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SPECIAL
REPORT

U.S. SUPREME COURT ADDRESSES PATENT ELIGIBILITY OF ISOLATED DNA UNDER 35 U.S.C. §101

June 20, 2013

On June 13, the U.S. Supreme Court issued a substantially unanimous decision on patent eligibility of isolated DNA under 35 U.S.C. §101, in *Association for Molecular Pathology v. Myriad Genetics, Inc*.[1] The *Myriad* decision addresses the judicially-created "natural phenomena" exception to patent eligibility under §101.[2] On the same day, the USPTO issued the attached examiner-guidance memorandum, providing initial guidance to patent examiners for treatment of claims directed to naturally occurring nucleic acids or fragments thereof.

The *Myriad* Court held that "genes and the information they encode are not patent eligible under §101 simply because they have been isolated from the surrounding genetic material." However, the Court further held that DNA claims that were limited to non-naturally occurring DNA sequences are patent-eligible. The decision is relatively straightforward in this regard, and provides substantial guidance for drafting and challenging patent claims directed to inventions that are based on natural products.

The decision is particularly important to the biotechnology and pharmaceutical industries, particularly with respect to diagnostic and therapeutic (e.g., personalized medicine) technologies. It is relevant to the patenting of other biomolecules in addition to DNA (e.g., RNA, peptides, proteins, polysaccharides, antibodies, and hormones), and other isolated natural products. The decision is contrary to long-established USPTO policy under which isolated naturally occurring DNA was considered patent-eligible subject matter, and thus will adversely affect many existing patents and pending patent applications.

I. The Claims

The court discussed four representative claims from the Myriad patents.

[1] The underlying Federal Circuit decision was discussed in our August 3, 2011 Special Report, "Federal Circuit Addresses Patent Eligibility Of Isolated DNA And Related Diagnostic Methods." Our analysis and recommendations in that Special Report remain relevant. All of our Special Reports are available in the Resources/News & Events section of our website at www.oliff.com.

[2] The Supreme Court has recently addressed two other judicially-created exceptions to patent eligibility -- abstract ideas and laws of nature -- in its 2010 decision in *Bilski v. Kappos* (abstract ideas) and its 2012 decision in *Mayo Collaborative Services v. Prometheus Laboratories* (laws of nature). See our July 6, 2010 Special Report, "Supreme Court Holds That The Machine-Or-Transformation Test Is Not The Sole Test For Patentability of Process Claims And That Business Methods May Be Patentable," and our April 6, 2012 Special Report, "U.S. Supreme Court Again Addresses Scope Of Patentable Subject Matter Under 35 U.S.C. §101."

The first representative claim is directed to an isolated DNA coding for a polypeptide having a specified amino acid sequence. The Court correctly interpreted this claim to encompass both isolated DNA having a naturally occurring DNA sequence that codes for the specified amino acid sequence, and non-naturally occurring DNA sequences that code for the same amino acid sequence. The naturally occurring DNA sequence includes both coding regions (exons) and non-coding regions (introns).

The second representative claim specifies that the isolated DNA has a specific non-naturally occurring DNA sequence. In particular, the non-naturally occurring DNA sequence only includes the coding regions (exons) of the naturally occurring DNA sequence, the intervening non-coding regions (introns) having been removed. In the art, this type of non-naturally occurring DNA sequence is referred to as complementary DNA ("cDNA"). Myriad used processes that were well-understood in the art to obtain the claimed cDNA.

The third and fourth representative claims are also directed to isolated DNA and cDNA, respectively, but are broader than the corresponding first and second representative claims.[3] They both encompass *partial* DNA sequences of a specified minimum length. The third claim encompasses partial DNA sequences that may or may not include introns found within the naturally occurring DNA sequence. The fourth claim is narrower than the third claim, because it only encompasses partial sequences that do not include introns. However, because the fourth claim encompasses intron-free partial sequences entirely contained within a naturally occurring DNA sequence, it encompasses partial sequences that are indistinguishable from naturally occurring partial sequences.

