No. 15-1182

In The Supreme Court of the United States

SEQUENOM, INC.,

Petitioner,

v.

ARIOSA DIAGNOSTICS, INC., et al.,

Respondents.

On Petition For A Writ Of Certiorari To The United States Court Of Appeals For The Federal Circuit

BRIEF OF PROFESSOR TIMO MINSSEN AND ROBERT M. SCHWARTZ WITH 10 EUROPEAN AND AUSTRALIAN LAW PROFESSORS AS AMICI CURIAE IN SUPPORT OF PETITIONER

ANDREW J. DHUEY
Counsel of Record
456 Boynton Avenue
Berkeley, CA 94707
(510) 528-8200
ajdhuey@comcast.net

Counsel for Amici Curiae

TIMO MINSSEN
Professor of Biotechnology Law (fr. 1 May 2016)
FACULTY OF LAW
UNIVERSITY OF COPENHAGEN
Studiestraede 6
DK-1455 Copenhagen K, Denmark

ROBERT M. SCHWARTZ
Researcher
FACULTY OF LAW
LUND UNIVERSITY
Lilla Gråbrödersgatan 4
222 22 Lund, Sweden

COCKLE LEGAL BRIEFS (800) 225-6964
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INTEREST OF THE AMICI CURIAE[1]

Amici curiae are European and Australian law professors, and researchers who teach and write on patent law, intellectual property law, constitutional law, and legal history. Their interest is promoting continuity in the evolution of these interrelated doctrines to ensure that the patent system continues to secure innovation to its creators, owners and beneficiaries. In their professional opinion, this Court should grant the petition for a writ of certiorari because the Federal Circuit's decision in this case contradicts longstanding decisions of this Court and other Federal courts. Moreover, this decision conflicts with U.S. treaty policy and threatens innovation on a global level. If left to stand as binding precedent, and in the absence of sufficient alternative incentives, the Federal Circuit's patentable subject matter test would jeopardize the development of, and access to, new therapies in an increasingly important area of modern medicine.

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[1] Pursuant to Supreme Court Rule 37.6, amici curiae state that no counsel for any party authored this brief in whole or in part, and that no person or entity other than amici curiae or its counsel made a monetary contribution to the preparation or submission of this brief. Petitioner and Respondents have filed general letters of consent to the filing of amicus briefs pursuant to Rule 37.2(a) of this Court's rules. Pursuant to Rule 37, Amici gave timely notice to Petitioner and Respondents of their intent to file this brief.

Amici curiae have no stake in the parties or in the outcome of the case. A full list of the Amici is appended at the end of this brief.

SUMMARY OF ARGUMENT

Sequenom's[2] patentable subject matter test introduced a rigid, atomistic approach to claims eligibility that would result in an unsound change to U.S. patent policy, which has encouraged the global convergence of patent standards for over twenty years. The *Sequenom* 35 U.S.C. §101 test conflicts with the holistic, harmonized European approach to excepted or excluded subject matter. As applied, it arguably contradicts international treaties to which the U.S. is a party,[3] and upon which the European Patent Convention's[4] patentability exceptions and exclusions are based.[5] Global fragmentation of patent standards

[2] *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1377 (Fed. Cir. 2015).

[3] *See* U.S. Const. Art. VI, cl. 2.

[4] Convention on the Grant of European Patents, Munich 5 October 1973 ("EPC 1973"), 1065 U.N.T.S. 199, as revised by the Act Revising Article 63 EPC of 17 December 1991 and the Act revising the EPC of 29 November 2000 ("EPC 2000").

[5] *Cf.* Article 52(4) EPC 1973 (now Article 53(c) EPC 2000) and Decision G 1/07 of 15 February 2010 (*Treatment by surgery-MEDI-PHYSICS*) ("G-1/07"). VIII *The comments made by the President of the EPO*, 4. *International patent law and practice*. (Remarking that EPC (1973) Article 52(4) was based on PCT Rules 39.1 and 67.1 and Article 27.3(a) of TRIPS.)

threatens efficiencies of scale and destabilizes those policies. This case supplies a compelling vehicle to clarify the patent eligibility tests enunciated in this Court's recent case law since the patent claims' scope were forensically construed in a *Markman* proceeding.[6]

ARGUMENT

Biopharmaceuticals and diagnostic methods follow similar and rather harmonized development and authorization pathways among the major legal systems. Disruption in one pathway easily spills over into others. Thus it is important to identify potential conflicts early and rectify them before positions become path-dependent and difficult to resolve. While differences in patent law may be expected to exist, divergent approaches to genetic product and process patent eligibility institutionalize deep-seated differences in the approaches of different courts to new technologies, especially in the life sciences. *Sequenom*'s disjunctive eligibility test deviates from the long-standing, integrated approach of *Diamond v. Diehr*[7] mirrored in the integrative European approach to patent ineligible subject matter which do not necessarily conflict with this Court's recent decisions. *Sequenom*

[6] *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 2013 WL 5701532 (N.D. Cal. October 16, 2013) (not reported in F. Supp. 2d.)

