2010-1406

United States Court of Appeals for the Federal Circuit

THE ASSOCIATION FOR MOLECULAR PATHOLOGY, THE AMERICAN COLLEGE OF MEDICAL GENETICS, THE AMERICAN SOCIETY FOR CLINICAL PATHOLOGY, THE COLLEGE OF AMERICAN PATHOLOGISTS, HAIG KAZAZIAN, MD, ARUPA GANGULY, PhD, WENDY CHUNG, MD, PhD, HARRY OSTRER, MD, DAVID LEDBETTER, PhD, STEPHEN WARREN, PhD, ELLEN MATLOFF, M.S., ELSA REICH, M.S., BREAST CANCER ACTION, BOSTON WOMEN'S HEALTH BOOK COLLECTIVE, LISBETH CERIANI, RUNI LIMARY, GENAE GIRARD, PATRICE FORTUNE, VICKY THOMASON, and KATHLEEN RAKER,

Plaintiffs-Appellees,

v.

UNITED STATES PATENT AND TRADEMARK OFFICE,

Defendant,

and

MYRIAD GENETICS, INC.,

Defendant-Appellant,

and

LORRIS BETZ, ROGER BOYER, JACK BRITTAIN, ARNOLD B. COMBE, RAYMOND GESTELAND, JAMES U. JENSEN, JOHN KENDALL MORRIS, THOMAS PARKS, DAVID W. PERSHING, and MICHAEL K. YOUNG, in their official capacity as Directors of the University of Utah Research Foundation,

Defendants-Appellants.

Appeal from the United States District Court for the Southern District of New York in Case No. 09-CV-4515, Senior Judge Robert W. Sweet.

BRIEF OF AMICUS CURIAE PROFESSOR EILEEN M. KANE IN SUPPORT OF PLAINTIFFS-APPELLEES AND AFFIRMANCE

EILEEN M. KANE
PENN STATE DICKINSON SCHOOL OF LAW
328 Katz Building
University Park, PA 16802
(814) 863-3166
emk17@psu.edu

DECEMBER 7, 2010

COUNSEL PRESS, LLC (202) 783-7288 * (888) 277-3259 233726

FORM 9. Certificate of Interest

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

Association for Molecular Pathology et al. v. United States Patent & Trademark Office et al

No. 2010-1406

CERTIFICATE OF INTEREST

Counsel for the (petitioner) (appellant) (respondent) (appellee) (amicus) (name of party) Eileen M. Kane certifies the following (use "None" if applicable; use extra sheets if necessary):

1. The full name of every party or amicus represented by me is:

Eileen M. Kane

2. The name of the real party in interest (if the party named in the caption is not the real party in interest) represented by me is:

Eileen M. Kane

3. All parent corporations and any publicly held companies that own 10 percent or more of the stock of the party or amicus curiae represented by me are:

None

4. ☑ The names of all law firms and the partners or associates that appeared for the party or amicus now represented by me in the trial court or agency or are expected to appear in this court are:

Eileen M. Kane, Penn State Dickinson School of Law

Dec. 6, 2010
Date

Eileen M. Kane
Signature of counsel

Eileen M. Kane
Printed name of counsel

Please Note: All questions must be answered

cc: _____

TABLE OF CONTENTS

Page

TABLE OF AUTHORITIES

Page(s)

Cases

Constitutional Provisions

Statutes

Other Authorities

STATEMENT OF INTEREST OF AMICUS CURIAE

Eileen M. Kane is Professor of Law at Penn State Dickinson School of Law. Professor Kane has a Ph.D. in molecular biology, and her legal scholarship has focused on the intersection of patent law and the life sciences, with particular attention to the patent eligibility of DNA. She is a registered attorney before the United States Patent and Trademark Office. Professor Kane has no financial interest in the above referenced case. This brief is submitted because of the continuing importance of striking a balance between the patent system and the public domain. Professor Kane submits this brief as amicus curiae pursuant to Federal Rule of Appellate Procedure 29(a). All parties have consented in writing to the filing of this brief.

SUMMARY OF THE ARGUMENT

This case is not complicated, when reduced to its fundamentals: is it possible to patent the genes and the correlations between genes and disease? Patent law has long accommodated a balance between an inviolable preserve of open knowledge and the gated zones of patented inventions. That balance is enforced through the patentable subject matter doctrine of 35 U.S.C. § 101. This challenge to the patent eligibility of the claimed genes and genetic correlations is important because of the long-established norms in patent law jurisprudence that laws of nature and natural products cannot be patented, and the possibility that illegitimate patent claims have preempted the use of knowledge tools that belong in the public domain.

