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Toward Aligning the Law with Biology? The Federal Circuit's About Face in *Enzo Biochem, Inc. v. Gen-Probe, Inc.*[*]

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INTRODUCTION

Advances in biotechnology offer great potential for the health and welfare of humankind. As our knowledge of microscopic cellular processes and their relationship to the functioning of the body as a whole grows, so does the potential to develop new cures for a broad range of diseases. Realization of this potential depends upon many factors, including how the courts apply existing patent doctrines to biological inventions. Scientists need to protect their discoveries adequately in order to encourage research and development, while businesses need a reliable intellectual property portfolio to attract investors. Both needs can be fulfilled by a patent system that is predictable and addresses the unique issues raised by biotechnology. This fulfillment may necessitate a Congressional amendment of the patent laws for biological inventions and the promulgation of clear judicial rules in these matters.

In *Enzo Biochem, Inc. v. Gen-Probe, Inc.*,[1] the Federal Circuit Court of Appeals reached a decision that could signal that biotechnology presents novel issues for patent laws and that the current doctrines are inadequate. The case centered on a patent[2] owned by plaintiff Enzo Biochem, Inc. (Enzo) relating to DNA probes capable of specifically detecting the

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1. 296 F.3d 1316 (Fed. Cir. 2002). Because two Federal Circuit cases share a common name, the initial decision, 285 F.3d 1013 (Fed. Cir. 2002), will be referred to as *Enzo I*, while the rehearing, 296 F.3d 1316 (Fed. Cir. 2002), will be denoted *Enzo II*.

2. *See* U.S. Patent No. 4,900,659 (issued Feb. 13, 1990).

bacteria that cause gonorrhea over the highly homologous bacteria responsible for meningitis.[3] The precise sequences of the probes were not included in the patent specification, but they were described by their selective binding properties, and samples of the sequences were placed in a public depository.[4] Enzo brought an action for patent infringement against a group of biotechnology and pharmaceutical interests.[5] The group subsequently moved for summary judgment that the claims were invalid for failure to meet the written description requirement of 35 U.S.C. § 112, paragraph 1.[6] The district court granted the motion.[7] A split Federal Circuit panel initially affirmed the decision (hereinafter *Enzo I*).[8] However, just over three months later, the Federal Circuit abruptly vacated its former holding, reversed and remanded the district court's ruling (hereinafter *Enzo II*), and denied a petition for rehearing en banc.[9]

Two major issues are raised by the case, both relating to exactly what satisfies the written description requirement for biotechnology inventions. The first issue is whether functional terms are sufficient to meet the written description requirement for biological inventions in general and DNA molecules specifically.[10] This is an important point because the Federal Circuit had previously established an almost *per se* rule that only the exact sequence of a DNA molecule would provide an adequate written description.[11] This exact-sequence rule is problematic, as it ignores the fact that biological inventions are not always amenable to purely structural

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3. *See Enzo II*, 296 F.3d at 1320-21.

4. *See id*. Depositories such as the American Type Culture Collection (ATCC) maintain and propagate samples of biological materials (including DNAs, bacteria, and mammalian cells) submitted by scientists. For a small maintenance fee, members of the scientific community may obtain these samples for their own research purposes. *See generally* ATCC website, *at* http://www.atcc.org (explaining the depository principle and procedures, including deposits for patenting purposes) (last visited Mar. 11, 2003).

5. *See Enzo I*, 285 F.3d at 1016.

6. *See id*.

7. *See id*.

8. *See id*. at 1013.

9. *See id*.; *see also Enzo II*, 296 F.3d at 1330.

10. *See Enzo II*, 296 F.3d at 1328.

11. *See* Regents of the Univ. of Cal. v. Eli Lilly & Co., 119 F.3d 1559, 1566 (Fed. Cir. 1997) (stating "[a]n adequate written description of a DNA . . . 'requires a precise definition, such as by structure, formula, chemical name, or physical properties'") (quoting Fiers v. Revel, 984 F.2d 1164, 1171 (Fed. Cir. 1993)).

descriptions and many structurally distinct DNAs are functionally equivalent. The Federal Circuit's reversal may indicate a realization that this *per se* approach is untenable and functional aspects of biological inventions may be the means required to describe them adequately.

The second issue is whether the purpose of the written description requirement is solely to prove that an inventor possessed the invention at the time of filing, or if the doctrine serves additional purposes for biological inventions.[12] This issue is important because prior case law establishes that proof of possession of the invention satisfies the written description requirement in the non-biological arts.[13] As such, an actual deposit of the material would seem to be the ideal way of establishing possession. However, significant confusion surrounds whether a deposit, or the recitation of the DNA sequence in the specification, or both is required. The Federal Circuit's ruling in *Enzo II* suggests that a deposit, and therefore possession alone, is sufficient.[14] However, this conflicts with the Circuit's earlier holding that the actual sequence must be delineated.[15] Failure to resolve this ambiguity will create uncertainty in biotechnology and could stifle research and development.

This Comment will examine the current status of the written description requirement and analyze whether the Federal Circuit sufficiently clarified the issue in its *Enzo II* holding. Section I will provide a basic lesson in biotechnology and will detail the evolution of the written description requirement as applied to biotechnology inventions. Section II will describe the court's two holdings and the rationales behind them. Finally, Section III will critique these rationales. This Comment concludes that although the court's holding is a step in the right direction, significant confusion still surrounds the written description requirement. Further, the Federal Circuit should extend their holding by ruling en banc that the disclosure requirement may be satisfied by enabling others to

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12. *See Enzo II*, 296 F.3d at 1329-30.

13. *See* Union Oil Co. of Cal. v. Atl. Richfield Co., 208 F.3d 989, 997 (Fed. Cir. 2000) (stating "the Patent Act and this court's case law require only sufficient description to show one of skill in the refining art that the inventor possessed the claimed invention at the time of filing").

14. *See Enzo II*, 296 F.3d at 1326.

15. *See Eli Lilly*, 119 F.3d at 1569 (holding that the description of a cDNA "requires a kind of specificity usually achieved by means of the recitation of the sequence of nucleotides that make up the cDNA").

make and use a DNA invention, rather than requiring the recitation of the DNA sequence, and that the disclosure requirement may be demonstrated by both functional and structural data.

I. BACKGROUND

A. BIOTECHNOLOGY OVERVIEW

"Biotechnology" is a catchall term, encompassing a vast array of technologies that continue to grow with each new discovery. A relatively small number of technological areas have received most of the judicial focus, largely because issues related to these methodologies have been adjudicated by the Federal Circuit or its predecessor Court of Claims and Patent Appeals (CCPA). The substances that have been addressed significantly by these courts include monoclonal antibodies,[16] antisense RNA,[17] and recombinant DNA technology.[18] For reasons elaborated below, this Comment will focus on problems best illustrated by recombinant DNA technology. However, the arguments made here may be applied to other areas of biotechnology, or to any rapidly progressing technology.