[7] *Diamond v. Diehr*, 450 U.S. 175 (1981), ("Diamond v. Diehr".)

debatably also conflicts with the Patent Cooperation Treaty[8] and potentially Article 27 of the TRIPS agreement.[9] TRIPS is part of continuing efforts to harmonize global patent standards in which the EU and U.S. have invested substantial effort and is heavily influenced by this Court's prior decisions. As European commentators have observed:

> [H]istory has shown that groundbreaking U.S. Supreme Court decisions can influence patent law and practice all over the world. An example of this is the *Chakrabarty* decision, where it has been suggested that in the years following this case, the TRIPS Agreement (1994) sought ways to regularize and

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[8] *Cf.* Rules 39.1 and 67.1 of the Patent Cooperation Treaty, Washington 19 June 1970, in force 24 January 1978, as amended ("PCT"). 28 U.S.T. 7645.

[9] Agreement on Trade-Related Aspects of Intellectual Property Rights. Annex 1C of the Marrakesh Agreement establishing the World Trade Organization, signed in Marrakesh, Morocco on 15 April 1994 ("TRIPS"). 1869 U.N.T.S. 299. *Cf.* Article 27(1) TRIPS ("Subject to the provisions of paragraphs 2 and 3, *patents shall be available* for *any inventions*, whether products or processes, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application".) TRIPS Articles 27(2) and (3) are worded after EPC Articles 52(4) and 53 (now Art. 53 EPC 2000) and accommodates both *Chakrabarty*'s broad eligibility window, as well as the considerations related to the moral limits of ordre public and the Hippocratic oath. *See* Margo A. Bagley, "A Global Controversy: The Role of Morality" in Vol. 2 *Biotechnology Patent Law Intellectual Property and Information Wealth: Issues and Practices in the Digital Age*, Peter K. Yu Ed. (Westport, Praeger Press 2007), pp. 334-336.

> internationalize the technological and legal culture that flowed in that decision.[10]

Sequenom's eligibility test deviates from the long-standing, integrated U.S. approach and the integrative European approach to patent ineligible subject matter. Concentrating on a comparative discussion of European approaches, we also note recent developments in Australia. Recently the Australian High Court held isolated nucleotide sequences are patent ineligible subject matter,[11] but it retains the same broad and flexible interpretation of its manner of manufacture requirement since 1959[12]. This also differs from *Sequenom*'s rigid test.

Divergent patent eligibility standards for innovative biotech technologies are particularly problematic for medicinal products and diagnostic methods meant to serve the world's population and the IP regimes meant to foster their development. Significant differences in eligibility standards strain the operation of and cooperation among, the Trilateral Offices (USPTO, EPO and the Japanese Patent Office) *inter alia* increasing the cost and complexity of obtaining

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[10] Isabelle Huys, Geertrui Van Overwalle and Gert Matthijs, *Gene and genetic diagnostic method patent claims: a comparison under current European and U.S. patent law*, 19 Eur. J. Hum. Genet. 1104, 1106 (2011) ("Huys".)

[11] *D'Arcy v Myriad Genetics, Inc.* [2015] HCA 35.

[12] *National Research and Development Corporation v Commissioner of Patents* (1959) 102 CLR 252.

triadic patent family protection in the life sciences.[13] They raise costs, create uncertainty, and risk fragmenting the global delivery system for innovative medical technology. They can also disrupt the existing balance among different forms of IP protection sought by technology innovators.

Recognizing that it is unlikely that this Court will revise the gravamen of its three recent decisions regarding patentable subject matter under §101,[14] we urge it to clarify the eligibility test they establish.[15] The need was demonstrated in *Sequenom*, where the author of the panel's decision and three judges authoring the *en banc* per curiam denial of the petition for rehearing, believed that they were left with no discretion despite concerns over its detrimental effects on future developments in the life sciences. We fear that unless this Court clarifies its two-part test

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[13] Triadic patent families are defined at the OECD as a set of patents taken at the European Patent Office ("EPO") and the Japan Patent Office ("JPO") and granted by the U.S. Patent and Trademark Office ("USPTO") which share one or more priorities. OECD Patent Statistics Manual (OECD Publishing 2009), Ch. 1 Glossary.

[14] *Mayo Collaborative Services v. Prometheus Laboratories, Inc.*, 566 U.S. ___, 132 S.Ct. 1289, 182 L.Ed.2d 321 (2012) ("Mayo"); *Association for Molecular Pathology v. Myriad Genetics, Inc.*, ___ U.S. ___, 133 S.Ct. 2107, 186 L.Ed.2d 124 (2013) ("Myriad"); and *Alice Corporation Pty. Ltd. v. CLS Bank International*, ___ U.S. ___, 134 S.Ct. 2347, 189 L.Ed.2d 296 (2014) ("Alice".)

[15] *Alice*, 134 S.Ct. at 2355 (quoting *Mayo*, 132 S.Ct. at 1297-1298.)

(which cites *Diamond v. Diehr*[16]), global standards for medical diagnostic patents will diverge to the detriment of innovative medical diagnostics and of patients and patentees worldwide. For comparative purposes we provide a summary of the European patent landscape regarding patents on medical diagnostic methods utilizing genomic materials and the EPC's test for claims dependent upon patent ineligible subjects such as discoveries, scientific theories, mathematical methods, and methods for treatment of the human or animal body.