There are two theories of patent ineligibility that can be applied to the gene. The gene is a DNA molecule with a specific patent ineligibility that results from its unique property as the repository of the genetic code. The patenting of genes preempts the use of the genetic code and thus violates the prohibition on patenting laws of nature. This theory of specific patent ineligibility does not implicate the patenting of other molecules in the life sciences. However, the gene is also generally ineligible for patenting in view of the product of nature doctrine, which requires the inventive alteration of any natural product before a patent can be granted. The isolated gene of the challenged patent claims is not altered from its

natural state, but simply reproduced outside the cell. It is a product of nature, and as such, cannot be patented.

The patenting of genetic correlations also violates the prohibition on patenting laws of nature, as the relationships between DNA and disease are prototypical laws of nature. As genetic medicine continues to develop, it is critical that the genotype-phenotype correlations which are essential to this field remain unpatented. More generally for the life sciences, it is essential to establish whether every observation of molecular performance can be converted into a patent claim.

Not everything can be patented. The Supreme Court has been quite clear that the laws of nature, natural phenomena, and abstract ideas are not patentable. The underlying rationale is that scientific advances depend on an available substrate of basic knowledge, and that, therefore, patenting the intellectual foundations of a field has an adverse effect on its progress. The exclusions from patentable subject matter are intended to keep foundational and uninvented knowledge available to all and outside the patent system. Neither genes nor genetic correlations are invented, yet the laws of nature embodied in these discoveries are preempted by the patent claims under challenge in this case. The district court properly identified the eligibility defects of the challenged patent claims, and its conclusion that these patent claims are invalid under 35 U.S.C. § 101 should be affirmed.

ARGUMENT

I. The Gene Has a Specific Patent Ineligibility

DNA is a unique molecule that functions as the chemical repository of inherited information which is written in the language of the genetic code. A gene is a natural embodiment of the genetic code, and the finite set of human genes comprise the human genome. The genetic code is a law of nature and as an essential component of the public domain in molecular biology. The patenting of genes preempts the genetic code, and is contrary to the Supreme Court's prohibition on patenting laws of nature.

A. The Genetic Code Is a Law of Nature

The discovery of the double helical structure of the DNA molecule suggested that hereditary information might be captured in a molecule with a novel structural design. James D. Watson, *DNA: The Secret of Life* 53 (2004). The chemical analysis of DNA revealed that it was composed of a discrete set of nucleotides which were arranged sequentially. The molecular structure was then understood to convey an informational code which accounted for its ability to function as the hereditary material. *Id*. at 76.

The genetic code, deciphered in 1966, explains the relationship between DNA and protein. The gene functions as a template according to the genetic code. "The genetic code is not the message itself but the 'dictionary' used by the cell to

translate from the four-letter language of nucleic acid to the 20-letter language of protein." Frances Crick, *The Genetic Code III*, 215 Scientific American 55, October 1966. The genetic code describes a discrete set of fixed relationships between DNA and protein, mediated through RNA intermediates. It is a set of equivalences that dictate that a specific DNA sequence has a specific protein correlate. It is interchangeably used by disparate organisms across biology. The leading historian of the genetic code noted that its significance was apparent when the code's universality among organisms was clear: "Universality was of course a highly prized feature. If true, then on the phenomenonological level it would elevate the genetic code to the pedestal of universal laws of nature, a privilege usually reserved for the Olympian reaches of physics." Lily E. Kay, *Who Wrote The Book Of Life?: A History Of The Genetic Code* 276 (2000).

The genetic code is equivalent in status to the laws of physics previously recognized as laws of nature in the jurisprudence of patentable subject matter. "The laws of nature, physical phenomena, and abstract ideas have been held not patentable. Thus, a new mineral discovered in the earth or a new plant found in the wild is not patentable subject matter. Likewise, Einstein could not patent his celebrated law that $E=mc^2$; nor could Newton have patented the law of gravity. Such discoveries are "manifestations of . . nature, free to all men and reserved exclusively to none." *Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980). This

recitation of unpatentable scientific laws by the Supreme Court provides a firm basis for concluding that discoveries of scientific equivalences cannot be patentable subject matter; in fact, these are precisely the kinds of intellectual achievements that must be segregated from the patent system so that they can be used freely by all. The designation of the genetic code as a law of nature has implications for the patenting of its natural embodiments, which are the genes.

B. The Genes Are the Natural Embodiments of the Genetic Code and Are Not Invented

Genes are nature's exemplars of the genetic code – as such, they embody this law of nature. The conversion of the genetic code into a human organism is accomplished by the particular set of formulas that are individually encapsulated as the genes. Extensive scientific efforts have been expended to locate and characterize the genes and to sequence the full human genome, finally culminating in the efforts of the Human Genome Project. International Human Genome Sequencing Consortium, *Finishing the Euchromatic Sequence of the Human Genome*, 431 Nature 931 (2004).