The genetic information of an organism is stored within deoxyribonucleic acid (DNA), a complex macromolecule located in the nucleus of each cell.[19] The backbone of a single DNA strand is made up of a polymer of sugars, with each sugar bound to one nucleotide base.[20] There are four bases in DNA designated A, T, C, and G.[21] These bases are the "letters" of a molecular alphabet, and their specific arrangement encodes the data necessary for the functional characteristics of a cell and, in turn, an organism.[22] DNA is maintained as a double helix of two complementary strands, as each base binds with a

16. *See, e.g.*, In re Wands, 858 F.2d 731 (Fed. Cir. 1988) (describing monoclonal antibodies used in the diagnosis of Hepatitis B).

17. *See, e.g.*, Enzo Biochem, Inc. v. Calgene, Inc., 188 F.3d 1362 (Fed. Cir. 1999) (describing the use of antisense RNA to prevent ripening of FLAVR SAVR tomato).

18. *See, e.g.*, In re Goodman, 11 F.3d 1046 (Fed. Cir. 1993) (describing the method for producing mammalian polypeptides in plant cells).

19. *See* BRUCE ALBERTS ET AL., MOLECULAR BIOLOGY OF THE CELL 335 (Miranda Robertson et al. eds., 3d ed. 1994) (1983).

20. *See id*. at 98-99.

21. *See id*. The four bases are: Adenine (A), Thymine (T), Cytosine (C), and Guanine (G). *See id*.

22. *See id*. at 102.

particular partner base: A always pairs with T and C always pairs with G.[23] Human genomic DNA is made up of approximately three billion of these base pairs, most of which have no known function.[24] Specialized areas of the genome, the so-called genes, contain the information necessary for the production of the true building blocks of the cell-proteins.[25]

To produce these proteins, a process known as transcription first occurs.[26] In this process, DNA is used as a template to produce a faithful,[27] though condensed,[28] copy of the gene sequence.[29] This copied genetic information is then transported by single stranded molecules of messenger ribonucleic acid (mRNA) out of the nucleus to the cytoplasm where protein synthesis occurs.[30]

In a process known as translation, each mRNA is used as a template for the construction of the protein encoded by the original gene sequence within the genomic DNA.[31] The bases of each mRNA are sequentially "read" in groups of three, with each triplet referred to as a codon.[32] Each codon specifies the incorporation of a specific amino acid into the nascent protein chain.[33] This process continues until a special codon, known as a "stop codon," is reached, terminating the building process and releasing the completed protein.[34]

A degree of redundancy exists in the transfer of information from DNA to protein, leading to what is termed the

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23. *See id*. at 99.

24. *See id*. at 339-40.

25. *See id*. at 104.

26. *See id*. at 104-05.

27. Slight modifications are made to the mRNA molecule. The DNA base thymine (T) is substituted in each instance with the base uracil (U). *See id*. at 100. In addition, a methylated cap structure is placed at the beginning (or 5' end) and a series of adenine bases are added at the terminus (or 3' end) of the mRNA molecule. *See id*. at 368-69. Despite these alterations, the essential coding sequence of the original DNA molecule is maintained. *See id*.

28. Genes are composed of both protein-coding sequences known as exons interspersed with noncoding, regulatory regions know as introns. *See id*. at 105. As mRNAs are processed, intron sequences are excised and exon sequences rejoined to one another by a catalytic process known as "splicing." *See id*. The resulting mRNA thus contains only the contiguous protein-coding regions and is thus shorter than the corresponding genomic DNA. *See id*.

29. *See id*. at 104-05.

30. *See id*.

31. *See id*. at 106-07.

32. *See id*. at 106.

33. *See id*.

34. *See id*. at 234.

"degeneracy" of the genetic code.[35] Although the four bases that comprise DNA can be arranged into sixty-four different codons,[36] there are only 20 amino acids employed in the manufacture of human proteins.[37] Therefore, most of the amino acids are encoded by multiple unique codons.[38] As a result, a scientist in possession of the nucleotide sequence of a particular gene can readily determine the corresponding protein sequence.[39] Possession of a protein sequence, however, does not allow a researcher to define the exact gene sequence that encodes that protein.[40]

B. RECOMBINANT DNA TECHNOLOGY

Recombinant DNA techniques provide a convenient means to produce large amounts of a particular protein.[41] This technique is important both for researching the function of a given protein and in the industrial production of the protein for therapeutic use in plants, humans, and animals.[42]

mRNA molecules expressed by a cell can be isolated and converted into a DNA copy by using a viral enzyme in a process called reverse transcription.[43] The resulting DNA molecules contain only the protein-coding sequences of genes, and are referred to as complementary DNAs (cDNAs).[44] Once the cDNA for a gene is isolated, it may be connected with additional pieces of DNA that promote its transcription.[45] The resulting construct is a compact DNA molecule free from the regulatory DNA elements that normally control the rate of its transcription.[46] This molecule may then be inserted into various cell types, ranging from bacteria to cultured

35. *See id*. at 230-31.
36. Three of which are "stop codons." *Id*. at 234.
37. *See id*. at 46.
38. *See id*. at 230-31. Of the twenty amino acids, only two, methionine and tryptophan, are encoded solely by a single codon. *Id*. at 231.
39. *See id*. at 106.
40. *See id*. at 314.
41. *See generally id*. at 291-334 (explaining how recombinant DNA technology has generated new experimental approaches that have revolutionized cell biology).
42. *See id*. at 291.
43. *See id*. at 310.
44. *See id*. at 310-11.
45. *See id*. at 320-21.
46. *Id*.

mammalian cell lines.[47] These cells are then harnessed as tiny factories: large volumes of the cells are grown and the protein is isolated from the milieu by conventional purification techniques.[48] The isolated proteins have myriad uses, including the treatment of human diseases.[49]

Isolated DNA molecules may also be used as probes to detect the presence of a specific DNA sequence within a larger DNA molecule, such as a bacterial genome.[50] In this process, the double stranded genomic DNA is first separated into single strands by heating, then allowed to cool in the presence of the single stranded probe DNA.[51] The probe will preferentially anneal to its complementary sequence if it is present in the genomic DNA sample.[52] If the probe is derived from a sequence unique to the genome of a particular bacterial strain, it may be used to identify the presence of that strain over a similar bacterium.[53]

The explosion of genomic and proteomic research has provided a wealth of sequence data for researchers to decipher.[54] With the Human Genome Project fundamentally completed, it is now possible to scan the entire human genome for potential gene-encoding sequences.[55] The protein sequences encoded by these genes will soon be determined and added to the growing list of proteins whose structures are known, but whose functions are not.[56] Researchers will then face the task of discovering functions for these "orphan" protein sequences.[57]

A moderately skilled researcher can employ modern DNA techniques to readily alter the sequences of isolated cDNAs molecules.[58] This fact, combined with the inherent degeneracy of the genetic code, allows the rapid creation of many unique

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47. *Id.* at 321.
48. *See id.*
49. *See id.*
50. *See id.* at 300.
51. *See id.*
52. *See id.*
53. *See id.*
54. *See* Stanley Fields, *Proteomics: Proteomics in Genomeland*, 291 SCIENCE 1221, 1221 (2001). Proteomics refers to the study and manipulation of the set of proteins expressed within a particular cell type. *See id.*
55. *See* J.C. Venter et al., *The Sequence of the Human Genome*, 291 SCIENCE 1304, 1306 (2001).
56. *See* Fields, *supra* note 54, at 1221.
57. *See id.*
58. *See* ALBERTS, *supra* note 19, at 323.

