United States District Court,
W.D. Wisconsin.

DIGENE CORPORATION,
Plaintiff.
v.
THIRD WAVE TECHNOLOGIES,
Defendant.

No. 07-C-0022-C

July 23, 2007.

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OPINION AND ORDER

BARBARA B. CRABB**, District Judge.**

This civil case for patent infringement is before the court for construction of certain claim terms in plaintiff Digene Corporation's U.S. Patent No. 5,643,715, a patent directed to nucleic acid hybridization probes for human papillomavirus types, particularly human papillomavirus type 52. A hearing was held on the claim construction disputes on June 22, 2007. The parties dispute the meaning of several terms; they also disagree about the number that need construction. Plaintiff contends that the court need construe only three terms; defendant agrees with plaintiff about the three that are in need of construction (although it disagrees with plaintiff's proposed constructions), but argues that the jury would benefit from a judicial construction of eight additional terms.

From the parties' arguments at the hearing and in their pre-hearing briefs and from the patent claims, patent specification and prosecution history, I conclude that the jury would benefit from having a judicial construction of all eleven claim terms and that the disputed terms should have the following constructions.

1. "HPV DNA" is "a full length genome of one human papillomavirus."

2. "HPV 52 DNA" is "a DNA molecule that is only type 52 HPV."

3. "wherein the length of HPV 52 DNA is between approximately 15 and 8000 nucleotide bases" means "between 15 and approximately 8000 nucleotide bases."

4. "consists of all or a fragment of an HPV DNA" means "all or a fragment of one HPV DNA and does not contain any other DNA."

5. "HPV 52 DNA labeled with a detectable label" means "HPV 52 DNA that has a detectable label that is not DNA."

6. An "HPV 52 hybridization probe" is "a nucleic acid molecule that is specific for HPV 52 DNA and differentiates HPV 52 DNA from DNA of all other HPV types."

7. An "HPV hybridization probe" means "a nucleic acid molecule that is specific for the DNA of any one type of HPV and differentiates the DNA of that type from DNA of all other HPV types."

8. (undisputed) "cross-hybridizes to the HPV portion of clone of pCD 15 to greater than 50%" means "cross-hybridizes to the HPV portion of clone pCD 15 so as to result in the conversion of 50% of the DNAs to fully or partially double-stranded DNA molecules."

9. (undisputed) "under moderately stringent conditions" means "at approximately 25o C below the melting temperature of a perfectly base-paired double-stranded DNA."

10. (undisputed) "under stringent conditions" means "at approximately 10 (deg.)C below the melting temperature of a perfectly base-paired double-stranded DNA hybrid."

11. (undisputed) "under non-stringent conditions" means "at approximately 35 (deg.)C below or more the melting temperature of a perfectly base-paired double-stranded DNA hybrid."

I. BACKGROUND OF INVENTION

Human papillomavirus (HPV) is the most common sexually transmitted virus and the cause of a number of cervical diseases, including invasive cervical cancer. To date, more than 118 HPV types have been identified and grouped according to their DNA sequences. As of 1988, however, when the inventor of the '715 patent filed his first application for the patent, only 51 of the types were known. Fourteen of these were (and still are) considered clinically relevant high-risk HPV types associated with cervical cancer, including HPV type 52. It and seven other HPV types are detectable in 20% of all identified cervical cancers.

The '715 patent claims, among other things, a hybridization probe for detecting HPV types, particularly type 52, and methods for detecting HPV through hybridization. Hybridization is the process by which two complementary single stranded nucleic acids such as DNA or RNA combine. If the sequences of bases in two strands match closely enough, the strands will hybridize to form the double-stranded ladder of a molecule. A particular strand of DNA will hybridize best with a strand that has a fully complementary sequence, although it can achieve some hybridization with another strand even if the two strands are not perfect complements. Because single-stranded DNA will bind preferentially to its complement, such strands may be used as "hybridization probes" to identify the presence of a particular type of DNA in a sample. To do this, however, the probe must be able to differentiate between its target and all other types of DNA.

Hybridization can be influenced by a number of factors, one of which is temperature. Increased temperatures will cause even perfectly matched double-stranded DNA to unbind or melt. (The melting temperature of any particular type of double-stranded DNA molecule is the point at which melting will occur for more than 50% of the copies of that molecule and 50% of the complementary strands will bind to one another.). Significantly cooler temperatures will allow single-stranded DNA to bind to sequences that are less than perfectly complementary. These cooler temperature conditions are referred to as "non-stringent." Under these conditions, a researcher can determine whether two single-stranded DNA molecules are partially complementary to one another. When conditions become more stringent, that is, when the temperatures are raised, only DNA molecules with more complementary sequences will hybridize. Thus, one can detect closely related specific DNA sequences by conducting hybridization under stringent conditions.