The gene, while formally described as a chemical compound,
is functionally explained as a template. The dynamic gene operates by the laws of the genetic code. Activation of a gene initiates a sequence of metabolic events that unfold to accomplish the ultimate objective of generating a protein from a gene, a process generally known as gene expression.

The use of the genetic code in genetic medicine is accomplished by research into the behavior of the genes, which dictate the structure and function of the human organism. While the science is novel and paradigm-shifting, it is only because it draws on the knowledge and use of the naturally occurring molecules, the genes, to arrive at a precise and individualized account of an individual's genetic and biochemical identity. "[T]he ultimate consequences of the integration of genomics into medical research and medical practice are likely to be revolutionary." Alan F. Guttmacher and Francis S. Collins, *Realizing the Promise of Genomics in Biomedical Research,* 294 Journal of the American Medical Association 1399 (2005).

The use of the genes is critical because these molecules carry the natural templates of the human organism. Despite the technical work that underlies the identification and sequencing of the natural genes, there can be no dispute that such efforts do no more than reveal a natural blueprint. "The genome sequence is a discovery, not an invention." John Sulston & Georgina Ferry, *The Common Thread: A Story Of Science, Politics, Ethics, And The Human Genome* 266 (2002).

Accordingly, because the genes function as templates through their embodiment of the genetic code, the eligibility analysis of these molecules necessarily implicates the effect of patenting on the availability of this underlying law of nature. More precisely for patent law, this question is generally framed as

investigating whether a law of nature is preempted by the grant of a patent claim. "[C]claims which directly or indirectly preempt natural laws or phenomena are proscribed." *In re Bergy*, 596 F.2d 952, 988 (C.C.P.A. 1979).

C. The Patenting of Genes Preempts the Genetic Code, and Is Invalid According to the Supreme Court's Prohibition Against Patenting Laws of Nature

When a law of nature or an abstract idea, which itself is unpatentable, has only certain embodiments, the Supreme Court has been alert to possible preemption of the underlying idea through patenting:

> "It is conceded that one may not patent an idea. But in practical effect that would be the result if the formula for converting BCD numerals to pure binary numerals were patented in this case. The mathematical formula involved here has no substantial practical application except in connection with a digital computer, which means that if the judgment below is affirmed, the patent would wholly pre-empt the mathematical formula and in practical effect would be a patent on the algorithm itself."

Gottschalk v. Benson, 409 U.S. 63, 71-72 (1972). By analogy, the only embodiments of the genetic code are the genes, and while the genetic code itself cannot be patented, the patenting of genes effectively preempts the use of the genetic code. The resolution of eligibility for the class of genes will be determined by a proper patentable subject matter analysis of one challenged and representative gene patent claim, an opportunity presented by this litigation. Each gene patent has preemptive effect because it withdraws the use of one of nature's genetic formulas. That is exactly what has happened with the patent claims on the BRCA1 and

BRCA2 genes. Although the patent claims are formally directed to "isolated DNA," the actual DNA sequence is the sequence of the native gene. The merger doctrine from copyright law supplies a relevant theoretical analysis: if an idea has a set of finite expressions, then property rights in the expressions are tantamount to ownership of the underlying idea; effectively, the idea and the expressions merge. *Baker v. Selden*, 101 U.S. 99 (1879). By analogy, the merger doctrine framework is helpful in understanding that the genes are the natural set of expressions of the genetic code, and their patenting effectively preempts the genetic code itself. Eileen M. Kane, *Splitting the Gene: DNA Patents and the Genetic Code*, 71 Tennessee Law Review 707, 753 (2004).

It is well established in patent jurisprudence that "natural phenomena, abstract ideas, and laws of nature" may not be patented. *Diamond v. Diehr,* 450 U. S. 175, 185 (1981). Just this year, the Supreme Court reaffirmed the continuing vitality of these exclusions: "The concepts covered by these exceptions are "part of the storehouse of knowledge of all men …free to all men and reserved exclusively to none." *Bilski v. Kappos*, 130 S. Ct. 3218, 3225 (2010), quoting *Funk Brothers Seed Co. v. Kalo Inoculant Co., 333 U.S. 127, 130* (1948). These categories of unpatentable subject matter have been carefully identified and maintained by the Supreme Court. In fact, the Court has been clear about its rationale for these exclusions: "Phenomena of nature, though just discovered, mental processes, and

abstract intellectual concepts are not patentable, as they are the basic tools of scientific and technological work." *Gottschalk v. Benson,* 409 U.S. 63, 67 (1972).