cDNAs that encode the *same* protein sequence.[59] Thousands of DNA molecules with unique chemical structures exist that, when transcribed and translated, all produce exactly the same protein.[60]

C. THE PATENT SYSTEM

The importance of patents to the development of an industrialized society has been understood in the United States since its very inception. This realization is manifest in the Constitutional mandate authorizing Congress "[t]o promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries."[61] The first Congress exercised this power immediately by adopting the Patent Act of 1790.[62]

Though the patent laws are frequently amended, the goals behind them have changed little since 1790.[63] The laws grant a time-limited monopoly to an inventor as a reward for the discovery and its disclosure to the public.[64] The Supreme Court recently described the patent system as "a carefully crafted bargain that encourages both the creation and the public disclosure of new and useful advances in technology."[65] Thus, the patent system seeks to promote public access to technological advances and to reward the inventors who discover them.[66]

In general, an invention is patentable if it is useful, novel

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59. *See id.* at 323-34.

60. *See id.* at 106 (showing potential combinations of nucleotides encoding each amino acid).

61. U.S. CONST. art. I, § 8, cl. 8.

62. Patent Act of 1790, ch. 7, 1 Stat. 109, 109-12 (1790). *See generally* Edward C. Walterscheid, *Patents and the Jeffersonian Mythology*, 29 J. MARSHALL L. REV. 269, 269 (1995).

63. *See* ROBERT P. MERGES & JOHN F. DUFFY, PATENT LAW AND POLICY: CASES AND MATERIALS 10 (3d ed. 2002) (noting "the 1952 Patent Act, the first major revision of the patent statute since the nineteenth century, restated many of the fundamental principles on which American patent law had been based since 1790").

64. *See* Kurt M. Saunders, *Patent Nonuse and the Role of Public Interest as a Deterrent to Technology Suppression*, 15 HARV. J.L. & TECH. 389, 398 (2002).

65. Pfaff v. Wells Elecs., Inc., 525 U.S. 55, 63 (1998) (citing Bonito Boats, Inc. v. Thunder Craft Boats, Inc., 489 U.S. 141, 151 (1989)).

66. *See* Saunders, *supra* note 64, at 398.

and nonobvious.[67] In addition, the invention must be adequately disclosed in an application filed with and examined by the United States Patent and Trademark Office (PTO).[68] The specification of the patent application must sufficiently set out the details of the invention such that the public may take advantage of its merits after the patent term expires.[69]

D. 35 U.S.C. § 112, FIRST PARAGRAPH

The text of the first paragraph of 35 U.S.C. § 112 sets forth the substantive disclosure requirements that must be met for the issuance of a patent.[70] In essence, this section delineates what information about the invention must be included in the specification to entitle the inventor to the patent.[71] It provides:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.[72]

The written description and enablement requirements of § 112, paragraph 1 are quite intertwined.[73] Disclosures sufficient to meet one requirement often provide enough to satisfy the other. Despite this, the Federal Circuit has held that written description and enablement are two separate requirements, and failure to satisfy either can result in the invalidation of a patent.[74]

E. THE WRITTEN DESCRIPTION REQUIREMENT

The origin of the written description requirement can be traced back to the original Patent Act of 1793 when an

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67. *See* 35 U.S.C. §§ 101-103 (2002).
68. *See id*. §§ 111-112.
69. *See id*. § 112.
70. *See id*.
71. *See id*.
72. *See id*.
73. *See* Kennecott Corp. v. Kyocera Int'l, Inc., 835 F.2d 1419, 1421 (Fed. Cir. 1987) (stating in reference to 35 U.S.C. § 112, paragraph 1: "[t]he purpose of the description requirement of this paragraph is to state what is needed to fulfill the enablement criteria. These requirements may be viewed separately, but they are intertwined.")
74. *See* Vas-Cath, Inc. v. Mahurkar, 935 F.2d 1555, 1563 (Fed. Cir. 1991) (holding that for a disclosure to be adequate under 35 U.S.C. § 112, it must have "a 'written description of the invention' which is separate and distinct from the enablement requirement.").

adequate description of an invention was all that provided the public with notice of an invention's scope.[75] In 1822, the Supreme Court succinctly stated that, in addition to enablement, the object of the disclosure was to "put the public in possession of what the party claims as his own invention, so as to ascertain if he claims anything that is in common use. . . ."[76] This notice function, however, was soon obviated when a requirement for claims was added to the Patent Act in 1870.[77] For the next century, a disclosure was adequate if it enabled one of skill to make and use the invention.[78]

The long-dormant written description requirement was given new life in 1967 when the CCPA decided *In re Ruschig*.[79] In *Ruschig*, a claim was added to a patent application one year after its filing.[80] The court held that the specification sufficiently enabled one skilled in the art to practice the invention contained in the late claim.[81] Despite this, the court invalidated the late claim, ruling that an adequate written description is required to prove that the applicant actually possessed the invention as of the filing date.[82] Thus, a new purpose for the written description requirement was born: a means to reject claims added after filing that are not supported by the disclosure contained within the originally filed specification. Since 1967, the written description requirement has served as the statutory basis for establishing the priority dates to which individual claims are entitled.[83]

While both cases were decided on other grounds, the Federal Circuit reached two decisions establishing key patent principles for biological inventions that would have serious ramifications for the written description requirement.[84] The first decision considered genus claims to a series of

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75. *See id*. at 1560-61.

76. Evans v. Eaton, 20 U.S. (7 Wheat.) 356, 434 (1822).

77. *See* Janice M. Mueller, *The Evolving Application of the Written Description Requirement to Biotechnological Inventions*, 13 BERKELEY TECH. L.J. 615, 620 (1998).

78. *See id*. at 620-21.

79. 379 F.2d 990 (C.C.P.A. 1967).

80. *See id*. at 991.

81. *Id*. at 996.

82. *See id*. at 995-96.

83. See Mueller, *supra* note 77, at 620-21.

84. *See* Amgen, Inc. v. Chugai Pharm. Co., 927 F.2d 1200 (Fed. Cir. 1991); Fiers v. Revel, 984 F.2d 1164 (Fed. Cir. 1993).

recombinant DNAs.[85] Researchers at Amgen had cloned the human gene for erythropoietin (EPO), a protein useful for treating anemia by stimulating red blood cell production in the bone marrow.[86] The patent at issue in the case claimed all DNAs capable of encoding a protein with an amino acid sequence similar to EPO such that the protein produced from the DNA possessed EPO-like activity.[87] The court invalidated this claim for lack of enablement[88] because it potentially covered millions of EPO analogs while disclosing the properties of only a few.[89]

The second decision, *Fiers v. Revel*, came by way of a priority determination in an appeal from an interference proceeding.[90] In *Fiers*, the respondent Revel tried to establish a priority date for a human DNA claim by stating that the DNA was part of the invention and providing a method by which it could be isolated.[91] The court rejected this argument and reasoned that a DNA claim must be limited to its precise sequence, or "a description of the DNA itself."[92] The court then elaborated that an adequate description required conception, and that "a conception of a DNA requires a precise definition, such as by structure, formula, chemical name, or physical properties. . . ."[93] The ruling suggested that a DNA claim could be invalidated for failure to include its exact sequence, even if the inventor otherwise properly enabled the invention by teaching how to obtain the DNA.