To aid understanding, we conceptualize the four representative claims as follows:

1. A full-length, isolated DNA that codes for a certain protein (i.e., having a naturally occurring or non-naturally occurring DNA sequence).

2. A full-length, isolated DNA of claim 1, wherein internal regions (introns) of the naturally occurring DNA sequence have been removed.

3. An isolated DNA sequence of a specified minimum length that is included within any naturally occurring or non-naturally occurring DNA sequence of claim 1.

4. An isolated DNA sequence of a specified minimum length that is included within any DNA sequence of claim 1 or claim 2 that does not include introns.

II. The Supreme Court's Decision

Section 101 of the Patent Act defines subject matter *eligible* for patentability to include "any new and useful … composition of matter." Other sections of the Patent Act govern whether a patent-eligible composition is indeed patentable (based on novelty, nonobviousness, adequate written description, enablement, etc.). The Court confirmed that there are exceptions to §101 that prohibit the patentability of (i) laws of nature, (ii) natural phenomena, and (iii) abstract ideas. The Court also confirmed that these exceptions are not without limits, because "all inventions at some level embody, use, reflect, rest upon, or apply laws of nature, natural phenomena, or abstract ideas, and too broad an interpretation of this exclusionary principle could eviscerate patent law" (internal quotation marks omitted). The Court framed the issue in this case as whether

[3] Although broader, the third and fourth representative claims were drafted in dependent form. The propriety of this claiming format under 35 U.S.C. §112(d) was not at issue in this case.

Myriad's claims are directed to natural phenomena (exception (ii)).

A. Naturally Occurring DNA

The Court recognized its prior decision in *Diamond v. Chakrabarty*[4] as being directly relevant to determining whether Myriad's claims encompassing naturally occurring DNA sequences are directed to patent-eligible subject matter. In *Chakrabarty*, the Court held that a claim to a genetically modified bacterium was patent-eligible, because the claim was directed to the non-naturally occurring bacterium, and not to a pre-existing but previously unknown natural bacterium. According to the Court, "[t]he *Chakrabarty* bacterium was new 'with markedly different characteristics from any found in nature.'" The Court found, to the contrary, that Myriad's discovery of an important and useful but pre-existing gene did not create anything new, regardless of the extensive efforts undertaken to make this discovery or the importance of this discovery. In the Court's opinion, "[g]roundbreaking, innovative, or even brilliant discovery does not by itself satisfy the §101 inquiry."

The Court analogized the facts in this case to those in *Funk Brothers Seed Co. v. Kalo Inoculant Co*.[5] In *Funk Brothers*, the patent claimed a mixture of naturally occurring strains of nitrogen-fixing bacteria that did not inhibit each other, allowing farmers for the first time to inoculate different types of crops with a single bacterial composition. In that case, the Court held that this bacterial mixture was not patent-eligible, because the patentee's claims did not require that the bacteria be altered in any way. The Court found that the Myriad claims likewise did not require that the naturally occurring DNA be altered in any way other than by shortening the DNA molecule.

The Court rejected Myriad's argument that the claims are saved by the fact that isolating DNA from genomic DNA *severs* chemical bonds, and thereby creates a non-naturally occurring, shortened molecule. According to the Court, "Myriad's claims are simply not expressed in terms of chemical composition, nor do they rely in any way on the chemical changes that result from the isolation of a particular section of DNA." Instead, the Court viewed the claims as being "concerned primarily with information contained in the genetic *sequence*, not with the specific chemical composition" (emphasis in original). The Court did not explore in depth how Myriad could have drafted patent-eligible claims that recited DNA in terms of "chemical composition" or that recited "chemical changes" that result from isolation. However, the decision did note that "[i]f the patents depended upon the creation of a unique molecule, then a would-be infringer could arguably avoid at least Myriad's patent claims on entire genes … by isolating a DNA sequence that included … one additional nucleotide pair."