The challenged composition of matter claims capture the naturally occurring wild-type genes or naturally occurring mutated genes that correspond to the human BRCA1 and BRCA2 gene sequences, although described in the claim language of "isolated DNA" (Claims 1, 2, and 7 of U.S. Patent 5,747,282; Claims 1, 6, and 7 of U.S. Patent 5,837,492 and Claim 1 of U.S. Patent 5,693,473), and are invalid. Patent claims that comprise fragments of the BRCA1 gene can also operate to cover the use of the full-length gene (Claims 5 and 6 of U.S. Patent 5,747,282), and such claims are invalid as they encompass ineligible subject matter. All of these nucleotide sequences are identical to the naturally occurring nucleotide sequences that perform the work of the native BRCA1 and BRCA2 genes. They are natural and uninvented expressions of the genetic code, and have preemptive effect.

The genetic code, which is an unpatentable law of nature, does not effectively reside in the public domain if private rights are held in DNA gene sequences, so that the use of the biologically relevant expressions of the genetic code - the genes - cannot occur without permission from a patent holder. The patenting of genes, therefore, results in preemption of the genetic code, an outcome that conflicts with the Supreme Court's dictate that the laws of nature should

remain in the public domain, free for all to use. Accordingly, the composition of matter claims (Claims 1, 2, 5, 6 and 7 of U.S. Patent 5,747,282; Claims 1, 6, and 7 of U.S. Patent 5,837,492 and Claim 1 of U.S. Patent 5,693,473) are invalid for lack of patentable subject matter under 35 U.S.C. § 101.

D. The Specific Patent Ineligibility of a Gene Does Not Implicate the Patenting of Other Biomolecules

DNA, as the chemical repository of genetic information, has a complex identity. The universal language of inheritance – the genetic code – can be embodied as a sequence of nucleotide chemicals. The gene is both the static chemical compound and the dynamic template executed through the genetic code. Not surprisingly, the eligibility analysis of this molecule is complicated by its multidimensional character, and the above analysis presents a specific theory of patent ineligibility that is DNA-centric. What is at stake here is whether patents can be granted on the discovered finite set of genetic formulas that are the genes, and this question is quite singular for the field of patent law.

Concern has been expressed that a decision regarding the eligibility of a patent claim on a gene will call into question the patenting of other biomolecules, and chill innovation in biotechnology. *Association for Molecular Pathology v. U.S. Patent & Trademark Office*, 702 F. Supp.2d 181, 211 (S.D.N.Y. 2010). That is not accurate. For the reasons outlined here, the gene, claimed as an isolated

DNA molecule, has a set of unique attributes that demand a more complicated eligibility analysis than would be required for other molecules. It is possible to reach a decision regarding the DNA eligibility issue using the foregoing theory of specific patent ineligibility to arrive at a conclusion that does not affect the patenting of other biological molecules.

Moreover, the central issue presented in this case is whether the most basic discoveries of genetic sciences – finding the genes and identifying their functions – are candidates for patenting. A decision from this court that these essential scientific tools should remain in the public domain does not deprive the biotechnology industry of other patenting opportunities. In fact, maintaining the essential knowledge tools in the public domain is the predicate for the value-added creativity that converts discovery into invention. The patent system is charged with encouraging inventive activity, not rewarding discoveries.

II. The Gene Has a General Patent Ineligibility As a Product of Nature

The foregoing characterization of DNA and its identity as a chemically incorporated template is also relevant to a separate theory of ineligibility, which is based on the exclusions of products of nature from patenting. The Supreme Court has instructed that the removal of a natural product from its environment – a product of nature – does not qualify as an inventive act which authorizes the grant of patent on the product. When considering whether a genetically engineered

bacterium was an invented product, the Court noted that the patentable subject matter inquiry must distinguish "between products of nature, whether living or not, and human-made inventions." *Diamond v. Chakrabarty*, 447 U.S. 303, 313 (1980). However, the Court has recognized that inventive status may be conferred when the natural product has "markedly different characteristics" than the natural product. *Id*. at 310. The Court recognized that patent eligibility could be satisfied by a "product of human ingenuity" "having a distinctive name, character [and] use." *Id*. at 309-10.

The comparison of the "isolated DNA" in the above-referenced composition of matter claims on wild-type and mutant genes to the naturally occurring genes has two separate inquiries. These are the questions of structure and function. Is the isolated DNA structurally identical to the native gene? Does the isolated DNA function in the same manner as the native gene?

