NOTE: This disposition is nonprecedential.

United States Court of Appeals for the Federal Circuit

THE SCRIPPS RESEARCH INSTITUTE,
Plaintiff-Appellant

v.

ILLUMINA, INC.,
Defendant-Appellee

2018-2089

Appeal from the United States District Court for the Southern District of California in No. 3:16-cv-00661-JLS-BGS, Judge Janis L. Sammartino.

Decided: August 29, 2019

JUSTIN SCOTT COHEN, Thompson & Knight LLP, Dallas, TX, argued for plaintiff-appellant. Also represented by HERBERT J. HAMMOND, JAMES MICHAEL HEINLEN; DEREK TOD GILLILAND, Nix Patterson & Roach LLP, Daingerfield, TX.

JUANITA ROSE BROOKS, Fish & Richardson, PC, San Diego, CA, argued for defendant-appellee. Also represented by MICHAEL ARI AMON, CRAIG E. COUNTRYMAN.

Before WALLACH, CLEVENGER, and TARANTO, *Circuit Judges*.

Opinion for the court filed by *Circuit Judge* TARANTO.

Dissenting opinion filed by *Circuit Judge* CLEVENGER.

TARANTO, *Circuit Judge*.

The Scripps Research Institute owns now-expired U.S. Patent No. 6,060,596, which describes and claims bifunctional molecules having certain properties, along with libraries of such molecules. Scripps sued Illumina, Inc. in the Southern District of California, asserting infringement of claims 1, 3, 10, and 16 of the '596 patent. The district court issued claim-construction rulings that addressed three terms that involve the variable *a* and a claim phrase that refers to a *linker molecule*. Shortly thereafter, Scripps and Illumina filed a joint motion stipulating that, under the claim-construction rulings, Illumina has not infringed the asserted claims. The district court granted the motion and entered a final judgment in Illumina's favor.

Scripps appeals the claim-construction rulings involving the *a* terms and the *linker molecule* phrase. Both parties agree that, if the rulings involving the *a* terms are correct, the district court's judgment should stand. Because we agree with the district court regarding the *a* terms, we affirm the judgment without reaching the dispute over the *linker molecule* phrase.

I

A

The '596 patent is titled "Encoded Combinatorial Chemical Libraries." Its specification describes bifunctional molecules, represented by the formula A–B–C, gathered into a library. At a general level, the A side of each bifunctional molecule is the molecule of interest (such as a molecule that binds to a particular target, '596 patent, col.

2, lines 64–66), the C side is a molecule serving an indexing function in the library, and B is a linker between A and C.

The "chemical moiety" A in the A–B–C bifunctional molecule is a "polymer." '596 patent, col. 4, lines 31, 33. The polymer "comprises a linear series of chemical units represented by the formula $(X_n)_a$, wherein X is a single chemical unit in polymer A and n is a position identifier." *Id.*, col. 4, lines 33–36.[1] The specification notes that "a is an integer," typically between four and fifty. *Id.*, col. 4, lines 41–42.

The C in the A–B–C molecule is the "identifier oligonucleotide." *Id.*, col. 5, lines 56–57. The specification explains that oligonucleotide C is made up of unit identifiers corresponding to the chemical units of polymer A. *Id.*, col. 5, lines 58–61. Specifically, oligonucleotide C has "a sequence represented by the formula $(Z_n)_a$, wherein Z is a unit identifier nucleotide sequence within oligonucleotide C that identifies the chemical unit X at position n." *Id.* Each unit identifier Z typically includes between two and ten nucleotides, preferably chosen from the bases found in DNA: adenosine, cytosine, guanosine, and thymidine. *Id.*, col. 6, lines 7–19.

The B portion of the bifunctional molecule is the "linker molecule" that connects polymer A and oligonucleotide C. *See id.*, col. 8, lines 20–24. The specification explains that linker molecule B "can be any molecule that performs the function of operatively linking the chemical moiety to the identifier oligonucleotide." *Id.* It further notes that linker

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[1] The '596 patent and papers in the record sometimes use italics for numerical variables such as a and n and sometimes do not. For clarity and consistency, we use italics for such variables throughout this opinion. We do so even when quoting language not italicized in the original, without flagging each formatting change.

molecule B preferably "has a means for attaching to a solid support" and also "separat[ing] from the solid support." *Id.*, col. 8, lines 25–33.

