these real world examples, rather than the implausible ones offered by Ostrer, that the Court should keep in mind as it weighs the potential impact of its decision. No one would or could patent coal, gold, or kidneys. But an overbroad rule directed to eliminating that fanciful possibility would have real and lasting consequences for other areas of innovation that depend on patent protection. Every time the Court thinks about coal, it should think about antibiotics. Every time it thinks about gold, it should think about erythropoietin. Every time it thinks about kidneys, it should think about insulin, antibodies, DNA vaccines, industrial enzymes, early detection of foodborne illnesses, and

all the other countless inventions that might never be made and disclosed without the incentives provided by the patent system.

IV. PATENTS ON ISOLATED DNA MOLECULES DO NOT IMPEDE THE PROGRESS OF SCIENCE OR HARM PATIENTS

A. Ostrer Exaggerates The Effect Of Myriad's Composition-Of-Matter Claims

Ostrer makes a series of sweeping—and demonstrably incorrect—assertions regarding the preemptive effect of Myriad's composition-of-matter claims. Those assertions provide no basis for deviating from decades of precedent and PTO practice recognizing the patent-eligibility of isolated DNA molecules.

1. As an initial matter, it would be a mistake for the Court to turn the preemption principle that the Court discussed in *Mayo* into the decisive test that Ostrer proposes. *See* Pet. Br. 40. This Court acknowledged in *Mayo* that "too broad an interpretation of [the preemption] principle could eviscerate patent law." *Mayo Collaborative Servs.* v. *Prometheus Labs., Inc.*, 132 S. Ct. 1289, 1293 (2012). This case well illustrates the sort of speculation and collateral litigation that indiscriminately applying a preemption standard would require.

2. Ostrer contends that Myriad's claims "reach all uses of the two human genes" (Pet. Br. 42), and that "[t]he effect of the patents has been to prevent and deter research" (*id.* 43) and to "bar access to people's genetic information" (*id.* 44). These unsubstantiated allegations exaggerate the effect of the composition-of-matter claims before the Court.

Ostrer initially challenged two distinct sets of claims: broad diagnostic method claims directed to

"comparing" or "analyzing" DNA sequences and the composition-of-matter claims at issue here. It was the first set of claims, not the second, that impacted genetic diagnostic testing. But those diagnostic method claims were invalidated even before this Court decided *Mayo*. Now that the diagnostic method claims have been invalidated, the remaining composition-of-matter claims are unlikely to have any effect on Ostrer, and certainly not the sweeping effect that Ostrer alleges.

The first set of claims (claims 1, 2, and 7 of U.S. Patent No. 5,747,282; claims 1, 6, and 7 of U.S. Patent No. 5,837,492; and claim 1 of U.S. Patent No. 5,693,473) are all directed to isolated DNA molecules comprising *thousands* of nucleotides. Conventional BRCA testing, however, is based on the amplification and analysis of much smaller fragments of DNA. *See, e.g.*, Cook-Deegan et al., *Impact of Gene Patents and Licensing Practices on Access to Genetic Testing for Inherited Susceptibility to Cancer*, 12 Genetics Med. S15, S23 (Apr. Supp. 2010). As Ostrer concedes (at 11 n.3), there is no need to create full-length molecules to engage in that testing.

The remaining two claims (claims 5 and 6 of the '282 patent) have broader scope because they cover isolated fragments having as few as 15 nucleotides. The breadth of such claims, however, makes them more susceptible to attack under 35 U.S.C. § 102 (anticipation), § 103 (obviousness), and/or § 112 (written description and enablement), avenues Ostrer intentionally disavowed. *See supra* pp. 18-19.

Moreover, existing and emerging sequencing techniques such as whole genome sequencing do not require isolation of the gene being sequenced. *See, e.g.*, Holman, *Will Gene Patents Derail the Next Generation of*

Genetic Technologies?: A Reassessment of the Evidence Suggests Not, 80 UMKC L. Rev. 563, 579-580 (2012); Price, *Unblocked Future: Why Gene Patents Won't Hinder Whole Genome Sequencing and Personalized Medicine*, 33 Cardozo L. Rev. 1601, 1618-1623 (2012). It is thus highly questionable whether Myriad's composition-of-matter claims would impede genetic testing.