The purified gene is often claimed as an isolated complementary DNA (cDNA) – the abbreviated, message-bearing form of the gene, a result of laboratory manipulation, reflecting divergence from the physical genomic form. Bruce Alberts et al., *Molecular Biology of the Cell* 503, 4th edition (2002). However, all of that structural investment is done to preserve the natural informational content of the gene – the maintenance of its functional identity. The goal of recovering the natural gene sequence as an isolated DNA is to preserve the informational content

of the molecule so that it is identical to the native gene. That identity is essential for using an isolated gene in medically-related applications, such as genetic testing or gene therapy. Any deviation from the natural DNA sequence would compromise the use of the isolated DNA as the functional equivalent of the gene in the cell. The mimicry of the native gene undermines any assertion that an inventive alteration has occurred. Accordingly, the composition of matter claims (Claims 1, 2, 5, 6 and 7 of U.S. Patent 5,747,282, Claims 1, 6, and 7 of U.S. Patent 5,837,492 and Claim 1 of U.S. Patent 5,693,473) are invalid for lack of patentable subject matter under 35 U.S.C. § 101.

Resolution of patent eligibility for a gene under the product of nature doctrine does implicate the patenting of other biomolecules, but only in the sense that the doctrine can be used to assess other patenting efforts in the life sciences. However, the product of nature doctrine has a long pedigree in patent law, completely separate from any analysis of DNA, and a determination that genes are ineligible for patenting does not preclude the patent eligibility of the truly inventive alterations of natural products.

III. The Relationship Between Genotype and Phenotype Is a Law of Nature and Cannot Be Patented as a Method Claim

There are several insights from genetic science that account for the paradigm shift that genetic science has brought to medicine. The first is that the genetic code is captured in a set of DNA molecules, which are the genes. The genome is the

actual full set. There is some DNA sequence variation (mutations) among human beings, which account for the biological diversity of the human species. The next insight is that the medical status of an individual can depend on the actual DNA sequences that are found in her genome. This observation is described as the functional relationship between genotype (the DNA sequence) and phenotype (the actual biological consequence of that sequence). How does DNA sequence variation account for medical individuality? It is because an altered DNA molecule will encode an altered protein, and that mutated protein will behave erratically or not at all, with a disruption to normal cellular function, resulting is disease. The above description captures the causation sequence between DNA and disease, where genotype dictates phenotype. Bruce Alberts et al., *Molecular Biology of the Cell* 525, 4th edition (2002).

The genotype-phenotype correlation is, therefore, a naturally occurring relationship. It is certainly a natural phenomenon or a law of nature, as it can only be discovered, not invented. Genetic medicine is the use of these natural correlations to offer a personalized medical profile to a patient, and to devise treatments that are informed by the knowledge of any underlying genetic aberration.

It is not possible to patent the genotype-phenotype correlation, as it is solely a law of nature. In fact, these correlations are so natural - and potentially problematic - that genetic medicine is devoted to the investigation of these inherited genetic dictates through the use of genetic testing. For example, a genetic test can be used to determine the DNA sequences of the BRCA1 and/or BRCA2 genes in a patient, in order to investigate whether the individual carries the DNA mutations in the genes that are associated with a higher risk of developing early onset breast or ovarian cancer. That is a prototypical example of using the genotype-phenotype relationship in medical care. The study of gene mutations which confer clinical risk allows disease to be explained through precise molecular mechanisms. Piri L. Welsch et al., *BRCA1 and BRCA2 and the Genetics of Breast and Ovarian Cancer*, 10 Human Molecular Genetics 705 (2001). As a result, a patient can be offered a more personalized assessment of risk, diagnosis and/or prognosis, and therapeutic regimens can be individually optimized.

What is at stake in this litigation is whether the basic relationship between the genotype (the DNA sequence) and the phenotype (cancer risk) can be patented in the form of the challenged method patent claims which effectively describe the act of comparing a patient's BRCA1 or BRCA2 DNA sequence to the normal DNA sequences for these genes in order to identify any mutations and identify cancer risk.

The challenged patent method claims can be deconstructed. A patent claim written as a method of "detecting a germline alteration" is simply a patent method claim that seeks to patent any use of the medically significant mutations in the BRCA1 gene (Claim 1 of U.S. Patent 5,709,999). A patent claim which describes a method of "comparing" DNA sequences is simply a patent method claim that seeks to monopolize the foundational observation that knowledge of the BRCA1 or BRCA2 genotype of a patient will be relevant to assessment of her risk for developing breast or ovarian cancer **(**Claim 1 of U.S. Patent 5,753,441, Claims 1 and 2 of U.S. Patent 6,033,857). A patent claim which describes a method of "screening" for a "somatic alteration" in a tumor cell is simply a patent method claim that will control the use of the knowledge that a naturally-arising mutation in the BRCA1 gene in a tumor sample from a patient may have clinical impact (Claim 1 of U.S. Patent 5,710,001). All of these patent claims, upon inspection, can be reduced to the same structure: the claim confers a monopoly on the use of the natural relationship between a patient's BRCA1 or BRCA2 genotype and her clinical profile. The conclusion is clear: through the format of a patent method claim, any use of a genotype-phenotype correlation, which is an unpatentable law of nature, is controlled by the patent holder. This outcome does not comport with well-established principles of eligibility in patent law that distinguish valid from invalid patent method claims. "The rule that the discovery of a law of nature