The Court also refused to give any deference to the longstanding USPTO policy on the patent eligibility of isolated DNA. As noted above, that USPTO policy changed upon issuance of the *Myriad* decision and the attached memorandum.

For these reasons, the Court held that Myriad's claims to naturally occurring DNA are directed to patent-ineligible subject matter. Thus, the first, third and fourth representative claims are *not* directed to patent-eligible subject matter, because they encompass isolated but otherwise naturally occurring DNA segments.

[4] 447 U.S. 303 (1980).

[5] 333 U.S. 127 (1948).

B. Non-Naturally Occurring DNA

The Court held that "cDNA does not present the same obstacles to patentability as naturally occurring, isolated DNA segments." The Court rejected the argument that cDNA is patent-ineligible subject matter on the basis that its sequence is *dictated* by nature, because it is unquestionable that something new is created when cDNA is made. The Court thus held that "cDNA is not a 'product of nature,'" rendering it patent-eligible. However, the Court noted that there would be an exception to this broad statement when a "very short series of DNA may have no intervening introns to remove when creating cDNA" -- i.e., when a short cDNA sequence is identical to a short intron-free sequence of naturally occurring DNA.

The discussion of a short DNA molecule having no intervening introns is particularly relevant to the fourth representative claim. A short cDNA molecule that corresponds to a single coding region of DNA (an exon) or a portion thereof will have the same sequence as the corresponding region of the naturally occurring DNA. For this reason, such a short strand of cDNA may be indistinguishable from natural DNA, and thus not patent-eligible. Accordingly, the second representative claim, directed to the full-length cDNA molecule, defines patent-eligible subject matter because the corresponding length naturally-occurring DNA molecule includes additional portions (introns) inside the molecule. On the other hand, the fourth representative claim, directed to a short cDNA molecule, does not define patent-eligible subject matter because it encompasses molecules that are indistinguishable from short segments of naturally occurring DNA.

C. Limitations On The Scope Of The Decision

The Court devoted a separate section of the opinion to clarifying what is *not* implicated by its holding. Specifically, the Court stated that this case does *not* involve (i) any method claims, (ii) any claims directed to *applications* of Myriad's discovery, or (iii) the patentability of DNA in which the order of the naturally occurring sequence has been altered. The Court then succinctly summarized the decision as "merely hold[ing] that genes and the information they encode are not patent eligible under §101 *simply because* they have been isolated from the surrounding genetic material" (emphasis added).

III. Analysis

The *Myriad* decision articulates a workable test for determining whether a claim to isolated DNA is directed to a patent-ineligible natural product under §101. Simply stated, the test is whether the claim is broad enough to encompass a non-specific unaltered segment of a naturally-occurring DNA molecule; if so, the claim is not directed to patent-eligible subject matter. However, the decision has broader implications to more narrowly drafted DNA claims, and to composition claims in general, especially biomolecule claims.

It is clear from the decision that any claim that encompasses an *entirely* naturally occurring composition, i.e., a product of nature, is not directed to patent-eligible subject matter. This would appear to particularly apply to DNA and other biomolecules, such as RNA, peptides, proteins (including antibodies and enzymes), polysaccharides, and hormones, but is not necessarily so limited.

Further, the Court expressly held that merely defining DNA as "isolated" is insufficient to confer patent eligibility to a naturally occurring DNA sequence. By extension, a claim to any "isolated" natural product is likely patent-ineligible. Accordingly, this decision could affect the patent eligibility of all biological, as well as non-biological, compositions of matter that have merely been isolated from nature.[6]

The Court appeared to distinguish between (i) a product of nature in an *isolated* state, and (ii) a *chemically modified* product of nature. In doing so, the Court treated the mere breaking of unspecified covalent bonds to shorten the molecule as mere isolation, rather than chemical modification to include, e.g., different internal structure. Based on the Court's reasoning, products of nature that have been chemically modified, including biomolecule analogs and derivatized or labeled biomolecules, appear to remain patent-eligible subject matter.