The specification teaches a "method for producing a plurality of bifunctional molecules to form a library of this invention." *Id.*, col. 9, lines 62–63. "In the present synthesis methods," a bifunctional molecule A–B–C is created according to "an alternating parallel synthesis procedure." *Id.*, col. 9, line 66, through col. 10, line 7. The procedure involves "add[ing] chemical unit X and then add[ing] a unit identifier nucleotide sequence Z that defines (codes for) that corresponding chemical unit." *Id.* With a library of bifunctional molecules formed in that way, researchers can discern the identity of bound polymer A by reading the corresponding genetic tag, *i.e.*, oligonucleotide C. *Id.*, col. 2, line 66, through col. 3, line 1.

Independent claim 1 recites the following:

> 1. A bifunctional molecule according to the formula A–B–C, wherein A is a polymer comprising a linear series of chemical units represented by the formula $(X_n)_a$, wherein X is a single chemical unit in polymer A, B is a linker molecule operatively linked to A and C[,] and identifier oligonucleotide C is represented by the formula $(Z_n)_a$, wherein a unit identifier nucleotide sequence Z within oligonucleotide C identifies the chemical unit X at position n; and wherein n is a position identifier for both X in polymer A and Z in oligonucleotide C having the value of $1+i$ where i is an integer from 0 to 10, such that when n is 1, X or Z is located most proximal to the linker, and a is an integer from 4 to 50.

Id., col. 43, lines 2–14. Claim 3 depends on claim 1 and additionally requires that "said polymer is an oligosaccharide, pol[y]peptide, glycolipid, lipid, proteoglycan, glycopeptide or oligonucleotide." *Id.*, col. 43, lines 18–20.

Unlike claims 1 and 3, which involve a single bifunctional molecule, claims 10 and 16 claim libraries containing multiple bifunctional molecules. Claim 10 recites "[a] library comprising a plurality of species of bifunctional molecules according to claim 1." *Id.*, col. 44, lines 4–5. Claim 16 depends on claim 10 and further requires that "each of said species of bifunctional molecules in said plurality is present in molar equivalents of from 0.2 to 10.0." *Id.*, col. 44, lines 29–31.

B

In December 2016, Scripps sued Illumina, asserting that Illumina's making, using, selling, and offering to sell its BeadChip products infringed claims 1, 3, 10, and 16 of the '596 patent. After the Patent Trial and Appeal Board denied Illumina's petition for an inter partes review of all claims of the '596 patent except claims 7–9, Illumina moved to dismiss the district-court case, arguing that its BeadChip products could not meet the requirements of claim 1 (and hence of claims 3, 10, and 16) under any plausible construction of the *a* terms. The court, concluding that it could not at that stage reject Scripps's proposed constructions of the *a* terms, denied Illumina's motion to dismiss.

The parties then engaged in full claim-construction litigation over the terms *a*, $(Z_n)_a$, and $(X_n)_a$ (the *a* terms), and the claim phrase *B is a linker molecule operatively linked to A and C*, and a couple of other terms not involved in this appeal. After accepting briefs from both sides, the district court heard testimony and argument at a hearing. On April 10, 2018, the court issued an order construing all disputed terms. *Scripps Research Inst. v. Illumina, Inc.*, No. 16-CV-661, 2018 WL 1726597 (S.D. Cal. Apr. 10, 2018).

First, the court construed *a* to mean "an integer from 4 to 50 that is further defined in the context of the formulas $(Z_n)_a$ and $(X_n)_a$." *Id.* at *6. Next, it construed $(X_n)_a$ to mean "a representation of polymer A, where '*a*' is the number of chemical units of X forming the polymer A." *Id.* It

similarly construed $(Z_n)_a$ to mean "a representation of identifier oligonucleotide C, where 'a' is the number of chemical unit identifiers in the oligonucleotide." *Id.* Relatedly, the court determined that the value of a must be the same for both $(X_n)_a$ and $(Z_n)_a$. *Id.* at *5.

The court then turned to the phrase *B is a linker molecule operatively linked to A and C*. The Board had already construed the *linker molecule* phrase in its decision denying Illumina's petition for an inter partes review. Analyzing the prosecution history of earlier patents in the same family as the '596 patent, the Board determined that Scripps had disclaimed some linker molecules. Accordingly, the Board construed the *linker molecule* phrase to mean that "linker molecule B (1) links to A and to C, (2) allows for alternat[ing] addition of nucleotides and amino acids to itself, and (3) is capable of coupling to and decoupling from a solid support without cleaving either the polypeptide or oligonucleotide from linker molecule B." J.A. 977. The district court adopted the Board's construction, deeming it "reasoned" and "persuasive." *Scripps*, 2018 WL 1726597, at *6–7.