II. PROSECUTION HISTORY

The '715 patent is the result of several continuing applications, the first of which was filed on October 26, 1988. During the prosecution process, the applicant narrowed the claims in various ways. For example, in the claim that eventually issued as claim 8 (numbered as claim 6 throughout the application process), the applicant's original claim was "Essentially pure HPV 52 DNA or fragments thereof." File History 0032. The examiner rejected this claim on the ground that a "fragment" could read on a single nucleotide, FH 0086, and that other HPV types contained sequences of 15 bases identical to sequences found in HPV 52, so that clones of these viruses anticipated the claimed invention. FH 0090.

In response, the inventor amended his claim to specify "unique" fragments that do not hybridize under stringent conditions to "other HPV DNA" and wherein the length of the fragments is between approximately 15 and 8000 nucleotide bases. FH 0101. This amendment was rejected on the ground that the specification was not enabling for "the full scope of 'fragments,' since one must perform physical comparisons with nucleic acids which are not enabled by the specification, to even determine which sequences fall within the claim." FH 0133. The examiner asked,

[W]here is the support for fragments of at least 15 bases or 300-800 bases that do not hybridize to other HPV under conditions of moderate stringency? Applicant is no doubt aware that the probability of cross-hybridization rises as shorter fragments are tested, so it is not clear if any 15 base or 300 base fragments in the HPV 52 DNA genome fail to hybridize to any other HPV under these conditions.

FH 0134. In response, the applicant said that he agreed that the "probability of cross-hybridization rises as shorter fragments are tested." FH 0145. He explained "that is why those skilled in the art discourage the use of probes having less than 15 bases and why the claims similarly limit the fragments to those having a length between 15 and 8000 nucleotide bases." FH 0145-46. He did not object to the examiner's assumption that he was claiming "at least 15 bases."

When the applicant argued that one could test fragments for hybridization against all other HPVs, which would establish uniqueness to HPV 52, FH 0144-45, the examiner was not persuaded. "[T]he claim requires a failure to hybridize with any HPV type, not merely the 51 prior art types." FH 0163. In response, the applicant amended the claim to read as follows:

Essentially pure HPV 52 DNA which does not hybridize under stringent conditions to HPV DNA selected from the group consisting of DNA from HPV types 1 through 51, wherein the length of the DNA is between

approximately 15 and 8000 nucleotide bases.

FH 0196. In this same amendment, the applicant wrote that "the present application would enable one skilled in the art to make and use HPV 52 DNA or RNA having a length between 15 and 8000 nucleotide bases without undue experimentation because the specification provides detailed instructions on ... (4) the size of the HPV 52 DNA fragments." FH 0202.

This amendment met with no greater success than its predecessors. The examiner rejected it as not enabled by the specification. She raised three points. (1) The specification showed no support for using moderately stringent conditions with fragments shorter than the entire genome; (2) under moderately stringent conditions, HPV type 52 hybridizes with HVP type 33; and (3) practicing the invention would require one skilled in the art to have access to the DNAs of types 1-51. FH 0234-36. The examiner rejected claim 1 as well, directing the applicant to add "consisting of" or "consisting essentially of" to claim 1 so that it would not seem to encompass prior art DNA strands that included sequences 15 bases long matching fifteen-base sequences in HPV 52 DNA. FH 0237. She noted that a fifteenbase sequence "is short enough to appear in DNAs which are not in any way related to the human papillomavirus." FH 0236. The applicant added "consisting essentially of" to claim 1. (As later issued, this phrase reads "consists of.")

After several more rejections and amendments, the examiner rejected all of the applicant's claims in an Office Action dated December 28, 1995. Among other inadequacies, she identified the fact that HPV 11 contains a nucleotide base sequence that is identical to one taught in figure 1 of the patent application. FH 0330-31. The applicant then filed an amendment in April 1996, adding the words "consisting of" to all of the independent claims. He argued that the invention was directed to

all or fragments of Human Papillomavirus type 52 (HPV 52) DNA or RNA, or methods for using HPV 52 DNA and RNA.... First, the claimed HPV 52 DNA has a length of between 15 and 8000 nucleotide bases. This range roughly corresponds to the range from a relatively small hybridization probe to the length of a complete HPV genome. Second, the claimed HPV 52 DNA is all or a part of an HPV DNA, that is the DNA of an entire human papillomavirus, where the HPV DNA cross-hybridizes to the HPV portion of clone pCD 15 to greater than 50% under moderately stringent conditions.... Third, the claimed HPV 52 DNA must not hybridize to DNA from HPV types 1 though 51, all of the HPV types known at the time the invention was made, under stringent conditions. Collectively, these characteristics limit the claimed HPV 52 DNA to all or a fragment of a type 52 HPV where the claimed HPV 52 DNA is specific for HPV type 52, that is, the claimed HPV will not hybridize to the other HPV types under stringent conditions. Thus, only specific DNA segments are being claimed; segments which by virtue of the recited hybridization conditions are specifically those which do not occur as a part of any HPV of types 1 though [51].