As Judge Linn's *Sequenom* concurrence demonstrates, the Court below believes that *Mayo* impliedly modified *Diamond v. Diehr* to eliminate all "conventional activity" from the claims analysis.[17] As Judge Linn also noted, that means that any post-solution activity that is purely obvious or conventional must also be ignored.[18] It may be expected that "law of nature" issues will also be encountered in relation to sufficiently non-obvious or unconventional post-solution activities which must utilize "the building blocks of

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[16] *Id.*, 134 S.Ct. at 2355 n. 3 (quoting *Diamond v. Diehr*, 450 U.S. at 188.) *Cf. Diamond v. Diehr*, 450 U.S. 188-190 (holding that it is inappropriate, especially in the context of "processes", to consider old and new elements in isolation because it would import "novelty", from §102 into §101.)

[17] Sequenom, 788 F.3d 1380 (Linn concurring.)

[18] *Id.*; *cf.* Judges Lourie and Moore's concurrence in *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 802 F.3d 1282, 1286 (Fed. Cir. 2015) ("December 12 Order") (*Per curiam* Order Denying petition for rehearing *en banc*.)

human ingenuity".[19] This argumentation framework rewrites the patent laws by combining the "new and useful" of section 101 with the "novelty" and "non-obvious" of §§102 and 103. That result could not have been within this Court's contemplation.

I. The European legal framework for patent eligibility

Apart from international patent treaties, such as the TRIPS agreement and the PCT, three European legal sources primarily govern patent law in Europe. *First*, the European Patent Office ("EPO") grants patents according to the EPC, a multilateral treaty currently in force in 38 countries which established a common system for the grant of patents.[20] A patent granted under the EPC attains national effect in the countries designated in the application and is subject to national patent law *post*-validation. The *second* source for European patent law is national law. *Third*, the European Union ("EU") promotes the internal harmonization of substantive and procedural patent law, prosecution, and litigation, most notably through the emerging European unitary patent and litigation system set out in the rules of the so-called

[19] *Alice*, 134 S.Ct. at 2354 (quoting Mayo, 132 S.Ct. at 1301.)

[20] *See* Articles 1 and 112 of EPC 1973. *See also* OF 4/2007 Revision of EPC 2000.

European Patent Package[21] and the draft rules of procedure.[22] In addition, the Biotech Directive[23] significantly affects the assessment of European patents. The main provisions of Directive 98/44 were incorporated into the Implementing Regulations ("IR") to the EPC[24] by Decision of the Administrative Council [of the EPO] of June 16, 1999.[25] Thus, the EPO assesses patentability of biotechnological inventions based on a one-to-one implementation of Directive 98/44

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[21] The EU "patent package" consists of the Agreement on a Unified Patent Court of 19 February 2013 OJ 2013 (C 175/) 1 ("UPCA"); Regulation (EU) 1257/2012 of the European Parliament and of the Council of 17 December 2012 implementing enhanced cooperation in the area of the creation of unitary patent protection OJ 2012 (L 361) 1; and Council Regulation (EU) 1260/2012 of 17 December 2012 implementing enhanced cooperation in the area of the creation of unitary patent protection with regard to the applicable translation requirement OJ 2012 (L 361) 89.

[22] *Cf.* Preliminary set of provisions for the Rules of Procedure ("Rules") of the Unified Patent Court, 18th draft of 1 July 2015 Adopted by the Preparatory Committee on 19 October 2015 (not yet in force). https://www.unified-patent-court.org/news/unified-patent-court-rules-procedure (last visited 21 February 2016.)

[23] Directive 98/44/EC of the European Parliament and of the Council of 6 July 1998 on the legal protection of biotechnological inventions, OJ 1998 (L 213) ("Biotech Directive".)

[24] Implementing Regulations to the EPC of 5 October 1973 as amended to 15 October 2014 ("IR") *see* https://www.epo.org/law-practice/legal-texts/html/epc/2013/e/ma2.html (last visited 21 February 2016.)

[25] OJ EPO 1999, pp. 437-440 and 573 ff. *See* http://archive.epo.org/epo/pubs/oj99/7_99/index.htm (last visited 21 February 2016.)

(although the EPO is not formally bound by European Community law.) Rule 23(e)(2) (now Rule 29(2) EPC 2000) defines which biological material originating from the human body may be patented.

II. Patentable Subject Matter and Technical Features

The most essential patentability criteria are summarized in Article 52(1) EPC, which provides:

> European patents shall be granted for any inventions, in all fields of technology, provided that they are new, involve an inventive step and are susceptible of industrial application.