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85. 927 F.2d at 1203.

86. *Id*. at 1200. "Genus" claims are those directed towards a family of items, rather than just a single family member, or "species." *See* Hugh McTavish, Note, *Enabling Genus Patent Claims to DNA*, MINN. INTELL. PROP. REV., Vol.2 No.1, 121, at 121-22.

87. *See* 927 F.2d at 1204. Claim 7 reads as follows:

> A purified and isolated DNA sequence consisting essentially of a DNA sequence encoding a polypeptide having an amino acid sequence sufficiently duplicative of that of erythropoietin to allow possession of the biological property of causing bone marrow cells to increase production of reticulocytes and red blood cells, and to increase hemoglobin synthesis or iron uptake.

Id.

88. *See infra* Part I.F.

89. *See Amgen*, 927 F.2d at 1214 ("It is not sufficient, having made the gene and a handful of analogs whose activity has not been clearly ascertained, to claim all possible genetic sequences that have EPO-like activity.").

90. *See* 984 F.2d 1164, 1171-72 (Fed. Cir. 1993).

91. *See id*. at 1170.

92. *Id*.

93. *Id*. at 1171.

Regents of the University of California v. Eli Lilly & Company seemingly confirmed that the chemical structure (sequence) of a DNA molecule is required to meet the written description requirement.[94] In *Eli Lilly*, scientists at the University of California cloned the cDNA for rat insulin; the sequence of which was included in the specification of a subsequent patent.[95] In addition, the specification also included the amino acid sequence of the human insulin protein and a method for cloning and obtaining the sequence of the human insulin gene.[96] It was further known that the amino acid sequences of insulin proteins are well conserved among diverse species and that non-human insulin was functional in the treatment of human diabetes patients.[97]

The patent at issue in *Eli Lilly* claimed not only the rat insulin cDNA, but also the human insulin cDNA.[98] In affirming the invalidation of the human insulin cDNA claim, the Federal Circuit reiterated the dual standards of the written description requirement suggested in *Fiers*.[99] According to the court, the University of California had not proved that it possessed the claimed invention nor had it adequately described the DNA molecule itself by structure, formula, chemical name, or physical properties.[100] The description of what a DNA or protein does, in terms of function or result, was held insufficient; the molecule itself must be described.[101]

The *Eli Lilly* decision sparked a rigorous debate amongst commentators, many of who were critical of the Federal Circuit's doctrinal expansion.[102] The heightened written

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94. 119 F.3d 1559, 1568-69 (Fed. Cir. 1997).

95. *See id*. at 1562-63.

96. *Id*. at 1567.

97. *See* Zhibin Ren, Note, *Confusing Reasoning, Right Result: The Written Description Requirement and* Regents of the University of California v. Eli Lilly & Company, 1999 WIS. L. REV. 1297, 1305-06 (1999).

98. *See Eli Lilly*, 119 F.3d at 1567.

99. *Id*. at 1568-69 (holding "[t]hus, as we have previously held, a cDNA is not defined or described by the mere name 'cDNA,' even if accompanied by the name of the protein that it encodes, but requires a kind of specificity usually achieved by means of the recitation of the sequence of nucleotides that make up the cDNA."); *see* Fiers v. Revel, 984 F.2d 1164, 1171 (Fed. Cir. 1993).

100. 119 F.3d at 1568.

101. *Id*. It is important to note that the claims at issue in *Eli Lilly* were original claims; the court was not attempting to determine at what date the disclosure supported added claims. Thus, the written description doctrine was being applied as a substantive disclosure requirement. *See id*.

102. *See e.g.*, Mueller, *supra* note 77, at 651-52 (arguing that inventors will delay filing applications until the precise structure of the DNA components of

description requirement for biotech inventions has been decried as a "super-enablement" standard, largely because the amount of detail required to satisfy the new written description requirement will almost certainly be enabling.[103] The written description requirement after *Eli Lilly* now potentially serves the following purposes: (1) to demonstrate possession of a claimed invention in priority disputes; (2) to convey all the details of an invention to facilitate enablement; and (3) to be a general measure of the adequacy of a disclosure independent of enablement. In addition, an implied purpose of the written description requirement is to allow for the examination of a patent by the PTO.[104]

In an effort to conform its examination procedures to Federal Circuit precedent, the PTO issued "Written Description Guidelines" (Guidelines) on January 5, 2001.[105] The Guidelines make a clear distinction between technologies that are new and unpredictable and those that are established.[106] Separate requirements are outlined for each.[107] For predictable technologies, the written description requirement is satisfied by the disclosure of the invention's function and its method of production.[108] This is not so for younger, and hence unpredictable, fields; a higher level of disclosure is needed.[109] "[A] clear depiction of the invention in detailed drawings or in structural chemical formulas" is also required for the unpredictable arts—a level of precision that strongly implies only a full structure will be satisfactory.[110]

The Guidelines are heavily focused on the biotechnology realm and provide many examples applicable to DNA and protein inventions.[111] The Guidelines state that disclosure of the amino acid sequence of a given protein satisfies the written

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the invention are known, thus hindering public access to cutting-edge technologies).

103. *See id.* at 633.

104. *See Enzo I*, 285 F.3d at 1027 (Dyk, J., dissenting).

105. Guidelines for Examination of Patent Applications under the 35 U.S.C. 112, ¶ 1, "Written Description" Requirement, 66 Fed. Reg. 1099 (Jan. 5, 2001) [hereinafter "Guidelines"].

106. *See id.* at 1106.

107. *See id.*

108. *See id.*

109. *See id.*

110. *See id.* at 1105.

111. *See generally id.*

description requirement for all cDNAs encoding that protein.[112] The PTO also allows descriptions of DNAs and proteins based on percentage of sequence identity with another known sequence.[113] Finally, for genus claims,[114] a "representative number of species" must be adequately described in compliance with the Guidelines' other requirements.[115] This can be achieved if the species described are indicative of the properties claimed for the entire genus.[116] This principle suggests that the PTO is willing to consider claims to slight variants of disclosed sequences that possess the same function.

F. THE ENABLEMENT REQUIREMENT

The enablement doctrine ensures that an inventor's claim scope is commensurate with the actual invention that is disclosed.[117] In order to enable properly, a patent must adequately teach a skilled artisan how to fully make and use the invention.[118] Enablement is traditionally assessed in biotechnology cases by determining whether the invention may be made and used without "undue experimentation."[119] The enablement standard has varied little over the last few decades, and satisfaction of the enablement requirement is a question of law.[120]

In *In re Wands*,[121] the Federal Circuit listed eight factors for courts to consider when determining if a disclosed invention's use required "undue experimentation."[122] The

112. *See id*. at 1111 n.57.