FH 0342-43. The applicant repeated the same representations in his final proposed amendment, filed in September 1996, in response to a rejection in which the examiner suggested that the applicant re-write his claims to read "wherein the HPV 52 DNA consists of a portion of clone pCD 15 between 15 and approximately 8000 bases...." FH 0372. The applicant did not make the suggested change in the claim wording. The '715 patent issued in its present form on July 1, 1997.

III. PRINCIPLES OF CLAIM CONSTRUCTION

The claims of a patent define its scope. Interpreting, or construing, the terms of the claim is a task for judges. Markman v. Westview Instruments, 52 F.3d 967, 979 (Fed.Cir.1995) (en banc), *aff'd,* 517 U.S. 370

(1996). The court starts with the so-called intrinsic evidence: the claims themselves, the patent specification and the prosecution history. Teleflex, Inc. v. Ficosa North America Corp., 299 F.3d 1313, 1325 (Fed.Cir.2002). Claim terms are to receive their ordinary and customary meaning, which is the meaning that a person of ordinary skill in the art would have understood the claim term to have as of the filing date of the patent application. Phillips v. AWH Corp., 415 F.3d 1303, 1313 (Fed.Cir.2005).

"[E]xtrinsic evidence in the form of expert testimony can be useful to a court for a variety of purposes, such as to provide background on the technology at issue, to explain how an invention works, to ensure that the court's understanding of the technical aspects of the patent is consistent with that of a person of skill in the art, or to establish that a particular term in the patent or the prior art has a particular meaning in the pertinent field." Phillips, 415 F.3d at 1312. In general, however, extrinsic evidence is viewed as less reliable than the patent and its prosecution history in determining the meaning of claim terms. *Id* .

IV. CONSTRUCTION OF DISPUTED CLAIM TERMS

The parties have sharp disagreements about three of the claim terms and agree that these terms require construction by the court. The three are "HPV DNA," "HPV 52 DNA" and "wherein the length of the HPV 52 DNA is between approximately 15 and 8000 nucleotide bases." Defendant believes that eight additional terms require construction, if only for the benefit of the lay jury; plaintiff disagrees but as to four of the claims is willing to accept defendant's proposed construction if the court agrees that the claims need interpreting. As to the other four, plaintiff disputes both the construction proposed by defendant as well as the need for construction.

I will begin with the first of the disputed claims that the parties agree require judicial construction.

A. " *HPV DNA* "

At the claim construction hearing, the parties agreed that the term HPV DNA refers to a full length genome of the human papillomavirus. *See, e.g.,* "wherein the HPV 52 DNA consists of all or a fragment of HPV DNA...." Claim 8, col. 16, lns. 46-47. The only dispute they had was whether the word "the" preceding human papillomavirus should be changed to "one," as defendant proposed. Defendant's proposal is sensible because it is obvious that the term human papillomavirus does not refer to more than one human papillomavirus; one could not have a full length genome of two human papillomaviruses). The word adds clarity to the term and it is consistent with the prosecution history and the canons of construction.

The prosecution history shows that the applicant told the examiner in April 1996 and again in September 1996 that "the claimed HPV 52 DNA is all or a part of *an* HPV DNA, that is the DNA of *an* entire human papillomavirus ..." FH 0342, 0372 (emphasis added). Such a representation is binding on the applicant. Standard Oil Co. v. American Cyanamid Co., 774 F.2d 448, 452 (Fed.Cir.1985) (prosecution history includes "all express representations made by or on behalf of the applicant to the examiner to induce a patent grant," including "amendments to the claims and arguments made to convince the examiner that the claimed invention meets the statutory requirements of novelty, utility, and nonobviousness"); Coleco Industries, Inc. v. U.S. International Trade Comm'n, 573 F.2d 1247, 1257 (Cust. & Pat.App.1978).

It is a canon of construction that "a" or "an" following the phrase "consisting of" is generally read as meaning one. Norian Corp. v. Stryker Corp., 432 F.3d 1356, 1359 (Fed.Cir.2005) ("In particular, this court has interpreted the word "a" in its singular sense when, as in this case, it has been used in conjunction with the closed transitional phrase "consisting of.") (citing Abbott Laboratories v. Baxter Pharmaceutical

Products, Inc ., 334 F.3d 1274, 1281 (Fed.Cir.2003). It is another canon of construction that " 'closed' transition phrases such as 'consisting of' are understood to exclude any elements, steps, or ingredients not specified in the claim." AFG Industries, Inc. v. Cardinal IG Co., Inc., 239 F.3d 1239, 1245 (Fed.Cir.2001) (citing PPG Industries v. Guardian Indus. Corp., 156 F.3d 1351, 1354 (Fed.Cir.1998)).