Considering the wording, it is clear that despite having to meet the most basic patent criteria, novelty, inventive step and industrial application, patents and patent applications must also display a "technical invention". This is confirmed by the EPC's implementing regulations, which emphasize that the invention must have *technical features* (Rule 43(1)), which relate to a technical field (Rule 42(1)(a)), and are concerned with a technical problem (Rule 42(1)(c)). Although the EPC does not explicitly define the concept of "inventions" as such, it is evident from these provisions that the "technicality" of inventions is a crucial prerequisite for meeting European patent eligibility standards, *i.e.*, "technical" is the opposite of

"as such".[26] Hence it is unsurprising that several court decisions in EPC contracting states have elaborated on the issue.[27]

III. Exclusions and Exceptions under the EPC

In contrast to the primarily uncodified U.S. patent law exclusions, under the EPC patent claim ineligibility is codified in the form of "exclusions" and "exceptions". EPC Article 52(2) explicitly codifies exclusions, *i.e.*, at least if they are claimed "as such".[28] Article 52(2) exclusions are used to reject claims that are abstract in nature (discoveries) or non-technical in nature (scientific theories or methods for performing mental acts). These are considered "non-inventions" "whose common feature is a substantial lack of technical

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[26] *E.g.*, a hammer used to drive tacks as opposed to the general concept of hammering.

[27] *See, e.g.*, *Biogen Inc. v. Medeva Plc*. [1997] R.P.C. 1, 41-42 (H.L.) (Per Lord Hoffman); Bundesgerichtshof [BGH] [Federal Court of Justice] March 27, 1969, X ZB 15/67 *Rote Taube* (Red Dove), [BGHZ] 52 (Ger.) Gründe ("Reasons") II.(A)(3) ("Lehre zum planmäßigen Handeln . . . " = "methodological teaching").

[28] EPC 2000 Articles 52(2) and (3) read:

> (2) The following in particular shall not be regarded as inventions within the meaning of paragraph 1:
>
> (a) discoveries, scientific theories and mathematical methods;
>
> (3) Paragraph 2 shall exclude the patentability of the subject-matter or activities referred to therein only to the extent to which a European patent application or European patent relates to such subject-matter or activities as such.

character".[29] The test for whether or not a claimed invention claims excluded matter "as such" first looks to the technical features claimed. "[T]he fact that the idea or concept underlying the claimed subject-matter resides in a discovery does not necessarily mean that the claimed subject-matter is a discovery 'as such'."[30] In a case having much in common with *Diamond v. Diehr*,[31] the PTO's Enlarged Board of Appeals (EBoA) interpreted this to mean that it was vital, especially in new fields of technology, to carefully examine all of the claims to determine the dividing line between excluded and permissible matters.[32] Accordingly, the test does not separate excluded from permissible matter in the claims because:

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[29] Opinion G-02/13 of 25 March 2015 (*tomato II/brocolli II*) ("Opinion G-02/13") VII *Application of the Rules of Interpretation* 2.(3)(a).

[30] Opinion G-2/08 of 11 December 1989 (*Friction reducing additive/MOBIL OIL III*) ("Opinion G-2/08") Reasons for the Decision 8.

[31] In Opinion G-3/08 of 12 May 2010 (*computer-implemented inventions, CIIs*) ("Opinion G-3/08"). In the course of declaring there was no divergence in the case law, the EBoA examined whether the requirement that a computer program demonstrate "a further technical effect" did not include the activity of programming – which as an excluded mental act (*i.e.*, loading a computer with a program), or running one on it could not escape the exclusion, but which act was required to be examined in relation to the permissible claim. *Cf.* Reasons for the Decision Point 13 ff.

[32] Opinion G-3/08, Reasons for the Decision Point 7.3.4. ("Where jurisprudence enters new legal territory, caution is required to avoid making statements that will prove untenable in the very next case to arise.")

> It is in fact a well-established principle that features which would, taken in isolation, belong to the matters excluded from patentability by Article 52(2) EPC may nonetheless contribute to the technical character of a claimed invention, and therefore cannot be discarded in the consideration of the inventive step.[33]

EPC Article 53 sets forth five main groups of inventions for which no patent may be granted ("exceptions") but "does not envisage a system of general exceptions to patentability that *per se* would allow or even necessitate a broad interpretation of any of the exclusions".[34] EPC Article 53(c) codifies the "exception" of medical diagnostic methods and methods of treatment practiced on the human body.[35]

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[33] *Id.*, Reasons for the Decision Point 12.2.2: *cf.* Guidelines for Examination in the European Patent Office November 2015 Pt. G Ch. II-2. *See* https://www.epo.org/law-practice/legal-texts/guidelines.html.

[34] Opinion G-02/13, VII *Application of the Rules of Interpretation* 2.(3)(a).

[35] *Cf.* Article 53(c) EPC:

> European patents shall not be granted in respect of:
>
> * * *
>
> (c) methods for treatment of the human or animal body by surgery or therapy and diagnostic methods practiced on the human or animal body; this provision shall not apply to products, in particular substances or compositions, for use in any of these methods.

The rationale for excepting medical methods from patentability is based on ethical and social reasons to guarantee that the exercise of medical skills is not restricted or hindered by patents, ensuring the public's freedom to choose the best medical treatment and the provision of medical services, or which delay the application of such treatment.[36]

In Opinion G-1/04[37], the EBoA defined Article 53(c)'s "diagnostic methods practiced on the human body" as encompassing the following consecutive steps: (1) the examination phase involving the collection of data, (2) the comparison of these data with standard values, (3) the finding of any significant deviance, that is, a symptom, during the comparison and (4) the attribution of the deviance to a particular clinical picture, that is, the deductive medical or veterinary decision phase.[38]

Additional statements in G-1/04 are also significant.[39] *First*, the Board defined "diagnosis" with regard to the exception of diagnostic methods practiced on the human body as "the determination of the nature of a medicinal condition intended to identify a pathology".[40] The Board also found that to be excluded

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[36] Decision G-1/07 VIII The comments made by the President of the EPO, 3.