113. *Cf. id*. at 1104 (explaining that "possession may be shown . . . by describing *distinguishing identifying characteristics* sufficient to show that the applicant was in possession of the claimed invention").

114. *See supra* note 86 and accompanying text.

115. Guidelines, *supra* note 105, at 1106.

116. *Id*. at 1106.

117. *See* McTavish, *supra* note 86, at 124-25.

118. *See e.g.*, Atlas Powder Co. v. E.I. du Pont de Nemours & Co., 750 F.2d 1569, 1576 (Fed. Cir. 1984) (asserting that "[t]o be enabling under § 112, a patent must contain a description that enables one skilled in the art to make and use the claimed invention").

119. *See* Amgen, Inc. v. Chugai Pharm. Co., 927 F.2d 1200, 1212 (Fed. Cir. 1991) (stating "[t]hat some experimentation is necessary does not constitute a lack of enablement; the amount of experimentation, however, must not be unduly extensive").

120. *See* Enzo Biochem, Inc. v. Calgene, Inc., 188 F.3d 1362, 1371 (Fed. Cir. 1999) (listing enablement cases).

121. 858 F.2d 731 (Fed. Cir. 1988).

122. *See id*. at 737.

Wands factors are:

> (1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims.[123]

Acknowledging that inventions in highly technical fields may require substantial amounts of work to reproduce, the *Wands* court clarified that the focus of the inquiry should be on what is "undue," and not on "experimentation."[124] A patentee need not provide detailed instructions on methods that are routine in the field.[125] The invention need not be understandable by the general public to be properly enabled.[126] Rather, a person having ordinary skill in the art (a "PHOSITA"[127]) must be capable of making and using the invention.[128] In the field of biotechnology, a PHOSITA is a Ph.D.-level scientist.[129]

II. CASE DESCRIPTION

A proper understanding of the Federal Circuit's decision in *Enzo Biochem, Inc. v. Gen-Probe, Inc.* requires that the facts of the case be more thoroughly elaborated. Enzo's patent claimed DNA probes that specifically bound the genomic DNA from the bacteria responsible for gonorrhea over that of the bacteria that causes meningitis.[130] These two bacterial strains are between eighty and ninety-three percent homologous.[131] The claims were structured in terms of binding ratios between the two strains when the probes were employed in a hybridization assay.[132] Although the patent application did not include the sequences of the DNA probes, three DNA sequences were deposited with the ATCC,[133] a public biological depository.[134]

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123. *Id.*
124. *Id.*
125. *See Calgene*, 188 F.3d at 1373-74.
126. *See id.*
127. *See generally*, Joseph P. Meara, Comment, *Just Who is the Person Having Ordinary Skill in the Art? Patent Law's Mysterious Personage*, 77 WASH. L. REV. 267 (2002) (discussing generally the judiciary's use of the PHOSITA standard).
128. *See Calgene*, 188 F.3d at 1373.
129. *Id.*
130. *See* U.S. Pat. No. 4,900,659, *supra* note 2.
131. *See Enzo II*, 296 F.3d at 1320.
132. *See id.* at 1321-22.
133. *See supra* note 4 and accompanying text.

Claims were drawn to these three sequences, as well as "discrete nucleotide subsequences thereof" and "mutated discrete nucleotide sequences of any of the foregoing inserts that are within said hybridization ratio and subsequences thereof."[135] Thus, the substance of the invention is any DNA sequence that binds to the chromosomal DNA of the two bacteria within a specified range.[136]

In reaching its initial decision affirming the invalidity of the patent, the Federal Circuit woodenly applied the "biotech" written description doctrine synthesized in *Eli Lilly*.[137] The court reiterated the rule that the "adequate written description of genetic material 'requires a precise definition, such as by structure, formula, chemical name, or physical properties'. . . ."[138] The court then found that the disclosure of the probe's ability to bind specifically to one bacterial genome was not a "chemical property" of the probe and was thus inadequate.[139] These data were merely functional, and "[a] description of what the genetic material does, rather than of what it is, does not suffice."[140] The simple fact, that the precise DNA sequences were not recited in the specification, established a *per se* failure to satisfy the requirement.[141] The court went on to hold that functional disclosure did not satisfy the PTO Guidelines, and that these Guidelines were not binding upon the court anyway.[142] Finally, the court ruled that while a deposit may satisfy the enablement requirement, it is not an adequate substitute for a written description.[143]

In a dissenting opinion, Judge Dyk disagreed with the majority's holding that the sequence of a DNA molecule was *per se* required to meet the written description requirement.[144] He pointed out that reaching such a conclusion as a matter of law was inappropriate since "the written description requirement

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134. *See Enzo II*, 296 F.3d at 1326.

135. *Id.* at 1322.

136. *See* U.S. Pat. No. 4,900,659, *supra* note 2.

137. *See Enzo I*, 285 F.3d 1013, 1018 (Fed. Cir. 2002).

138. *Id.* at 1018 (quoting Regents of the Univ. of Cal. v. Eli Lilly & Co., 119 F.3d 1559, 1566 (Fed. Cir. 1997) (quoting Fiers v. Revel, 984 F.2d 1164, 1171 (Fed. Cir. 1993))).

139. *Id.*

140. *Id.* (citing *Eli Lilly*, 119 F.3d at 1568).

141. *See id.* at 1021.

142. *See id.* at 1019.

143. *See id.* at 1021-22.

144. *See id.* at 1024-25.

presents a factual issue."[145] Accordingly, the correct inquiry should be "whether one of ordinary skill in the art would consider the specification to describe the claimed invention."[146] Judge Dyk reasoned that if selective hybridization is sufficiently indicative of a DNA structure in the view of experts in the field, then the law should also be satisfied.[147] The dissent also concluded that public deposit of biological materials is an ideal way to meet the written description's primary purpose of public notice of the patent's claim scope.[148] Judge Dyk also rejected the majority's claim that a secondary purpose of the written description requirement— allowing for efficient examination by the PTO— was not met.[149] He noted that the examiner had not rejected the claims for failure to comply with the written description requirement, and that the PTO encourages applicants to use depositories to satisfy §112, paragraph 1 requirements.[150] In conclusion, the dissent reflected that the policy endorsed by the majority was unfair to the applicant who, finding no statutory or PTO bar, relies on a public deposit.[151]

On petition for rehearing, the Federal Circuit abruptly vacated its earlier decision and summarily reversed the insufficiency of deposited material.[152] The court held that "reference in the specification to deposits of nucleotide sequences describes those sequences sufficiently to the public for purposes of meeting the written description requirement."[153] The claims directed to the deposited sequences themselves, including the bacterial genomes used in the hybridization protocol, were thus held to be adequately described.[154] Whether this was also true for the generic claims to subsequences and mutations of the deposited sequences was a question of fact

145. *Id*. at 1024.
146. *Id*. at 1026.
147. *See id*.
148. *See id*. at 1027.
149. *See id*.
150. *See id*. at 1027-28.
151. *See id*. at 1029.
152. *See Enzo II*, 296 F.3d 1316, 1320 (Fed. Cir. 2002).
153. *Id*. at 1326. The court added "we hold that reference in the specification to a deposit in a public depository, which makes its contents accessible to the public *when it is not otherwise available in written form*, constitutes an adequate description of the deposited material sufficient to comply with the written description requirement of § 112, ¶ 1." *Id*. at 1325 (emphasis added).
154. *See id*. at 1326, 1328.