The Court also appeared to recognize that breaking of covalent bonds *might* in some cases be considered a chemical modification of a molecule. However, the Court refused to view Myriad's claims as traditional chemical claims, instead finding that "Myriad's claims are simply not expressed in terms of chemical composition, nor do they rely in any way on the chemical changes that result from the isolation of a particular section of DNA." The Court seemed to be focused on the undefined nature of the manner or location in which bonds in the claimed DNA were broken, highlighting that the claims did not depend on the creation of a unique, clearly limited molecule.

The Court's finding that Myriad's claims are neither "expressed in terms of chemical composition" nor rely on "chemical changes that result from the isolation of a particular section of DNA" provides at least *some chance* that isolated, but otherwise entirely naturally occurring biomolecules, could be patent-eligible if appropriately (but narrowly) claimed. Thus, it may be worthwhile to attempt to distinguish isolated biomolecules from naturally occurring biomolecules with claims that recite important specific chemical structure of the isolated biomolecules or that recite important chemical changes that result from isolation. Patent eligibility of such claims will likely be determined in future court decisions.

The USPTO apparently broadly reads *Myriad* in the attached memorandum. Thus, successfully obtaining and enforcing claims to isolated portions of naturally occurring molecules by specifying molecular endpoints or specifying chemical changes that result from isolation could be difficult and expensive. However, there may be other chemical/structural features that distinguish an isolated molecule of interest from a naturally occurring molecule.

Many biomolecules undergo changes to their higher-level structure upon isolation. These changes may provide a basis for claiming the biomolecules as patent-eligible subject matter. For example, many biomolecules (e.g., DNA, RNA, and proteins) can be described in terms of primary, secondary, tertiary, and quaternary structure. Although primary structure may be defined by sequence, higher levels of structure may change upon isolation, independent of sequence. Thus, reciting these changes in a claim provides a basis for arguing that the claimed molecule is patent-eligible.

[6] The Court was careful to distinguish between claiming (i) a *product* of nature in an isolated state, and (ii) a *method* of isolating a product of nature. The latter may remain patent-eligible subject matter. Specifically, the Court emphasized that "[h]ad Myriad created an innovative method of manipulating genes while searching for the [genes at issue], it could have sought a method patent."

In addition, the Court's reasoning regarding patent eligibility of cDNA would appear to extend to any DNA or other biomolecule (e.g., RNA, peptide, or protein) defined by its sequence, that has been internally modified to include a non-naturally occurring sequence. The Court even appeared to consider such a molecule patent-eligible if it *might*, but does not certainly, exist in nature through random natural mutations. Specifically, in a footnote, the Court stated that "[t]he possibility that an unusual and rare phenomenon *might* randomly create a molecule similar to one created synthetically through human ingenuity does not render a composition of matter nonpatentable" (emphasis in original).

These comments may not be controlling on the USPTO or future courts, as the Court purported to limit its decision to only cDNA, stating:

> Nor do we consider the patentability of DNA in which the *order* of the naturally occurring nucleotides has been altered. Scientific alteration of the genetic code presents a different inquiry, and we express no opinion about the application of §101 to such endeavors (emphasis added).

Despite this statement, it is very likely that the USPTO and future courts will broadly apply the Court's holding. The Court provided no explanation for why scientific alteration of the genetic code (distinct from that done to obtain cDNA) presents a different inquiry. Biomolecules having sequences with a non-natural order arguably require more human ingenuity to obtain, because their sequences are not dictated by nature. Further, the Supreme Court is unlikely to provide further guidance on this issue in the near future. Thus, as a practical matter, it appears relatively safe to conclude that claims reciting biomolecules having sequences of non-natural order are patent-eligible.[7]