cannot be patented rests, not on the notion that natural phenomena are not processes, but rather on the more fundamental understanding that they are not the kind of 'discoveries' that the statute was enacted to protect." *Parker v. Flook*, 437 U.S. 584, 593 (1978).

The significance of determining whether scientific correlations are eligible for patenting cannot be overstated. Beyond the identification of the molecules that perform biochemical tasks, modern biological research focuses on determining dynamic intermolecular relationships and biochemical causation. The potential method claims in biochemical or genetic testing are quite heterogeneous, where a patent claim may cover, for example, quantitative relationships between molecules, the mechanism of pharmaceutical metabolism, or the cause and effect relationship between genotype and phenotype. While the universe of biological molecules may be finite, the set of relationships and interactions that define human metabolism are likely to be vast. It is essential for the Court to establish whether every observation of molecular performance can be converted into a patent claim.

At the time of the district court decision, the analytic framework for assessing the eligibility of method claims was the machine or transformation test that arose from the business method patent disputes; the Supreme Court later decided that this test would not be the sole determinant of method claim eligibility. *Bilski v. Kappos*, 130 S. Ct. 3218, 3231 (2010). Thus, the method claims in the

instant case have not been analyzed for their possible violation of the prohibition against the patenting of laws of nature or natural phenomena. The Court now has the opportunity to assess the method claims to genetic correlations in a more appropriate eligibility framework. It should conclude that the method patent claims which effectively capture genotype-phenotype correlations (Claim 1 of U.S. Patent 5,709,999, Claim 1 of U.S. Patent 5,753,441, Claim 1 of U.S. Patent 5,710,001, and Claims 1 and 2 of U.S. Patent 6,033,857**)** are invalid for lack of patentable subject matter under 35 U.S.C. § 101.[1]

IV. Access to the Basic Tools of Genetic Science is Critical for the Patent System and the Scientific Enterprise

Not everything can be patented. The Supreme Court has been quite clear that "laws of nature, natural phenomena, and abstract ideas" are not patentable, although the interpretation of this maxim has been difficult. Yet, the underlying rationale is that scientific advances depend on an available substrate of basic knowledge, and that, therefore, patenting the intellectual foundations of a field has an adverse effect on its progress. The patentable subject matter doctrine in patent law - patent eligibility - performs this necessary gatekeeping function. The appropriate application of patent eligibility criteria is necessary in order that the patent system remain bounded by limitations which preserve the substrate of

[1] This brief takes no position on the patent eligibility of Claim 20 of U.S. Patent 5,747,282, which is not directed to a gene or genetic correlation.

common knowledge tools that can be freely drawn upon for intellectual creativity and scientific progress. This is particularly important for emerging fields of knowledge, as researchers uncover the essential knowledge that defines and coheres the field, and modern genetic science, which offers a new paradigm for understanding and treating disease, is such a field. Genetic testing can be used to identify disease susceptibility, to establish diagnostic status, and to design personalized therapeutic regimens in medical care. Any illegitimate patenting not only limits scientific research; it also impacts patient care.

It is not possible to invent around patented genes. There are no substitutes. If the patenting of genes and genetic correlations has occurred in violation of the exclusions from patentable subject matter, the patent owner is able to set the intellectual agenda for an entire clinical field, and decisions regarding access and comparative research can be dictated by commercial objectives. This outcome highlights the importance of the patent eligibility questions posed by this litigation.

Restrictive management of gene patents with critical diagnostic significance limits peer assessment, and lessens the available testing options for patients. If the sole commercial provider of a particular genetic test does not offer a comprehensive genetic analysis, the test will not provide the most accurate assessment of genetic status, and compensatory genetic testing to correct deficiencies may be prohibited by the patent holder. The actual genetic testing field

will then be defined by a divergence between the theoretically optimal and the commercially available. An artificially constrained genetic testing climate can result in patients receiving incomplete test results that cannot be relied on for medical decision making. *Association for Molecular Pathology v. U.S. Patent & Trademark Office*, 702 F. Supp.2d 181, 206 (S.D.N.Y. 2010). The limitations on commercial genetic testing for the BRCA1 and BRCA2 genes to determine the risk of hereditary breast and ovarian cancer which are imposed by Myriad Genetics also prevent women from seeking second opinions or confirmatory analysis of laboratory results. *Id*. at 207. Where exclusive control of the relevant patent portfolio for a particular disease field is used to frustrate a competitive genetic testing environment, the *de facto* clinical testing standards are set by a patent holder, rather than the scientific community. The clinical standard then becomes a function of the marketplace, rather than the laboratory. Eileen M. Kane, *Patent-Mediated Standards in Genetic Testing*, 2008 Utah Law Review 835, 849.