that could be answered only on remand.[155] The district court was instructed to "determine whether a person of skill in the art would glean from the written description, including information obtainable from the deposits of the claimed sequences, subsequences, mutated variants, and mixtures sufficient to demonstrate possession of the generic scope of the claims."[156]

The Federal Circuit also conceded that not "all functional descriptions of genetic material fail to meet the written description requirement."[157] The court then adopted the PTO Guidelines' standard that the written description may be met by disclosure of "functional characteristics when coupled with a known or disclosed correlation between function and structure."[158] The court held that ability of a DNA probe to selectively bind another DNA sequence may be sufficiently indicative of the probe's structure to satisfy the written description requirement.[159] The decision raised the possibility that the hybridization function of DNA probes, by itself, might not adequately describe probes generated from the deposited sequences.[160] The rationale was that the specification did not include the specific location on the bacterial DNA where the probes bound.[161] Nonetheless, the court ruled that the determination was a question of fact.[162] If one of skill in the art would find the "disclosure of the hybridization function and an accessible structure" satisfactory, then the court would as well.[163]

Because an en banc hearing is required to do so,[164] the Federal Circuit did not expressly overrule *Eli Lilly*.[165] The implicit *per se* rule against functional descriptions was dispelled; the court subtly altered its interpretation of *Eli Lilly*,

155. *See id*. at 1326-27.
156. *Id*. at 1327.
157. *Id*. at 1324.
158. *Id*. at 1324-25 (quoting Guidelines, *supra* note 105, at 1106).
159. *See id*. at 1324-25.
160. *See id*. at 1328.
161. *See id*.
162. *See id*.
163. *Id*.
164. *See* Campa v. United States, 300 F.3d 1361, 1367 (Fed. Cir. 2002) (noting "[a]s with all parties seeking to overturn the precedent of our court, Plaintiffs would likely need to seek en banc consideration of this issue") (citing FED. CIR. R. 35(a) ("[o]nly the court en banc may overrule a binding precedent")).
165. *See Enzo II*, 296 F.3d at 1330.

stating, "[a] description of what a material does, rather than of what it is, *usually* does not suffice."[166] Further, the court maintained that the written description requirement is not necessarily met solely by possession of the invention.[167] Possession is thus but one inquiry, and will fail to satisfy the written description requirement if "the specification does not adequately describe the claimed invention."[168] Compliance thus requires both the deposit itself and the recitation of the accession number of the deposit in the specification.[169]

III. ANALYSIS

A. THE WRITTEN DESCRIPTION REQUIREMENT AFTER *ENZO II*

After *Eli Lilly*, inventors were certain of one thing: the written description requirement for a DNA molecule was satisfied by the recitation of its exact sequence.[170] *Enzo II* purports to provide additional means by which inventors might also meet this goal.[171] Although this appears to be a concession to biologists, a significant gap is left between what *might* satisfy the requirement and what actually *does* provide an adequate written description.

Exactly what disclosure will now satisfy the written description requirement is unclear. On top of that, it appears as if a significant division exists amongst the Federal Circuit Judges themselves regarding the contours of the doctrine.[172] Patent prosecutors are thus left in the uncomfortable position of having to craft applications that meet the PTO's conception of written description, yet may not withstand future scrutiny in the courts. Despite the Federal Circuit's apparent doctrinal softening in the rehearing of *Enzo*, it is important to realize that much of the doctrine created in *Eli Lilly* remains good law.[173] This section attempts to explain the current contours of

166. *Id.* at 1329 (emphasis added) (citing Regents of the Univ. of Cal. v. Eli Lilly & Co., 119 F.3d 1559, 1568 (Fed. Cir. 1997)).

167. *See id.*

168. *Id.* at 1330.

169. *See id.*

170. *See supra* notes 94-97 and accompanying text.

171. *See supra* notes 152-163 and accompanying text.

172. *See generally*, Enzo Biochem, Inc. v. Gen-Probe, 42 Fed. Appx. 439 (Fed. Cir. 2002) (laying out the Federal Circuit judges' arguments for and against rehearing the case en banc).

173. *See supra* notes 164-169 and accompanying text.

the written description requirement.

1. Possession

The *Enzo II* decision upholds the conventional doctrine that the primary purpose of the written description requirement is to demonstrate possession of the claimed invention.[174] As held in *Eli Lilly*, this extends beyond determining if a patent's specification can adequately support amended claims; possession must also be demonstrated for original claims.[175] Making a biological deposit may now be used to demonstrate possession, but this is contingent on the accession number of the deposit being recited in the specification.[176] Although functional data indicative of a particular structure may now be used to demonstrate possession, the focus of the inquiry remains the physical possession of a DNA molecule itself.[177]

Merely showing physical possession of a DNA molecule, however, will not satisfy the written description requirement.[178] Enzo certainly possessed the claimed subsequences, as they are inherently parts of the deposited probes.[179] Under the *Enzo II* holding, something more is required: an inventor must also be able to sufficiently communicate possession to others.[180] However, meeting this burden is where the controversy begins.

2. Substantive Description

In addition to proof of possession, the *Enzo II* court requires that the specification provide a substantive description of the invention so that one skilled in the art would recognize its structure and limitations.[181] This requirement is wholly separate from possession, and is likewise unique to biotechnology inventions. A DNA must be described in such terms that one can develop a mental picture of the molecule. The critical question in this inquiry is not "do I think you have the invention?" Rather, it is "have you adequately captured the invention in words?" In accord with *Eli Lilly*, this inquiry

174. *See supra* note 156 and accompanying text.
175. *See supra* note 101 and accompanying text.
176. *See supra* note 169 and accompanying text.
177. *See supra* notes 166-168 and accompanying text.
178. *See supra* notes 167-168 and accompanying text.
179. *See supra* notes 131-133 and accompanying text.
180. *See supra* notes 167-169 and accompanying text.
181. *See supra* note 156 and accompanying text.

comprises a substantive disclosure requirement for purposes of patentability.[182] Although a biological deposit may also adequately describe an invention to satisfy this disclosure requirement, there are several caveats. For example, a biological deposit alone may not be sufficient if the court believes that the invention could have been captured solely with words or sequences.[183]

Therefore, in the case of a single DNA molecule, recitation of the precise DNA sequence or reference to a deposit in an accessible biological repository will satisfy the written description requirement.[184] The unsettled issue is what level of disclosure will meet the written description requirement for claims to sequences derived from the deposited probes. Notwithstanding the use of functional descriptions,[185] it is difficult to imagine how claims to subsequences such as Enzo's can meet this standard without placing a near impossible burden on the applicant. The specification would need to contain either a systematic listing of every potential DNA subsequence, or a deposit of each and every claimed sequence would need to be made. Neither of these options is practical when more than a handful of sequences are claimed.