[37] Opinion G-1/04 of 16 December 2005 (*Diagnostic methods*) ("Opinion G-1/04".)

[38] *Id., cf.* Huys.

[39] Opinion G-1/04.

[40] *Id.*, Reasons for the Opinion, point 5.1.

from patentability, the diagnostic method has to comprise all the steps mentioned above in points (1)-(4). *Second*, the Board found that the prerequisite "practiced on the human body" refers only to technical method steps, whereas the deductive decision phase in itself is a non-technical, merely intellectual exercise.[41] However, the Board noted that claims that are only directed to a deductive decision phase are excluded from patentability pursuant to Article 52(2) EPC since they concern only mental acts.[42] All of the steps must be examined together due to the multi-step nature of medical diagnosis.[43] Thus, to be patent eligible such methods must also encompass preceding technical steps *not* practiced on the human body. *Third*, the Board clarified the status of diagnostic methods when some or all steps are conducted by *in vitro* techniques in a laboratory and not directly on the human body. This may *e.g.*, include genetic diagnostic methods, such as the use of DNA microarrays or DNA sequencing. The Board considered such method steps to be of a purely technical nature and consequently concluded that genetic diagnostic methods claiming these technical steps are, in principle, patent eligible and not excluded by Article 53(c). Significantly, the Board held that the method steps of "obtaining results or findings" do not provide a

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[41] *Id.*, Reasons for the Opinion, point 5.2.

[42] *Id.*, Reasons for the Opinion, point 6 (referring back to point 5.2.).

[43] *Id.*, Reasons for the Opinion, point 6.2.2.

sufficient basis for denying patentability under Article 53(c) EPC.[44]

IV. The patent eligibility of *equivalent* claims at the EPO

The EPO followed the reasoning of the Enlarged Boards of Appeals above, when it upheld Myriad Genetics Inc.'s patent on the BRCA1 "breast cancer gene" and related claims for diagnosing a predisposition for breast and ovarian cancer in a human subject in cases T-1213/05[45], T-666/05,[46] T-80/05[47] and T-156/08[48], albeit in limited form. These rulings upheld the patent owners' right to collect royalties on tests carried out across Europe, although the patents' original scope was reduced to cover frameshift mutations, not BRCA1 or BRCA2 themselves. Thus the patent was confirmed at the European level. However, opponents may seek further reductions in the patents' scope in the national courts.[49]

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[44] *Id*., Reasons for the opinion, point 6.2.3.

[45] T-1213/05 (*Breast and ovarian cancer/UNIVERSITY OF UTAH*) of 27 September 2007.

[46] T-666/05 (*Mutation/UNIVERSITY OF UTAH*) of 13 November 2008.

[47] T-80/05 (*Method of diagnosis/UNIVERSITY OF UTAH*) of 19 November 2008.

[48] T-156/08 (*BRCA2/UNIVERSITY OF UTAH*) of 14 January 2011.

[49] Nayanah Siva, *Myriad wins BRCA 1 row*, 27 Nature Biotechnology 8 (2009).

The EPO's analysis of the counterpart of Sequenom's U.S. '540 patent, (European patent EP 994 963 ("EP '963")) reveals further fundamental differences.[50] EP '963 covers claims substantially identical to claim 1 of the U.S. '540 patent and was examined and granted by the EPO. EP '963 subsequently prevailed in an opposition procedure, and even withstood appeal to the EPO Technical Boards of Appeal ("TBA").[51] In T-146/07, the TBA found that the patentees' search for foetal nucleic acid origin in maternal serum or plasma was not indicated by the state of the art and was also found to meet the other patentability criteria, such as inventive step under Article 56 EPC.[52] Compare that approach with the Federal Circuit's bifurcated test which winnowed out of consideration the successful result of the same search to find that Sequenom's "invention" was an

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[50] Compare claim 1 of U.S. Patent No. 6,258,540 (US '540 patent) with claims 1 and 4 of European Patent EP 994 963:

> A detection method performed on a maternal serum or plasma sample from a pregnant female, which method comprises detecting the presence of a nucleic acid of foetal origin in the sample, wherein said nucleic acid is a paternally inherited sequence which is not possessed by said pregnant female. [. . .] 4. A method according to [claim 1], wherein said detecting comprises amplifying said nucleic acid.

[51] *See* Case T-146/07 of 13 December 2011 (*Non-invasive prenatal diagnosis/ISIS INNOVATION LTD*.) ("Case T-146/07") (Technical Board of Appeal 3.3.08.)

[52] *Id.* Reasons for the Decision 25-35.

unpatentable discovery, *i.e.*, cffDNA in plasma.[53] *This restrictive and formalistic approach* demonstrates the disruptive effect that the Federal Circuit's *Sequenom* test may have on incentivising breakthrough innovation.