The other doctrinal requirements for patentability (utility under 35 U.S.C. § 101, novelty under 35 U.S.C. § 102, nonobviousness under 35 U.S.C. § 103, or the disclosure doctrines of 35 U.S.C. § 112) can influence the scope of patent claims and the relative availability of patent rights, but these doctrines are not charged with the categorical determinations that necessarily result from judgments regarding patentable subject matter. It is precisely these categorical consequences

that turn decisions of patent eligibility into determinants of the intellectual climate of a field, as the contours of free and common knowledge are shaped by the courts when they properly apply 35 U.S.C. § 101.

It has been argued that gene patents are necessary to incentivize genetic research and the development of genetic tests. *Association for Molecular Pathology v. U.S. Patent & Trademark Office*, 702 F. Supp.2d 181, 211 (S.D.N.Y. 2010). The Secretary's Advisory Committee on Genetics, Health and Society (SACGHS), undertook a recent and comprehensive analysis on the need for and impact of patents affecting genetic testing. "[T]his information suggests that scientists are motivated to conduct genetic research by reasons other than patents, suggesting that discoveries will be sought regardless of the availability of intellectual property rights." The Secretary's Advisory Committee on Genetics, Health and Society, *Gene Patents and Licensing Practices and Their Impact on Patient Access to Genetic Tests* 23 (April 2010). A further conclusion was reached for the relationship between patents and commercial genetic tests: "[P]atent-derived exclusive rights are neither necessary nor sufficient conditions for the development of genetic test kits and laboratory-developed tests. In the area of laboratory-developed tests particularly, where development costs are not substantial, patents were not necessary for the development of several genetic tests." *Id*. at 35. The genetic tests offered by Myriad Genetics fall into the latter

category of laboratory-developed tests. It is not possible to resolve the conflict between the empirical research demonstrating that gene patents do not account for much of the progress in genetic science and the assertions that the disqualification of gene patents will have devastating consequences on biomedical innovation. However, it is possible to state that any ineligible patent claims in force have the effect of artificially constraining the set of knowledge tools in the public domain, a consequence that certainly reduces innovation by imposition of a chilling effect. It is important to acknowledge that the existence of a vibrant public domain is a key prerequisite for scientific inquiry and intellectual progress.

Technological and intellectual imperatives create the possibility of patenting novel forms of subject matter that test the patent system. The controversies over patentable subject matter, while centered in difficult legal questions regarding line-drawing, can be traced to instances where patenting alters the expectations of what comprises the public domain, including such knowledge categories such as genetic laws and business practices. Public confusion that attends to the patenting of genes or business methods may reflect an unarticulated, background view of the public domain, only made visible when its boundaries appear to collapse. This dimension of the patent system may be its most public face, as it presents some binary choices regarding what is allowed or what is not. However, in the sense that the patent system is viewed as a mechanism for encouraging the development and

dissemination of new knowledge, judicial attention to the dividing line between public and private in patent law could not be a more important task. "A patent by its very nature is affected with a public interest. As recognized by the Constitution, it is a special privilege designed to serve the public purpose of promoting the 'Progress of Science and useful Arts.'"*Precision Instrument Mfg. Co. v. Auto. Maint. Mach. Co*., 324 U.S. 806, 816 (1944) (quoting U.S. CONST. art I, § 8, cl. 8). Although bioethical and human rights objections have been raised to the patenting of genes and genetic correlations, it is clear that patent law jurisprudence itself provides the basis for declaring that the discoveries of genetic science cannot be patented, using the theories outlined in this brief.

Resolution of the eligibility controversies in genetic patenting is important for genetic medicine and also has larger theoretical implications. The life sciences await a definitive and modern interpretation of the product of nature doctrine and its scope, and a contemporaneous analysis of whether and how correlations in the life sciences are regarded as natural phenomena or laws of nature. The Court has an opportunity to update the set of "basic tools" for genetic science, and to settle these eligibility controversies for the benefit of scientists, medical practitioners, and patients who wish to use isolated genes and genetic correlations in research and medical care.