The wording of independent claims 1, 8, 18, 24 and 26 supports the interpretation of "the" as "an." All of the independent claims refer to HPV 52 DNA that "consists of all or a fragment of *an* HPV DNA." (Emphasis added.). Plaintiff argued in its pre-hearing briefs that the claims do not require HPV DNA to be only a "full length HPV genome," but it abandoned this argument at the claims construction hearing. Transcript, dkt. # 45, at 31, ln. 19, 33, lns. 19-25-34, lns. 1-4. This was a wise decision in light of the inventor's repeated statements to the examiner that the HPV DNA to which the patent application referred is the DNA of an *entire* human papillomavirus. FH 342, 372. Such a statement is not ambiguous, as plaintiff characterized it in its pre-hearing briefs, but definite and clear. Therefore, I conclude that the term "HPV DNA" should be construed as "a full length genome of one human papillomavirus."

B. " *HPA 52 DNA* "

Plaintiff's proposed construction is "DNA that consists of all or a fragment of type 52 HPV." Defendant suggests "DNA molecule derived from only type 52 HPV." The parties argued their competing constructions at some length in their briefs. At the hearing, however, they agreed that the term means a "DNA molecule that is type 52 HPV" and limited their disagreement to the word "only." As agreed upon, the parties' construction eliminates the word "derived," which plaintiff found objectionable both because it limited HPV 52 DNA to the way it is manufactured and because it appeared to be an "attempt to limit HPV 52 DNA to nucleic acids that would otherwise be expressly encompassed by the literal claim language and the functional limitations of the claims." Plt.'s Response Br., dkt. # 38, at 2.

Plaintiff's first objection to "derived" is odd in view of its own assertion to the examiner that "the claimed HPV 52 DNA must be *derived* from only type 52 HPV DNA." FH 0343 (emphasis added). However, its objection is mooted by the elimination of this word from the construed term.

Plaintiff's second objection extends beyond the word derived to the inclusion of the word "only" in the construction. Plaintiff maintains that the term HPV 52 DNA should not be construed to exclude DNA that is also found in an HPV type of a number higher than 52, so long as the HPV 52 DNA consists of a fragment of type 52 DNA. Plaintiff concedes that the term cannot be construed to include HPV types 1-51 because the applicant amended claim 6 (now claim 8) to add the phrase, "the HPV 52 DNA does not hybridize to DNA from HPV types 1 through 51 under stringent conditions." FH 0342. However, plaintiff argues that when the applicant proposed this amendment, he preserved the possibility that HPV 52 DNA could hybridize or detect HPV types yet to be identified (types 53 and higher).

To support this argument, plaintiff quotes a portion of the applicant's April 1996 amendment and response to office action. Plt .'s Response Br., dkt. # 38, at 6. In doing so, plaintiff omits an important sentence: "Since the HPV portion of clone pCD 15 is the HPV genome of the type 52 HPV discovered by applicant, and since cross-hybridization of an HPV to this type 52 HPV to greater than 50% under moderately stringent conditions identifies it, by definition, as an HPV of type 52, the *claimed HPV 52 DNA must be derived from only type 52 HPV DNA*." FH 0342 (emphasis added).

Before the applicant filed his April 1996 amendment, he might have had grounds for an argument that claim

6 encompassed fragments of all HPV strains known at the time of the invention (1-51) and as yet unknown HPV types, such as HPV 53, 54, etc. Once he filed the amendment, however, he gave up those grounds and the possibility of a claim encompassing fragments of HPV types of as yet unknown composition. Not only did he tell the examiner that the claimed HPV 52 DNA must be derived from only type 52 HPV DNA, but he changed the term "comprising" to "consisting of" in the relevant claims. ("wherein the HPV 52 DNA consists of all or a fragment of an HPV DNA ..." FH 0336-40.). In doing so, he chose to narrow the claim. Promega Corp. v. Applera Corp., 2002 WL 32355680 (W.D.Wis.2002) ("In contrast to the open transitional term 'comprising,' 'consisting of' is a closed transitional phrase that is 'understood to exclude any elements, steps, or ingredients not specified in the claim.' ") (quoting AFC Industries, Inc. v. Cardinal IG Co., Inc., 239 F.3d 1239, 1245 (Fed.Cir.2001)).