V. Interim Conclusions regarding the situation in Europe

In sum, while patents directed to the isolated BRCA genes, related diagnostic methods, and claims similar to the claims at issue in *Sequenom* remain highly controversial in Europe, both legislation and case law regard them as patent-eligible under EPC Articles 52 and 53.[54] The U.S. Supreme Court decisions, classifying an "isolated" genomic gene as a "product of nature" differ from the statutory text of the EPC and the Biotech Directive, holding both genomic and cDNA patentable if isolated from its natural environment. Moreover, genetic diagnostic method claims regarded as unpatentable "laws of nature" under the U.S.'s Mayo and Myriad mandated approaches, would, in principle, not be per se excluded from

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[53] 788 F.3d at 1379.

[54] *Cf.* Robert M. Schwartz & Timo Minssen, *Life after Myriad: The Uncertain Future of Patenting Biomedical Innovation and Personalised Medicine in an International Context*, 3 Intell. Prop. Q. 189 (2015). (Noting that European legislation and case law appears to be more restrictive with regard to the scope of protection granted to patents utilizing isolated (human) DNA sequences but that this is not addressed under patent eligibility standards.)

patentability in Europe *if* they are new, inventive and sufficiently disclosed. The Federal Circuit's exceptionally restrictive interpretation in *Sequenom* of Mayo's and Myriad's "significantly more" patent-eligibility criteria does not exist under European patent law.

VI. Innovation Policy Considerations

We recognize that there are many important questions about the effectiveness of an incentive-based patent system in particular areas of biomedical innovation and that a strict and systematically correct application of patent criteria is crucial for the innovation system and patent quality. We also realize that it may, in some areas, indeed be wise to consider a more pronounced role of complementary or alternative incentives independent of patents, or stimulated by more governmental or public involvement. There are a wide variety of push and pull mechanisms available for careful consideration in particular areas of biomedical innovation.[55] It can be expected that such mechanisms will play an increasing role, particularly in the areas of biological manufacturing

[55] *See*, *e.g.*, Lisa Larrimore Ouellette, *Patentable Subject Matter and Non-Patent Innovation Incentives*, 5 U.C. Davis L. Rev. 1115 (2016.)

methods, orphan drugs, antibiotics, diagnostics and personalized medicine.[56]

At the same time, patents on skillfully synthesized biological molecules, inventive genetic applications and sequencing technology, not-naturally occurring genes and proteins, remain important for many areas of the genetic diagnostic testing business and in personalized medicine. It is therefore argued that "the focus of academic and policy debate should shift to the pressing matters associated with this next wave of biotechnology patents as well as proprietary databases of genetic test information"[57]. Thus, the patent system will remain a crucial part of pharmaceutical innovation,[58] and it will be more important than ever to assure that the patent law system is not misused to address real or perceived problems that it was never created to solve. In particular the

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[56] *Cf.* Arti K. Rai & Jacob S. Sherkow, *The changing life science patent landscape*, 34 Nature Biotechnology 292 (2016). *See also* Rachel Sachs, *Innovation Law and Policy: Preserving the Future of Personalized Medicine* (April 20, 2015). Forthcoming, 49 U.C. Davis L. Rev. (2016), *see* http://ssrn.com/abstract=2596875 (accessed 10 April 2016.)

[57] Jonathon Liddicoat, Tess Whitton & Dianne Nicol, *Are the gene-patent storm clouds dissipating? A global snapshot*, 33 Nature Biotechnology 347 (2015); John M. Conley, Robert Cook-Deegan, Gabriel Lazaro-Munoz, *Myriad after Myriad: The Proprietary Data Dilemma*, 15 N.C.J.L. & Tech. 597 (2014) ("Myriad after Myriad".)

[58] *See, e.g.*, Dan L. Burk, *Patents as Data Aggregators in Personalized Medicine*, 21 B.U. J. Sci. & Tech. 233 (2015) ("Burk".)

combined effect of *Sequenom's* interpretation of *Myriad* and *Mayo* and *Alice* will affect many method claims which depend upon unmodified biological materials.

Although the most recent USPTO guidelines indicate some leeway for meeting patent eligibility standards in the future through clever modifications of naturally occurring products and processes, there is no doubt that the thresholds have been considerably heightened and there still remains considerable uncertainty with regard to genetic diagnostics. Moreover, the guidelines have no effect on *Sequenom*, *Myriad*, *Mayo* and the developing lower court case law which apply retroactively.

VII. The choice between patents, complementary incentives and trade secrets

In light of the above it is not surprising that biotech companies are increasingly finding alternate forms of IP such as data exclusivity and trade secrecy increasingly attractive.[59] But at what price? The patent laws require public disclosure of the invention and its enablement.[60] Nevertheless, patents are not the sole mechanism used by the pharmaceutical industry, nor do patent disclosures encompass all aspects of the commercialization of diagnostic methods or medicinal products that must be disclosed to public

[59] *See Myriad after Myriad*, at 633-634.