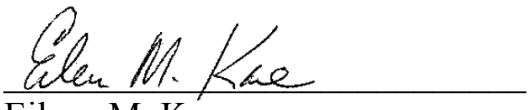
The patenting of applied research and true invention can coexist alongside the preserve of open and available knowledge, and both will contribute to future developments in genetic science. The inventive precision enforced through the proper application of 35 U.S.C. § 101 will allow creative applications of fundamental knowledge to emerge and legitimately solicit legal protection, while the intellectual substrates for genetic science remain unowned. That is the optimal balance for an effective patent system.

CONCLUSION

For the reasons stated, the judgment of the District Court that the patent claims on genes and genetic correlations are invalid for lack of patentable subject matter under 35 U.S.C. § 101 should be affirmed.

Dated: December 7, 2010

Respectfully Submitted,



Eileen M. Kane
Penn State Dickinson School of Law
328 Katz Building
University Park, PA 16802
(814) 863-3166
emk17@psu.edu

United States Court of Appeals
for the Federal Circuit

ASSOCIATION FOR MOLECULAR V PTO, 2010-1406

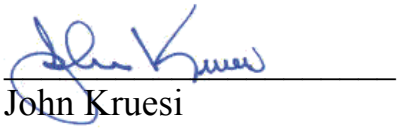
DECLARATION OF AUTHORITY PURSUANT TO 28 U.S.C. § 1746 AND FEDERAL CIRCUIT RULE 47.3(d)

I, John C. Kruesi, Jr., being duly sworn according to law and being over the age of 18, upon my oath depose and say that:

I am an employee of Counsel Press's Washington DC Office. Counsel Press was retained by Eileen M. Kane, *Amicus Curiae* to print the enclosed documents.

The attached Brief of Amicus Curiae Professor Eileen M. Kane in Support of Plaintiffs-Appellees has been submitted to Counsel Press, electronically and/or has been reprinted to comply with the Court's rules. Because of time constraints and the distance between counsel of record and Counsel Press, counsel is unavailable to provide an original signature, in ink, to the documents. Pursuant to 28 U.S.C. §1746 and Federal Circuit Rule 47.3(d), Professor Kane has authorized me to sign on her behalf.

December 7, 2010



John Kruesi

United States Court of Appeals
for the Federal Circuit

ASSOCIATION FOR MOLECULAR V PTO, 2010-1406

CERTIFICATE OF SERVICE

I, John C. Kruesi, Jr. being duly sworn according to law and being over the age of 18, upon my oath depose and say that:

Counsel Press was retained by Eileen M. Kane, *Amicus Curiae* to print this document. I am an employee of Counsel Press.

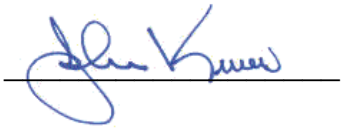
On the **7th Day of December, 2010**, I served the within **Brief of Amicus Curiae** upon:

Gregory A. Castanias Jones Day 51 Louisiana Avenue, NW Washington, DC 20001-2113 (202) 879-3939	Christopher A. Hansen American Civil Liberties Union 125 Broad Street, 18th Floor New York, NY 10017-6702 (212) 549-2606
Counsel for Defendants-Appellants	*Counsel for Plaintiffs-Appellees*

via Federal Express, by causing 2 true copies of each to be deposited, enclosed in a properly addressed wrapper, in an official depository of Federal Express.

Unless otherwise noted, 12 copies have been filed with the Court on the same date via hand delivery.

December 7, 2010



CERTIFICATE OF COMPLIANCE WITH TYPE-VOLUME LIMITATION, TYPEFACE REQUIREMENTS AND TYPE STYLE REQUIREMENTS

1. This brief complies with the type-volume limitation of Federal Rule of Appellate Procedure 32(a)(7)(B).

__x__ The brief contains 5,776 words, excluding the parts of the brief exempted by Federal Rule of Appellate Procedure 32(a)(7)(B)(iii),or

____ The brief uses a monospaced typeface and contains _____ lines of text, excluding the parts of the brief exempted by Federal Rule of Appellate Procedure 32(a)(7)(B)(iii).

2. This brief complies with the typeface requirements of Federal Rule of Appellate Procedure 32(a)(5) and the type style requirements of Federal Rule of Appellate Procedure 32(a)(6).

__x__ The brief has been prepared in a proportionally spaced typeface using MS Word 2007 in a 14 point Times New Roman font or

____ The brief has been prepared in a monospaced typeface using MS Word 2002 in a ___ characters per inch_____ font.

December 7, 2010
Date

(s) Eileen M. Kane

Name: Eileen M. Kane
Amicus Curiae