The applicant's representations to the examiner are binding on him and bind plaintiff by extension. Coleco Industries, Inc., 573 F.2d at 1257; *see also* Southwall Technologies Inc. v. Cardinal IG Co., 54 F.3d 1570, 1576, 34 USPQ2d 1673, 1676 (Fed.Cir.1995) ("The prosecution history limits the interpretation of claim terms so as to exclude any interpretation that was disclaimed during prosecution."); Spectrum International, Inc. v. Sterilite Corp., 164 F.3d 1372, 1378 (Fed.Cir.1998) ("explicit statements made by a patent applicant during prosecution to distinguish a claimed invention over prior art may serve to narrow the scope of a claim").

In light of the facts that the independent claims all contain the language "wherein the HPV 52 DNA *consists of* all or a fragment of *an* HPV DNA" and that plaintiff argued to the examiner that "the claimed HPV 52 DNA must be derived from *only* type 52 HPV DNA," FH 0343, thereby disclaiming HPV 52 DNA derived from any other type, I agree with defendant that the word "only" belongs in the construed claim term to make it clear that the DNA molecule is *only* type 52 HPV. I conclude that the proper construction of HPV 52 DNA is "a DNA molecule that is only type 52 HPV."

C. " *Between Approximately 15 and 8000 Nucleotide Bases* "

The patent refers repeatedly and consistently to the length of HPV 52 DNA as being "between approximately 15 to 8000 nucleotide bases." Ordinarily, the modifier "approximately" preceding the numbers would indicate that the applicant was claiming an HPV 52 DNA that could consist of slightly fewer than 15 bases and slightly more than 8000 bases, which is the way plaintiff reads it. *E.g., Quantum Corp. v. Rodime, LLC,* 65 F.3d 1571, 1581 (Fed.Cir.1995) (term "at least approximately 600 tpi" held to define an openended range starting slightly below 600 tpi). Defendant contends, however, that the prosecution history shows that the applicant disavowed any HPV 52 DNA shorter than 15 bases. Defendant points out that throughout the extended prosecution of the patent application, whenever the examiner raised an objection to the inventor's attempt to claim a length shorter than 15 bases, the applicant assured her that "between approximately 15 and 8000 nucleotide bases" did not include a length shorter than 15 bases.

Plaintiff denies that the applicant's statements to the applicant amounted to a disavowal of a length shorter than 15 nucleotide bases. If that were true, it asks, why would the examiner have allowed the patent to issue without moving the word "approximately" to a position preceding 8000, as she had recommended in the last rejection before issuance?

Plaintiff would construe the phrase as including a range of HPV 52 DNAs shorter than 15 bases and longer than 8000 bases or, stated slightly differently, "an HPV 52 DNA of a length ranging from a relatively small hybridization probe to the length of a complete HPV genome." In support of its position, it makes a number

of arguments. First, it denies defendant's assertion that the applicant clearly and unequivocally disclaimed any HPV 52 DNA shorter than 15 bases during the prosecution of the patent. Second, it cites cases in which courts have read words such as approximately or about as eliminating the precise lower limit of the range, such as *Quantum Corp.,* 65 F.3d at 1577. Third, it notes that the applicant attached to his November 1992 proposed amendment an article by Szostak, J.W. et al., "Hybridization with Synthetic Oligonucleotides" from *Methods in Enzymology,* in which the authors write that "Oligonucleotides 10 to 20 bases long are potentially useful as hybridization probes for the detection of unique genes in Southern blot filter hybridization experiments and for the screening of colony or bacteriophage banks for particular sequences." FH 0227. Fourth, it asserts that one of ordinary skill in the art would understand the term to include fragments shorter than 15 bases; and finally, it cites the statement in the specification at col. 12, lns. 14-16, that "[t]he particular size of the HPV 52 DNA or HPV 52 RNA fragments which can be employed as hybridization probes in the present invention is not critical."

Taking these in order, I start with plaintiff's denial of defendant's contention that the applicant's statements on minimum fragment length during the prosecution amounted to a clear and unequivocal disclaimer of any HPT 52 DNA shorter than 15 bases. Plaintiff cites a number of cases for the proposition that ambiguous disavowals of claim scopes do not amount to prosecution disclaimer. *E.g.,* Northern Telecom Ltd. v. Samsung Electronics Co., 215 F.3d 1281, 1293-95 (Fed.Cir.2000) (declining to to apply doctrine of prosecution disclaimer in a case in which court found alleged disavowal of claim scope to be ambiguous; disavowing statements must be so clear as to show both "reasonable clarity and deliberateness"); Rexnord Corp. v. Laitram Corp., 274 F.3d 1336, 1347 (Fed.Cir.2001) (refusing to apply doctrine of prosecution disclaimer because alleged disclaimer in prosecution history was inconclusive); Schwing GmbH v. Putzmeister Aktiengesellschaft, 305 F3d 1318, 1324-25 (Fed.Cir.2002) ("Prosecution history ... cannot be used to limit the scope of a claim unless the applicant took a position before the PTO that would lead a competitor to believe that the applicant had disavowed coverage of the relevant subject matter.").