3. Ostrer also exaggerates the effect of Myriad's claims by adopting a broad claim construction that directly contradicts the arguments he made in the district court. For example, Ostrer argues for the first time in this Court that Myriad's claims "reach any DNA if it is as little as 60% similar to the specified DNA" or "any DNA that creates proteins as little as 30% similar to the specified proteins." Pet. Br. 13. But in the district court, Ostrer and his expert witnesses argued that the portions of the specification he now cites do *not* alter the claims' plain meaning. *See* Grody Decl. ¶¶ 11, 14, 17, 26, 29 (Dkt. 67); Leonard Decl. ¶¶ 31, 34, 37, 46, 49 (Dkt. 68). Similarly, Ostrer now argues that the claims "reach all fragments of both the DNA and the proteins" and cover "other forms of genetic material," such as "'RNA.'" Pet. Br. 13. But in the district court, he argued that the claims do not cover anything more or less than the identified sequence. *See* AMP Summ. J. Br. 11 (Dkt. 62); Grody Decl. ¶ 29; Leonard Decl. ¶ 48. Other contradictions abound. *Compare* Pet. Br. 14 ("the sequence referenced is solely illustrative"), *with* AMP Summ. J. Br. 12 ("there is only one polynucleotide sequence that is covered by claim 2 and it is identified in the claim as SEQ ID NO:1").

These striking inconsistencies are not just technical errors. Rather, they go to the heart of Ostrer's strategy to exaggerate the impact of Myriad's composition-of-matter claims.

4. More generally, the claim that patents on isolated DNA molecules stifle basic research has no basis in fact. "[E]mpirical research suggests that the fears of widespread anticommons effects that block the use of upstream discoveries have largely not materialized." Caulfield et al., *Evidence and Anecdotes: An Analysis of Human Gene Patenting Controversies*, 24 Nature Biotech. 1091, 1093 (2006); *see also* Adelman & DeAngelis, *Patent Metrics*, 85 Tex. L. Rev. 1677, 1681 (2007) ("The existing empirical studies find few clear signs that the patenting of biotechnology inventions is adversely affecting biomedical innovation."). For example, a 2006 report by the National Research Council of the National Academies found that

> the number of projects abandoned or delayed as a result of technology access difficulties is reported to be small, as is the number of occasions in which investigators revise their protocols to avoid intellectual property complications or pay high costs to obtain access to intellectual property. Thus, for the time being, it appears that access to patents or information inputs into biomedical research rarely imposes a significant burden for academic biomedical researchers.

National Research Council, *Reaping the Benefits of Genomic and Proteomic Research* 134 (2006).

A 2005 survey of scientists involved in biomedical research found that "patenting does not seem to limit research activity significantly, particularly among those doing basic research." Walsh et al., *Patents, Material Transfers and Access to Research Inputs in Biomedical Research* 3 (2005). Only one percent of a random sample of 381 academic scientists reported a pro-

ject delay of more than a month due to patents on materials necessary for their research, and none reported abandoning a research project due to the existence of patents. *Id.* at 17; *see also* Walsh et al., *View from the Bench*, 309 Science 2002 (2005).

An earlier study found that patents "rarely precluded the pursuit of worthwhile projects." Walsh et al., *Working Through the Patent Problem*, 299 Science 1021 (2003). It noted that "for a given project, usually fewer than a dozen outside patents require serious consideration, and the number of licenses required is much fewer, often none." *Id.* When requested, licenses were often available at minimal or no cost. Walsh, *Patents & Access*, at 17. "Thus, not only are barriers or delays rare, but costs of access for research purposes are negligible." *Id.*

Ostrer's arguments about stifling research also ignore the protection provided to researchers under 35 U.S.C. § 271(e)(1), *see Merck KGaA* v. *Integra Lifesciences I, Ltd.*, 545 U.S. 193 (2005), and the common law research exception, *see Whittemore* v. *Cutter*, 29 F. Cas. 1120, 1121 (C.C.D. Mass. 1813) (Story, J.). In addition, throughout the biotech industry, rational forbearance against researchers is the norm. *See, e.g.*, Chandrasekharan et al., *Propietary Science, Open Science and the Role of Patent Disclosure*, 27 Nature Biotech. 140, 140 (2009). This helps explains why "there is little documented evidence that patents covering genes or indeed any other subject matter have a detrimental impact on the conduct of research in the academic setting." Toneguzzo, *Impact of Gene Patents on the Development of Molecular Diagnostics*, 5 Expert Op. Med. Diagnostics 273, 274 (2011).