[60] *See, e.g.*, 35 U.S.C. §§111 and 112.

health authorities.[61] Trade secrecy *e.g.*, takes the public disclosure aspect of the patent bargain out of the public domain and is as least as problematic for innovation as the blocking function complained of in *Mayo*, *Myriad* and *Alice*. Trade secrecy deprives the scientific world of the positive externality of accessing knowledge through a public disclosure process. Disclosures may motivate invention around a patent, but that spur is missing when it is a secret. Notwithstanding the debate over more pronounced roles for alternatives to patents or particularized complementary incentives, it is clear that this shift towards trade secrets may have chilling effects for data sharing in scientific collaborations, the development of biologic drugs and personalized medicine[62], and biosimilars and the development of innovative (manufacturing) processes.[63]

Sequenom tilts the equilibrium between patent and non-patent process protections towards trade secrecy, an area that is not internationally harmonized[64],

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[61] *See Myriad after Myriad*, at 633-634.

[62] *See, e.g.*, Burk.

[63] *See, e.g.*, W. Nicholson Price II & Arti K. Rai, *Are trade secrets delaying biosimilars?*, 348 Science 188, 188-189 (2015.)

[64] A recent OECD publication contains a Global review and analysis of trade secrecy. *See Enquiries Into Intellectual Property's Economic Impact* (OECD 2015) ("OECD Enquiry"), Chapter 3, Approaches to the Protection of Trade Secrets, pp. 130-134. *See* http://www.oecd.org/internet/intellectual-property-economic-impact.htm.

yet is protected under U.S. law[65] and International Treaties such as TRIPS and the Paris Convention.[66] In Europe, pharmaceutical companies cannot fully rely upon confidential business information due to the lack of harmonization among EU members and the costs of compliance with multiple legal systems.[67] If they obtain patents in Europe they lose trade secrecy protection in the U.S. while regulatory exclusivities are not adequately available for diagnostics.

Moreover, a new EU policy, and Regulation 536/2014 will soon require publication of clinical trial data during marketing authorization for a drug or device.[68] Forcing pharmaceutical companies to choose between reliance on patents in the European market

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[65] *Cf.* Section 1(4) Uniform Trade Secrets Act. 14 U.L.A. 433 (1985) and *Ruckelshaus v. Monsanto Co.*, 467 U.S. 986, 1001-1003 (1984.)

[66] Article 39 TRIPS and Articles 1 and 10 *bis* Paris Convention for the Protection of Industrial Property of 20 March 1883, as revised and amended. 21 U.S.T. 1583.

[67] Although much uncertainty remains, on 15 December 2015 the European Parliament and the European Council reached a preliminary agreement on the text of a Directive harmonizing trade secrecy, *cf.* http://ec.europa.eu/growth/industry/intellectual-property/trade-secrets/index_en.htm (accessed 1 March 2016.)

[68] Regulation (EU) 536/2014 of the European Parliament and of the Council of 16 April 2014 on clinical trials on medicinal products for human use and repealing Directive 2001/20/EC, OJ 2014 (L 158) 1; European Medicines Agency policy on publication of clinical data for medicinal products for human use EMA/240810/2013 (2 October 2014) p. 4 ("In general, . . . , clinical data cannot be considered [commercially confidential information]".)

or trade secrets in the U.S. is an expensive and divisive Hobson's choice.

A far greater set of unintended effects follows from the path dependency of future precedent based upon *Sequenom's* interpretation of this Court's patent ineligibility argumentation framework. One expects that an increasingly restrictive line of case law at the Federal Circuit, by removing ineligible subject matter from consideration, especially to as yet-unimagined innovative technologies, will construe the exclusionary principle to "swallow all of patent law".[69] Categorical exclusion of a broad innovation area from patent eligibility to curb overly-broad preemptive patenting is risky and produces unintended effects. In our view, other patent requirements, as well as post-grant litigation, play, and should play, an important role in granting well-defined claims that correspond to the inventors' actual contributions to the art. Rapid technical developments in combination with stricter applications of these requirements have already resulted in a shift of inventive activities from broad product claims to specific innovative applications.

The best workable interpretation of the *Mayo*, *Myriad* and *Alice* tests should incorporate the holding that "products of nature" and "laws of nature" "as such" are unpatentable, whereas biological products and processes harnessed to a "novel and useful" effect by human intervention are. Whether such intervention

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[69] *Alice*, 134 S.Ct. at 2354.

is sufficient and the products or processes would also pass other patentability requirements, such as non-obviousness, are completely different questions. Unfortunately, *Sequenom's* interpretation of *Mayo, Myriad* and *Alice* may have broader, chilling effects on patentability in crucial areas of biomedical innovation. *Sequenom* generates considerable uncertainty regarding the patentability of diagnostic methods. Multiple eligibility thresholds will likely force companies and innovators either to withdraw from crucial medical areas or to engage in – at least from a utilitarian perspective – problematic business models utilizing trade secrets or other protective measures.

We recognize that the dividing lines between patent-ineligible "products and processes of nature", and patent-eligible man-made biomedical inventions and methods using them are difficult to define. Moreover, not all biomedical innovations do – nor should they – depend on patents. We also acknowledge that in some areas of personalized medicine, antibiotics and orphan drugs, the patent system does not work well.