The cited cases are on point only if the applicant's statements to the examiner were ambiguous or inconclusive. A close look at those statements in the context of the prosecution history shows that they cannot be characterized in this way. The applicant told the examiner again and again that the length was between 15 and 8000 bases, not that it was between "approximately 15 and 8000 bases." He made a point of telling the examiner that "those skilled in the art discourage the use of probes having less than 15 bases," FH 0143-44, and he never objected to the examiner's characterization of the fragments as being "at least 15 bases" when she asked, "[W]here is the support for fragments of at least 15 bases, or 300-800 bases that do not hybridize to other HPV under conditions of moderate stringency?" FH 0134. In these circumstances, the apposite cases are ones such as Elkay Mfg. Co. v. Ebco Mfg. Co., 192 F.3d 973, 979 (Fed.Cir.1999) ("Arguments made during the prosecution of a patent application are given the same weight as claim amendments."), and Standard Oil, 774 F.2d at 452 (prosecution history includes "arguments made to convince the examiner").

Second, although it is the case that the Szostak paper disclosed the use of probes shorter than 15 bases in hybridization probes in general, the applicant made it clear throughout the extended prosecution of the patent application that his particular invention called for probes no shorter than 15 bases. His statements describe the metes and bounds of his claims. *E.g.,* "[T]he claims similarly limit the fragments to those having a length between 15 and 8000 nucleotide bases." FH 0145-46. The public has a right to rely on these statements.

Plaintiff's third argument relates to what a person of ordinary skill would understand the term

"approximately 15 bases" to mean. Plaintiff asserts that such a person would read the term as referring to fragments shorter than 15 and it has submitted the affidavit of Dr. Peter Howley to that effect. The submission is of no assistance. The affidavit is extrinsic evidence, which ranks below intrinsic evidence in the hierarchy of claim construction evidence. Courts do not resort to extrinsic evidence until they have determined that the intrinsic evidence is inadequate to resolve a question of construction. Even if that problem did not exist, the affidavit does not provide any information about what a person of ordinary skill would have understood the term "approximately 15 bases" to mean in the context of the '715 patent at the time the application was filed. Howley says only that in his opinion, plaintiff's proposed construction is "correct and more useful." Howley Affid., Plt.'s Exh. # 39, at 2.

Plaintiff's final point rests on the statement in the specification to the effect that the size of the fragments is not critical. This statement falls short of establishing that the fragments may be shorter than 15 bases. It can be read reasonably as saying only that the size between 15 and 8000 is not critical.

D. " *Consists of All or a Fragment of an HPV DNA* "

Plaintiff maintains that it is not necessary to construe this claim, which is found in independent claims 8, 18, 21, 24 and 26. Plaintiff is technically correct, only because the term depends on the construction of HPV DNA that I determined earlier. Incorporating that construction, I construe this term as meaning "all or a fragment of one HPV DNA that does not contain any other DNA." As discussed earlier, "an" means "one" and only one. Adding "that does not contain any other DNA" makes this explicit.

E. " *HPV 52 DNA Labeled with a Detectable Label* "

According to plaintiff, this is another term that does not need construction. During the course of the claims construction hearing, however, it became evident that the parties have a dispute about the nature of the detectable label. Defendant proposed the construction: "HPV 52 DNA that incorporates an atom or different compound that gives the DNA a new detectable property." Although plaintiff opposed a construction that eliminated the possibility that the label could be DNA, it agreed that if this is not a possibility (and it is not, given the constructions I have given to other claim terms), it would accept the construction "HPV 52 DNA labeled with a detectable label that is not DNA." I will adopt this construction. It is not necessary to construe the term "detectable label." Its meaning is not in dispute now that it has been construed as not including DNA and it can be explained to the jury.

F. " *HPV 52 Hybrididdation Probe* "

Claim 18 of the patent begins: "An HPV 52 hybridization probe comprising a member selected from the group consisting of...." Defendant contends that the introduction to claim 18 should be read as a "nucleic acid molecule that is specific for HPV 52 DNA and differentiates HPV 52 DNA from DNA of all other HPV types." Plaintiff opposes this construction, arguing that the term needs no construction because the claim is drawn to HPV 52 DNA or HPV 52 RNA, "which are structurally defined by the claim itself." Plt.'s Response Br., dkt. # 38, at 19. Plaintiff contends that if the claim term is construed, it should not be read as limiting the probe to a nucleic acid molecule specific for HPV 52 DNA.