Notably absent from the *Myriad* decision is any application of the Court's 2012 *Mayo* decision. The *Mayo* decision addressed method claims reciting laws of nature, the basis for another exception to patent eligibility. It discussed narrowly tailoring claims to recite particular applications of the laws of nature in order for the claims to be directed to patent-eligible subject matter. Without referring to *Mayo* by name, the *Myriad* Court implicitly acknowledged that the *Mayo* decision was not particularly relevant to the composition claims at issue, stating that (i) "there are no method claims before this Court," and (ii) "this case does not involve patents on new *applications* of knowledge" (emphasis in original). Accordingly, we do not believe that the *Myriad* decision materially affects the analysis and recommendations contained in our April 6, 2012 Special Report on *Mayo*.

The Court further quoted Judge Bryson of the Federal Circuit for aptly noting that "[m]any of [Myriad's] unchallenged claims are limited to such applications [of knowledge]." The three patents at issue in *Myriad* contain mostly unchallenged claims, including claims to DNA primers and probes, vectors, expression systems, transformed host cells, and kits.

DNA primer and probe claims encompassing naturally occurring sequences, without more, are unlikely to be found to be directed to patent-eligible subject matter merely

[7] The Court also did nothing to cast doubt on the patent eligibility of genetically engineered organisms, especially microorganisms, in discussing *Chakrabarty*, but instead appeared to reaffirm that non-naturally occurring genetically engineered organisms are indeed patent-eligible subject matter. A human *per se* is not patentable and never has been patentable in the United States.

because the claims refer to the DNA sequences in regard to their intended use as probes or primers. In contrast, DNA primer and probe claims that require an additional non-naturally occurring sequence or a non-naturally occurring element (e.g., a label) should be found to be directed to patent-eligible subject matter. Claims to non-naturally occurring vectors, expression systems, and transformed host cells that incorporate naturally occurring DNA sequences should also be found to be directed to patent-eligible subject matter, as in *Chakrabarty*. Further, claims to kits that contain naturally occurring DNA should be found to be directed to patent-eligible subject matter, if something that is non-naturally occurring is recited in the body of the claims.

To summarize, a claim to a biomolecule, such as DNA, should be found to be patent-eligible if it requires the presence of a non-naturally occurring feature (e.g., non-naturally occurring sequence, non-naturally occurring structure, or combination with a non-naturally occurring component). However, a claim merely reciting a *mixture* of two or more natural products, without more, is not likely to be found patent-eligible in accordance with this decision and the *Funk Brothers* decision.

IV. Recommendations

For patent applicants and patentees:

1. When drafting claims to a biomolecule-based invention, such as a DNA-based composition:

a. Do not rely for patent eligibility solely on a recitation that a broadly-defined biomolecule is "isolated."

b. Consider what features can be recited to distinguish an isolated biomolecule from the naturally occurring biomolecule, and draft claims reciting these features. Some common features that may be relevant include:

- non-naturally occurring sequences (e.g., cDNA, recombinant biomolecules, genetically engineered sequences, and added flanking sequences),
- non-naturally occurring nucleotides/amino acids,
- non-naturally occurring components (e.g., in the composition, in a kit, or as a label), and
- chemical/structural modifications.

c. Consider whether recitation of chemical/structural changes to the biomolecule that are solely due to isolation would narrow the claim too much to be worthwhile. If not, include such claims. However, also include other approaches, as *Myriad* might be interpreted to deny patent eligibility to such claims.

d. Draft claims reciting as much chemical structure as possible to avoid the application of *Myriad*.

e. Ensure that the claims do not unintentionally encompass an entirely natural product. Keep in mind that representative claims in this case that were broad enough to encompass both naturally occurring and non-naturally occurring DNA sequences were found to be directed to patent-ineligible subject matter.

f. Include a wide range of claims of various types (e.g., claims to compositions, kits, methods-of-making, methods-of-using, products-by-processes, etc.) and varying scope (broad to narrow) to protect against unintentional claiming of natural products and future shifts in the law. Kit and method claims may be especially important for strengthening protection for certain types of inventions.