B. Patents On Isolated DNA Molecules Do Not Harm Patients

Ostrer's assertions about the effects of Myriad's composition-of-matter patents on patient health and access to medical care are also exaggerated. It is easy to argue after an invention has already been discovered and disclosed that the public would be better off if it were not patented. It is just as easy to single out a particular invention and argue with the benefit of hindsight that patent protection was not necessary for its discovery and development.

Such facile arguments ignore the long-term benefits that the public derives from providing patent protection in exchange for the disclosure of new and useful discoveries. *See, e.g.*, *Eli Lilly & Co.* v. *Premo Pharm. Labs., Inc.*, 630 F.2d 120, 138 (3d Cir. 1980) ("Congress has determined that it is better for the nation in the long-run to afford the inventors of novel, useful, and nonobvious products short-term monopolies on such products[.]"). These arguments also ignore the fact that patent protection exists for a limited period, and once a patent expires, the invention enters the public domain. Indeed, Myriad's patents as well as many isolated DNA patents from the same era are due to expire in the very near future, after which the inventions will be in the public domain. *See* Resp. Br. 3

The advances made by the U.S. biotechnology industry under current law were not inevitable, and the industry's future success and continued global leadership depend on the ability to continue attracting private investors willing to shoulder the substantial risk of financing research and development. In the life sciences, early-stage companies hold roughly two-thirds of the future clinical pipeline. Boston Consulting Group,

Rising to the Productivity Challenge 6 & ex. 4 (2004). Without patent protection for isolated DNA molecules, many companies would be unable to see those projects through to completion as potential sources of investment dry up. The list of potentially life-enhancing therapeutics and diagnostics that die in the pipeline as a result might never be known. But their absence would be acutely felt by patients suffering from the many diseases that currently lack effective treatments and cures.

C. The Biotechnology Industry Has Relied On The Patent Eligibility Of Isolated Compositions Derived From Nature

The Court must also weigh Ostrer's unsupported assertions against the reliance interests of an industry that depends on a stable patent system to sustain innovation. Any adverse effects that might result from the limited monopoly that a patent provides pale in comparison to the devastating impact Ostrer's proposed rule would have on the industry.

The United States tries to minimize the reliance interests at stake by noting that the PTO did not adopt its utility guidelines until 2001. *See* U.S. Br. 5, 27-28. But far more important than what the PTO has *said* is what the PTO has *done*. The PTO has been granting patents on isolated DNA molecules for thirty years and granting patents on other isolated compositions derived from nature for well over a hundred years. The United States also ignores the reliance fostered by decades of judicial precedent. *See* Resp. Br. 4-5 & n.2. The modern biotechnology industry has developed and flourished under this regime of consistent protection for isolated compositions derived from nature.

If a different balance is to be struck, it should be struck by Congress based on sound evidence and with due regard to the reliance interest of existing patent-holders. *See Festo Corp.* v. *Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 U.S. 722, 739 (2002); *J.E.M. Ag Supply*, 534 U.S. at 145. In fact, Congress recently considered the issue of whether "gene patents" impede innovation or harm patients during its development of the America Invents Act, and opted to request a study on "effective ways to provide independent, confirming genetic diagnostic test activity where gene patents … exist." Leahy-Smith America Invents Act, Pub. L. No. 112-29, § 27(a), 125 Stat. 284, 338 (2011). Once the PTO finishes the study and makes its required recommendations to the relevant House and Senate committees, Congress will have yet another opportunity to consider whether there is a need for targeted solutions in this area. Notably, Congress did *not* request an evaluation of whether "gene patents" themselves should be restricted or banned.

This Court should respect the broad language Congress chose to use in Section 101 and, with due regard for the reliance interests at stake, leave it to Congress to set policy in this area. To do otherwise would allow unsubstantiated assertions and exaggerations to upset decades of practice in a vast array of technological areas that are vital to human health.

CONCLUSION

For the reasons stated above, the judgment of the Federal Circuit should be affirmed.

Respectfully submitted.

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