The initial inquiry is to determine whether any construction is necessary. It is if the introductory words are "additional structural limitations of the claim" rather than being merely a statement of purpose or description of intended use for the claimed structure. Corning Glass Works v. Sumitomo Elec. U.S.A., Inc., 868 F.2d 1251, 1257 (Fed.Cir.1989). Deciding the effect to be given preamble language "can be resolved

only on review of the entirety of the patent to gain an understanding of what the inventors actually invented and intended to encompass by the claim." *Id*.

A review of the '715 patent shows that it describes the patented invention as one that relates to nucleic acid hybridization probes "particularly for human papillomavirus type 52. The patent abstract reads "Nucleic acid hybridization probes for human papillomavirus types and particularly human papillomavirus type 52; and methods for applying the same." The Field of the Invention reads: "The present invention relates to nucleic acid hybidization probes for human papillomavirus and particularly for human papillomarvirus type 52 (hereinafter "HPV 52") and methods for employing the same." Col. 1, lns. 15-18.

The Summary of the Invention includes the sentence, "Accordingly, an object of the present invention is to provide nucleic acid hybridization probes which are specific for HPV type 52 ." Col. 4, lns. 30-32. In the November 1992 amendment, the applicant described the invention as including "[p]robes specific for HPV 52," which could be used for early diagnosis and treatment of papillimavirus infection. FH 0201. In a later response, filed in May 1993, the applicant made the same point about probes specific for HPV 52. FH 0249.

The statements in the patent and prosecution history are strong evidence that the applicant's purpose was the development of an HPV DNA hybridization probe that was specific for HPV 52 DNA and capable of differentiating HPV 52 DNA from the DNA of other HPV types. However, plaintiff points out additional statements in the specification, including the sentence, "Still another object of the present invention is to provide a method for detecting HPV DNA or RNA in general and HPV type 52 in particular, in an unknown sample of DNA or RNA, particularly an unknown sample of DNA or RNA derived from a genital lesion so as to determine the risk of cervical cancer development," id. at lns. 34-39. It notes that the specification describes two methods of employing hybridization probes: to test a tissue sample for the presence of HPV DNA or RNA in general or to test for a particular DNA or RNA or both, depending on the stringency of the hybridization conditions. Plaintiff asserts that this is support for its position that the hybridization probe that constitutes HPV 52 DNA of claim 18 need not be a nucleic acid that is specific for HPA 52 DNA and that differentiates HPV 52 DNA from DNA of all other HPV types.

Plaintiff's argument seems to be as follows: Both claims 24 and 26 recite the hybridization of the nucleic acids of an unknown sample to HPV 52 DNA that is defined identically to the nucleic acids of claim 18, yet claims 24 and 26 are describing two entirely different processes for entirely different purposes. In claim 24, the method described is detecting HPV DNA under non-stringent conditions, which would be useful with crude genital extracts, whereas in claim 26, the described method is detecting HPV 52 DNA specifically, under stringent hybridization conditions. Thus, plaintiff argues, "the specification makes clear that the hybridization probe that comprises HPV 52 DNA need not be a nucleic acid that is 1) 'specific for HPV 52 DNA' and 2) 'differentiates HPV 52 DNA from DNA of all other HPV types,' as required by [defendant's] proposed construction for the term "HPV 52 hybridization probe." Plt.'s Response Br., dkt. # 38, at 20.

Plaintiff does not explain why the use of an HPV 52 hybridization probe to detect HPV DNA in general (that is, without differentiating HPV 52 from other HPV types) makes defendant's proposed construction improper. The HPV 52 probe does not change its character when it is used for general HPV DNA detection in non-stringent conditions; it simply does not utilize the greater differentiation capability it has under moderately stringent and stringent conditions. Nevertheless, its differentiation capability and its molecular structure specific for HPV 52 DNA remain critical for detecting general HPV DNA. If this were not the case, why would the patent specification tell persons of ordinary skill that it is advantageous to use type 52 along with sequences representative of HPV types 6, 11, 16, 18, 31 and 33 when the unknown sample of

DNA is derived from genital lesions and these types of HPV are most likely to be found in genital lesions? '715 pat., col. 8, lns. 38-43. It is the specificness of the molecule that makes it useful for this purpose.

I conclude that when the applicant used the term "HPV 52 DNA hybridization probe" in claim 18, he intended to claim and encompass a nucleic acid molecule that is specific for HPV 52 DNA and that differentiates HPV 52 DNA from DNA of all other types. This claim term discloses " 'a fundamental characteristic of the claimed invention that is properly construed as a limitation of the claim itself.' " Poly-America, L.P. v. GSE Lining Technology, 383 F.3d 1303, 1310 (Fed. Cir.2004 (quoting Poly-America, Inc. v. Serrot International, Inc., 2001 WL 1335793, (N.D.Tex.2001)). Therefore, I will adopt the construction of this term proposed by defendant: "nucleic acid molecule that is specific for HPV 52 DNA and that differentiates HPV 52 DNA from DNA of all other types."