The scope of exactly *what* must be adequately described is also an open issue. Will it be fatal if an inventor fails to adequately describe a process or entity that he wrongly believes is common in the art? The inventor must also consider that future experts looking back to the technology present on the filing date will judge the descriptions. Thus, it might be wise to discuss relatively new techniques in great detail to compensate for the margin of error inherent in hindsight analyses. It also appears that in addition to the quality of the information contained within a figure, an inventor will be judged on the ability of the figure to communicate the importance of the data. The inventor not only must generate sufficient data to support the invention, but must also present the data in such a manner that the reader will understand how it relates to the claims of the invention.

3. The Adequacy of Functional Data

Enzo II marks the first time the Federal Circuit has

182. *See supra* notes 100-101 and accompanying text.
183. *See supra* note 153 and accompanying text.
184. *See supra* note 159 and accompanying text.
185. *See infra* Part III.A.3.

allowed functional rather than purely structural data to be considered towards fulfilling the possession and substantive description requirements discussed above.[186] Importantly, functional descriptions must still focus on what the inventor possesses, not what she has enabled.[187] Although the court opened the door to the use of functional data to meet the written description requirement, the court failed to provide guidance on exactly what will be viewed as adequate.

In fact, the court suggested that hybridization data would only be sufficient if the complementary sequence bound by the probe is disclosed.[188] This suggestion is, at best, a mixed blessing for inventors. On the one hand, it opens up the possibility that one may claim all DNA probes that bind to a precisely defined DNA sequence, without the need to specify all the possible sequences of the probes. On the other hand, this claim still requires that the sequence of the target DNA be disclosed, which might be just as limiting as requiring the sequence of the probe in the first place.

Because of their adoption by the court,[189] the PTO Guidelines provide a least one embodiment of the new standard for acceptable functional data.[190] The Guidelines state that functional definitions are allowable when "coupled with a known or disclosed correlation between function and structure."[191] While this standard sounds good in principle, its practical application is uncertain. The statement articulates that functional data is acceptable in certain circumstances, yet fails to define those scenarios. How strong must the correlation be? Must the functional data be indicative of the precise DNA structure at the nucleotide level? The language suggests that only functional data directly dependent on a known DNA sequence is acceptable, a concession akin to allowing a photocopy of a document to replace the original. The requirement thus remains dependent on the actual structure of the DNA molecule, with allowances made for the manner in which the sequence can be illustrated.

A reasonable reading of the decision might lead one to speculate that data indicative of DNA structure may suffice,

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186. *See supra* notes 157-163 and accompanying text.
187. *See supra* note 167 and accompanying text.
188. *See supra* notes 159-161 and accompanying text.
189. *See supra* notes 157-158 and accompanying text.
190. *See supra* notes 105-116 and accompanying text.
191. Guidelines, *supra* note 105, at 1106.

but that this extension is probably limited to data from which the sequence can be deduced with near-absolute precision. In other words, alternate ways of describing the sequence, provided one knows the exact sequence, may be an adequate proxy for the true sequence. Examples might include a restriction map coupled with the number of nucleotides, or the sequence of a DNA probe with which the claimed DNA hybridizes.[192] For example, if the scientific community knows that a particular protein can bind only to a precise DNA sequence, then an inventor may include the ability of a DNA to bind the protein to satisfy, at least partially, the written description requirement.

As in *Enzo II*, providing sufficient written description to support a claim to a genus of DNAs is a concern for inventors.[193] Assuming, arguendo, that the Federal Circuit adopted the *complete* PTO Guidelines for meeting the written description[194] rather than restricting it to the facts of the case, additional data may constitute sufficient disclosure for genus claims.[195] Of particular interest is the PTO Guidelines' suggestion that the disclosure of a protein sequence may adequately support all possible DNAs that encode the protein.[196] It remains unclear, however, if the Federal Circuit has adopted the full extent of the PTO Guidelines.

B. PRUNING BACK THE HEIGHTENED WRITTEN DESCRIPTION REQUIREMENT

In the inherently unpredictable biotechnology field, the primary issue remains; what is the proper standard for defining the scope of biological inventions.[197] In *Enzo II*, the Federal Circuit continues to place too much emphasis on the

192. *See* Mark J. Stewart, *The Written Description Requirement of 35 U.S.C. § 112(1): The Standard After* Regents of the University of California v. Eli Lilly & Co., 32 IND. L. REV. 537, 555 (1999).

193. *See supra* notes 155-156 and accompanying text.

194. This is merely a supposition at this point, as the court was ambiguous in its holding. In reference to the description of DNA probes by preferential binding, the court stated, "[w]e are persuaded by the Guidelines *on this point* and adopt the PTO's applicable standard for determining compliance with the written description requirement." *Enzo II*, 296 F.3d 1316, 1325 (Fed. Cir. 2002) (emphasis added).

195. *See supra* text accompanying notes 111-116.

196. *See supra* note 112 and accompanying text.

197. *See supra* note 163 and accompanying text.

primary structure of a DNA.[198] Despite making allowances for the use of functional data, the focus on adequate communication of possession rather than on what the disclosure teaches the public is the real problem. Removing the heightened written description requirement for biotechnology will bring the patent laws in accord with basic biological principles while providing clarity and certainty by employing the well-established enablement standard.[199]

By simply remanding the case to determine if the genus of subsequences was "possessed" by Enzo,[200] the court missed an opportunity to clarify the law. The court should have agreed to an en banc rehearing of the *Enzo I* decision and overruled the heightened written description requirement created by *Eli Lilly*.[201] In addition, the court should have held that, when applied to original claims, the written description requirement is satisfied if it coveys enough information to enable a PHOSITA to make and use the claimed invention. In other words, the enablement doctrine should be the sole standard for judging the adequacy of a patent's disclosure. The written description requirement should only maintain a distinct role in determining priority dates for amended claims, consistent with the holding in *Vas-Cath*.[202]

1. Biotechnology Realities

By focusing the district court on the adequacy of the disclosure's descriptive qualities, rather than upon what the disclosure enabled a PHOSITA to accomplish, the *Enzo II* court fashioned a law in conflict with basic principles of biology.[203] The patented invention at issue in the *Enzo* decisions is more than just a particular piece of DNA for which every embodiment may be easily described and physically possessed. The value of the invention is the identification of unique areas of a bacterial genome that can be used as probes.[204] The *Enzo II* court ignored the heart of the invention by focusing on technical possession and description,[205] neither of which is an

198. *See supra* notes 165-166 and accompanying text.
199. *See supra* notes 117-129 and accompanying text.
200. *See supra* notes 155-156 and accompanying text.
201. *See supra* notes 99-104 and accompanying text.
202. *See supra* note 74 and accompanying text.
203. *See supra* text accompanying note 168.
204. *See supra* text accompanying notes 130-132.
205. *See supra* text accompanying notes 167-169.

accurate measure of the invention's scope.

Further, if its claims are denied on remand, Enzo will be in the paradoxical situation of having enabled the use of subsequences derived from its probes, yet will not be entitled to claims covering the subsequences. A scientist needs no special skills to select and make use of a smaller nucleotide subsequence within those disclosed by Enzo.[206] Thus, the *Enzo II* court's rule can frequently reward the ordinary technician who learns from and exploits aspects of a patentee's unprotected invention.