2. Particularly for patentees in the biotechnology and pharmaceutical industries, but additionally for other patentees, review your important patents for claims that may be

adversely affected by this decision, to determine whether those patents should be reissued to add claims that would not be adversely affected.[8] This review should be done soon, to maximize the potential of adding claims that might be considered broadening within the two-year-from-issuance window for filing a broadening reissue application.

3. Similarly, review pending applications to determine whether claims should be added/amended to avoid provoking a §101 patent-ineligibility rejection under *Myriad* and the attached USPTO memorandum.

4. For discoveries related to natural products that cannot be valuably claimed as patent-eligible subject matter, consider protecting such discoveries as trade secrets until patentable applications of the discoveries are developed.

For licensees and others who are concerned with the potential or actual assertion against them of a patent with potentially patent-ineligible claims:

1. Immediately review the claims to determine whether they are directed to patent-eligible subject matter under *Myriad*.

2. Before taking action that could lead to accusations of infringement, consider whether the patentee could use reissue to obtain patent-eligible claims and whether reissue is likely to create important rights within a problematic time frame.

3. Consider and weigh options for invalidating the claims, including reexamination, post-grant review (for patents having a filing date on or after March 16, 2013), and a declaratory judgment action. (While patent-ineligibility cannot be made the basis for a reexamination request, the USPTO examiner can raise the issue during reexamination).

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[8] Following the Federal Circuit decision in *In re Tanaka*, 640 F.3d 1246 (Fed. Cir. 2011), narrowed claims could be added without changing existing claims in a reissue application. However, the existing and narrowed claims would both be subjected to a complete examination during reissue. See our April 29, 2011 Special Report, "Federal Circuit Approves Reissue Applications That Only Add Dependent Claims To An Issued Patent."

June 20, 2013

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
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MEMORANDUM

DATE: June 13, 2013

TO: Patent Examining Corps

FROM: Andrew H. Hirshfeld
Deputy Commissioner
For Patent Examination Policy

SUBJECT: **Supreme Court Decision in *Association for Molecular Pathology v. Myriad Genetics, Inc.***

Today in *Association for Molecular Pathology v. Myriad Genetics, Inc. (Myriad)*, the Supreme Court held that claims to isolated DNA are not patent-eligible under 35 U.S.C. § 101. *Myriad* significantly changes the Office's examination policy regarding nucleic acid-related technology. The purpose of this memorandum is to provide preliminary guidance to the Patent Examining Corps.

As of today, naturally occurring nucleic acids are not patent eligible merely because they have been isolated. Examiners should now reject product claims drawn solely to naturally occurring nucleic acids or fragments thereof, whether isolated or not, as being ineligible subject matter under 35 U.S.C. § 101. Claims clearly limited to non-naturally-occurring nucleic acids, such as a cDNA or a nucleic acid in which the order of the naturally-occurring nucleotides has been altered (e.g., a man-made variant sequence), remain eligible. Other claims, including method claims, that involve naturally occurring nucleic acids may give rise to eligibility issues and should be examined under the existing guidance in MPEP 2106, *Patent Subject Matter Eligibility*.

In *Myriad*, the Supreme Court considered the patent eligibility of several claims directed to isolated DNA related to the human BRCA1 and BRCA2 cancer susceptibility genes. The Supreme Court held that certain of Myriad Genetics' claims to isolated DNA are not patent-eligible, because they read on isolated naturally-occurring DNA that is a "product of nature." The Court held that isolating a "gene from its surrounding genetic material is not an act of invention." The Supreme Court held that other claims are patent-eligible, because they are limited to cDNA, which is a type of man-made DNA composition that is not naturally-occurring. The Court held that "cDNA is not a 'product of nature' and is patent eligible under §101."

The USPTO is closely reviewing the decision in *Myriad* and will issue more comprehensive guidance on patent subject matter eligibility determinations, including the role isolation plays in those determinations.