G. " *HPV* DNA Hybridization *Probe* "

As with the previous claim term, plaintiff contends that no construction is necessary. Defendant proposes "nucleic acid molecule that is specific for the DNA of any one type of HPV and differentiates the DNA of that type from DNA of all other HPV types."

The initial difficulty in understanding the parties' disagreement on this claim term is identifying the term they are discussing. The only reference to "HPV hybridization probe" is in dependent claim 19 (where the term seems clearly to encompass the "HPV 52 hybridization probe" that is the object of independent claim 18). Claim 21 talks about an "HPV hybridization probe *composition*." For the purpose of this order, I will assume that the hybridization probe at issue is the one of those making up the "hybridization probe composition." On that assumption, I find defendant's proposal persuasive because it is consistent with the claim language and the specification. As explained above, the hybridization probes work, separately or in composition with other probes, only if they are made up of molecules specific for a particular type of HPV.

Therefore, I will adopt the construction, "nucleic acid molecule that is specific for the DNA of any one type of HPV and differentiates the DNA of that type from DNA of all other HPV types."

H. " *Cross-Hybridizes to the HPV Portion of Clone pCD 15 to Greater than 50%* "

Plaintiff does not believe that any construction is needed for this term and the next three but it does not object to the one proposed by defendant if the court believes that it would be useful to the jury to have an explanation of the terms. The Court of Appeals for the Federal Circuit has told trial courts to "instruct the jury on the meanings to be attributed to all disputed terms used in the claims in suit so that the jury will be able to 'intelligently determine the questions presented.' " Sulzer Textil A.G. v. Picanol N.V., 358 F.3d 1356, 1366 (5th Cir.2004) (citing Shad v. Dean Witter Reynolds, Inc., 799 F.2d 525, 532 (9th Cir.1986)). Although the parties do not dispute the meaning of the "cross-hybridizes" and "conditions" claim terms, it will be helpful to the jury to know how persons of ordinary skill in the art understand these term. Therefore, I will adopt the construction for this term as proposed by defendant: "cross-hybridizes to the HPV portion of clone pCD 15 so as to result in the conversion of 50% of the DNAs to fully or partially-stranded DNA molecules."

I. " *Under Moderately Stingent Conditions*

This term is construed as "at approximately 25 (deg.)C below the melting temperature of a perfectly base-paired double-stranded DNA."

J. " *Under Stringent Conditions* "

This term is construed as at "at approximately 10 (deg.)C below the melting temperature of a perfectly base-paired double-stranded DNA hybrid."

K. " *Under Non-Stringent Conditions* "

This term is construed as at "at approximately 35 (deg.)C below or more the melting temperature of a perfectly base-paired double-stranded DNA hybrid."

ORDER

IT IS ORDERED that the disputed terms of plaintiff's U.S. Patent No. 5,643,715 shall have the following constructions:

1. "HPV DNA" is "a full length genome of one human papillomavirus."

2. "HPV 52 DNA" is "a DNA molecule that is only type 52 HPV."

3. "Wherein the length of HPV 52 DNA is between approximately 15 and 8000 nucleotide bases" means "between 15 and approximately 8000 nucleotide bases."

4. "Consists of all or a fragment of an HPV DNA" means "all or a fragment of one HPV DNA and does not contain any other DNA."

5. "HPV 52 DNA labeled with a detectable label" means "HPV 52 DNA that has a detectable label that is not DNA."

6. An "HPV 52 hybridization probe" is "a nucleic acid molecule that is specific for HPV 52 DNA and differentiates HPV 52 DNA from DNA of all other HPV types."

7. An "HPV hybridization probe" means "a nucleic acid molecule that is specific for the DNA of any one type of HPV and differentiates the DNA of that type from DNA of all other HPV types."

8. "Cross-hybridizes to the HPV portion of clone of pCD 15 to greater than 50%" means "cross-hybridizes to the HPV portion of clone pCD 15 so as to result in the conversion of 50% of the DNAs to fully or partially double-stranded DNA molecules."

9. "Under moderately stringent conditions" means "at approximately 25 (deg.)C below the melting temperature of a perfectly base-paired double-stranded DNA."

10. "Under stringent conditions" means "at approximately 10 (deg.)C below the melting temperature of a perfectly base-paired double-stranded DNA hybrid."

11. "Under non-stringent conditions" means "at approximately 35 (deg.)C below or more the melting temperature of a perfectly base-paired double-stranded DNA hybrid."

W.D.Wis.,2007.
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