Yet, considering the continuing importance of patents in many areas of biomedicine and collaboration[70], a limited, or more holistic application of the Supreme Court's patent-eligibility rationale better

[70] With regard to data exchange and collaboration in personalized medicine, *cf.* Burk.

supports much needed investment in biopharmaceutical innovation and furthers development of innovative treatments and precision medicine. That would go a long way towards assuring that differences among the world's patent law systems do not create unnecessary compliance costs, ultimately to be paid by the consumers of medical care.

CONCLUSION

The argumentation framework established in *Mayo*, *Myriad* and *Alice*, as interpreted by *Sequenom*, stands in clear contrast to current European legislation and practice. It arguably also contradicts international treaties. Patent law, while local in immediate effect, quickly migrates into an increasingly integrated global economy and destabilizes policies promoting an increasingly harmonized and efficient world patent system. We recognize that it is impossible to achieve *static* legal certainty in high-tech patenting and that national variations cannot be entirely avoided. But, where innovative technologies are new and not well understood by scientific experts, courts tasked with supervising the normative aspects of patent law should give clear direction that all of the moving parts must be as carefully considered as is possible. Concerns have been raised in Europe and the U.S. about overly preemptive patent scope, but these are addressed at different levels. In contrast to Europe, the CAFC has interpreted the uncodified exception as part of a "threshold test" for

patent-eligibility applied before assessing other patentability requirements. A strict and coherent application of these requirements, however, would invalidate overly-broad patent claims, while also permitting, well-defined, narrower claims on diagnostic technology. In our view, the current approach conflates the patent eligibility test with issues that can be more sensibly addressed within a strict and coherent assessment of novelty, non-obviousness and sufficient disclosure criteria or at the post-grant level. To entirely transplant those issues into the patent eligibility assessment might categorically close the patentability door on many well-defined and beneficial inventions that deserve patent protection. In the absence of sufficient forms of complementary incentives we risk that the wells driving technological progress run dry.

Accordingly, we urge this Court to clarify a patent eligibility test in line with its longstanding jurisprudence and in harmony with international and European law.

Respectfully submitted,

ANDREW J. DHUEY
Counsel of Record
456 Boynton Avenue
Berkeley, CA 94707
(510) 528-8200
ajdhuey@comcast.net

Counsel for Amici Curiae

APPENDIX

LIST OF AMICI CURIAE

Professor William Cornish CMG, QC, LLB (Adelaide) BCL (Oxon), LLD (Cantab), Bencher of Gray's Inn, Professor of English Law, London School of Economics (1970-90); Professor of Law, Cambridge University (1990-2004, with title of Herchel Smith Professor of Intellectual Property Law from 1995); External Academic Member of the Max-Planck Institute for Innovation and Competition, Munich (from 1989); Academic Director of the British Law Centre, Law Faculty, University of Warsaw and elsewhere in Central East Europe (1991-2012).
University of Cambridge
CB3 0AG
United Kingdom

Professor Avv. Vincenzo Di Cataldo, Dean and professor University of Catania (Italy)
Dipartimento di Giurisprudenza
Università di Catania
Via Gallo 24
I-95124 Catania
Italy

Professor Dr. Bengt Domeij, Professor of Intellectual Property Law Uppsala University
Uppsala University
Department of Law
Box 512
SE-751 20 Uppsala
Sweden

Dr. Jonathon Liddicoat, Philomathia Research Associate in Law Centre for Law, Medicine and Life Sciences Faculty of Law University of Cambridge
10 West Rd., Cambridge CB3 9DZ
United Kingdom

Dr. Ana Nordberg, Researcher in Life Science Law
Centre for Information and Innovation Law (CIIR)
Faculty of Law
University of Copenhagen
Studiestraede 6
DK-1455 Copenhagen K, Denmark

Professor Dr. Dianne Nicol, Director of the Centre for Law and Genetics University of Tasmania
Private Bag 89
Hobart TAS 7001
Australia

Professor Dr. Jens Schovsbo, Professor of Intellectual Property Law
Centre for Information and Innovation Law (CIIR)
Faculty of Law
University of Copenhagen
Studiestraede 6
DK-1455 Copenhagen K, Denmark

Professor Dr. Tine Sommer
Institute Leader Faculty of Law
Juridisk Institut
Aarhus BSS
Aarhus Universitet
Bartholins Allé 16, 1410-222
8000, Aarhus C, Denmark

Professor Dr. Dres. h.c. Joseph Straus, Director Emeritus
NIPMO-UNISA Chair for Intellectual Property, University of South Africa (UNISA), Pretoria; Marshall B. Coyne Visiting Professor of International and Comparative Law; George Washington University Law School, Washington D.C.; Visiting Professor, Tsinghua University School of Law, Beijing; Max-Planck Institute for Innovation and Competition
Marstallplatz 1
D-80539 Munich
Germany

Professor Dr. Esther van Zimmeren, Research Professor Globalization, Multi-level Governance and Federalism & IP Law
Faculty of Law
University of Antwerp
Stadscampus Venusstraat 23
S.V.205
2000 Antwerpen, Belgium