Focusing solely on the chemical structure of a protein or DNA molecule belies its true nature. A DNA molecule is often useful not merely due to its nucleotide sequence, but also because of its ability to encode a particular protein.[207] Under the holding of *Enzo II*, a scientist seeking to patent a DNA sequence that encodes a particular protein would need to disclose every other degenerate DNA capable of encoding the same protein. If she failed to do so, synthesizing a distinct DNA that encodes the exact same protein could easily circumvent her patent.[208]

If an inventor provides sufficient instructions so that the public can readily make and use a genus of DNAs, she should be entitled to claim this genus. In *Enzo II*, the acceptability of claims to subsequences of the deposited sequences should have been judged by whether the disclosure was enabling. This stipulation, combined with the other substantive patenting requirements (e.g., novelty), accurately contains the scope of the invention to that which has been taught to the public.[209] It makes little sense to deny protection simply because the precise DNA sequences have not been laboriously recited on paper. Enablement provides a fair measure of claim scope; there is no need for an arbitrary and inflexible second standard.[210] If Enzo's disclosure does not teach the ordinary scientist how fully to make and use the inventions, the claims are properly rejected as involving undue experimentation.[211]

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206. *See supra* notes 58-60 and accompanying text.

207. *See supra* notes 19-34 and accompanying text.

208. *See supra* notes 58-60 and accompanying text.

209. *See supra* notes 67-69 and accompanying text.

210. *See* Robert A. Hodges, *Black Box Biotech Inventions: When a "Mere Wish or Plan" Should Be Considered an Adequate Description of the Invention*, 17 GA. ST. U. L. REV. 831, 857-858 (2001).

211. *See supra* notes 117-129 and accompanying text.

A rigorous structural focus ignores the truly innovative elements of a DNA invention and effectively treats each individual nucleotide as a separate claim element. While a fixed structural requirement freezes the technology at a level already exceeded by today's methods, the enablement standard allows the adequacy of the disclosure to evolve with the effort required to carry out the described process. Cloning genes from amino acid sequences, even partial sequences, is increasingly routine.[212] Determining the function of a protein or DNA is the truly innovative work.[213] The current written description requirement rewards those who master basic technical procedures, rather than those who extend the boundaries of biology.

2. Benefits of the Enablement Standard

The inadequate patent protection currently afforded DNA inventions discourages the public disclosure of new discoveries. For example, consider the options of a company like Enzo making the same discovery while cognizant of the heightened written description requirement at the time of invention. Even though the claims to the deposited sequences were allowed, the invention is worthless without inclusion of the claims to subsequences and subtle mutations.[214] A competitor needs only to obtain the sequence of the unique DNAs from the patent specification or depository and select a smaller probe from within the disclosed sequence that functions equivalently. Faced with this degree of protection from a patent, Enzo will be better served by keeping the knowledge as a trade secret or attempting to develop a method to conceal the sequence of the probe from the end user. Neither of these options will result in a meaningful public disclosure that fulfills the constitutional mandate to further the sciences.[215]

Use of the enablement standard as the sole measure of disclosure, in contrast, provides claim coverage commensurate with what has been added to the public domain.[216] This result

212. *See, e.g.*, Yuji Yamanashi & David Baltimore, *Identification of the Abl- and rasGAP-Associated 62 kDa Protein as a Docking Protein, Dok*, 88 CELL 205, 209 (1997) (detailing a procedure for the cloning of a mammalian gene from peptide sequences derived from an isolated protein).

213. *See supra* text accompanying notes 54-57.

214. *See supra* text accompanying notes 135-136

215. *See supra* notes 61-66 and accompanying text.

216. *See supra* notes 117-129 and accompanying text.

is fair to inventors and not only provides incentive for innovation, but also encourages the disclosure of new discoveries so that the public may benefit from and build upon them.

The enablement standard would also promote greater harmony between the PTO and the Federal Circuit. Under the current system, the Federal Circuit promulgates rules on what constitutes an adequate written description and the PTO attempts to faithfully translate these rules into workable protocols for examiners.[217] Use of only the enablement doctrine obviates the need for this constant updating process as the standard is flexible and evolves with the very technology being assessed. The PTO and the courts would be making the same judgment and applying the same standard: whether the disclosure is sufficient to enable one to make and use the invention. Though each institution's interpretation of what disclosure is enabling may deviate slightly over time, the Federal Circuit can still make subtle corrections to PTO procedure through its decisions. Because the enablement standard varies with the technological capabilities at the time in question, the awkward task of shoehorning state of the art inventions into judicial categories based on decades-old conceptions will be avoided. The Federal Circuit's subsequent rulings are thus less likely to be antipodal to PTO decisions, and patents granted by the PTO are less likely to be later held invalid for failure to comply with unforeseen disclosure requirements.

Finally, the enablement standard is based on well-settled case law, which provides the clarity and certainty required by the patent-dependent biotechnology industry.[218] Because compliance with the enablement requirement is a question of law, trial outcomes are likely to be more predictable than jury-decided written description issues.[219] In the end, even if the Federal Circuit had invalidated Enzo's claims for lack of enablement, Enzo might well have foreseen this problem through its own analysis of the adequacy of the patent's disclosure. However, because Enzo's patent was issued almost

217. *See supra* notes 105-115 and accompanying text.

218. *See* Sasha Blaug, et al., Enzo Biochem v. Gen-Probe: *Complying with the Written Description Requirement under US Patent Law*, 21 NATURE BIOTECHNOLOGY 97, 98 (2003).

219. *See supra* text accompanying notes 117-120.

eight years prior to the *Eli Lilly* decision,[220] the company was powerless to either predict or prevent potentially invalidating deficiencies arising from the new written description doctrine. Unless the heightened written description requirement is shelved in the near future, one can only speculate how many other patentees will fall into this trap.

IV. CONCLUSION

The Federal Circuit has long struggled with the application of the written description requirement to biotechnology inventions, and considerable confusion surrounds exactly what it takes to satisfy the requirement. The court missed the opportunity to clarify the doctrine in the rehearing of *Enzo Biochem, Inc. v. Gen-Probe, Inc.* The court correctly held that a biological deposit and a reference to the accession number of the deposit in the specification can be used to demonstrate possession of an invention. At the same time, however, the court maintained the previously held view that possession alone will not meet the written description requirement. The larger question of which functional descriptions are adequate remains unanswered.

The Federal Circuit should take the next available opportunity to overrule the *Eli Lilly* decision through an en banc hearing and return enablement as the sole substantive disclosure requirement of 35 U.S.C. § 112, paragraph 1. The heightened written description standard applied to biotechnology inventions after *Eli Lilly* ignores fundamental biological principles and focuses too much attention on the structure of a DNA or protein. In addition, the standard is inflexible to technological changes and requires constant updating that leads to uncertainty over patent validity. Finally, the heightened requirement fails to meet the constitutional purpose behind the patent laws by discouraging full disclosure of biological inventions. Simply returning to the enablement disclosure standard that was in effect prior to *Eli Lilly* would solve the bulk of these problems.

220. *See* U.S. Pat. No. 4,900,659, *supra* note 2.