On May 17, 2018, Scripps and Illumina filed a joint motion for final judgment, stipulating that, under the district court's claim-construction rulings, "Illumina has not infringed, did not infringe, and cannot infringe" the asserted claims. J.A. 7. Both parties agreed that, under the court's construction of a, the value of a for Illumina's BeadChip products is one, which falls outside the claimed range of four to fifty. They also agreed that Illumina's BeadChip products do not contain linker molecules under the court's construction of the *linker molecule* phrase. The parties acknowledged that "[e]ach of these rulings"—the constructions of the a terms; the determination that a must have the same value in $(X_n)_a$ and $(Z_n)_a$; and the construction of the *linker molecule* phrase—"provides an independent basis why Illumina has not infringed the Asserted Claims." *Id.* The next day, on May 18, 2018, the district court

granted the joint motion and entered judgment against Scripps.

Scripps timely appealed on June 15, 2018. We have jurisdiction under 28 U.S.C. § 1295(a)(1).

II

We see the dispute over the a terms as raising three separate but related questions: (1) whether a in $(Z_n)_a$ counts the number of chemical unit identifiers, (2) whether a in $(X_n)_a$ counts the number of chemical units, and (3) whether a must be the same for both polymer A and oligonucleotide C. Scripps answers each of those questions in the negative, maintaining that a counts individual nucleotides for oligonucleotide C, that a counts monomers for polymer A, and that a need not be the same for $(Z_n)_a$ and $(X_n)_a$. We address each issue in turn, though the issues are related because $(Z_n)_a$ and $(X_n)_a$ are closely related, so our resolutions of the issues are mutually reinforcing.

A

We agree with the district court that a in $(Z_n)_a$ counts chemical unit identifiers, not individual nucleotides. In its introductory paragraph explaining C and its Z_n components and their correspondence to the already described A and its X_n components, the specification states that, in $(Z_n)_a$, a is "an integer as described previously to connote the number of *chemical unit identifiers* in the oligonucleotide." '596 patent, col. 5, lines 63–65 (emphasis added). This is a definition, and at least where (as here) there is nothing extraordinary to the contrary, "the inventor's lexicography governs." *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1316 (Fed. Cir. 2005) (en banc).

At the same time, the specification nowhere says that a in the formulas refers to the number of nucleotides in the overall oligonucleotide C, *i.e.*, $(Z_n)_a$. It does use nucleotides to measure the length of the individual "unit identifier[s]," *i.e.*, each Z_n, *see*, *e.g.*, '596 patent, col. 6, lines 7–14, 61–63;

and it also notes both a preferable number of nucleotides in an overall identifier oligonucleotide "for effective hybridization" and the considerations that "contribute to length of the identifier oligonucleotide," *id.* col. 6, line 64–col. 7, line 3. *See also id.*, col. 18, lines 14–34 (discussing polymerase chain reaction, involving hybridization to which sheer number of nucleotides relevant). But the specification does not use nucleotides as the unit for *a*, or even label *a* the "length" of C, having defined that variable in terms of "the number of chemical unit identifiers." *Id.*, col. 5, lines 63–65. Moreover, the specification makes plain that each individual "*unit identifier* nucleotide sequence" (each Z_n, corresponding to a chemical unit X_n) typically has multiple nucleotides, *id.*, col. 6, lines 61–63 (emphasis added) (six is "typical and exemplary"), so in the complete "identifier oligonucleotide" C consisting of multiple "unit identifier" sequences (Z_1, Z_2, Z_3, . . .), the nucleotide count would not equal the "chemical unit identifier" count.

We see no sound basis for understanding the word "connote" in this setting to mean anything but "is." In its opening brief in this court, Scripps made no argument about the significance of the word "connote" in the specification. In its reply brief, Scripps asserted that "connote the number of chemical unit identifiers" means stating one number (nucleotides) that by calculation with another number (the number of nucleotides per chemical unit identifier, if it is uniform) can lead to identification of the number of chemical unit identifiers. Aside from its lateness, this assertion is unduly strained. Scripps points to no such use of "connote" in scientific contexts like this one. And it would be especially odd to find such an unusual (or entirely novel) use given where "connote" appears in this patent—namely, in the opening, concept-introducing paragraph of the section that defines and explains the identifier oligonucleotide C and its makeup—without any language that points to a need for calculation or the assumptions and method of such a calculation. The only reasonable understanding of

"connote" in this setting, we think, is the straightforward one that a is "the number of chemical unit identifiers" (which correspond to the "chemical units" in $(X_n)_a$ on a one-to-one basis).

Notably, this understanding reflects ordinary chemical nomenclature—which Illumina's expert confirmed in testimony that we do not see meaningfully contradicted. J.A. 1015–16. For example, the formula $CH_3(CH_2)_8CH_3$ represents the straight-chain hydrocarbon decane. The subscript outside the parentheses indicates how many times the group inside the parentheses repeats, *i.e.*, that there are eight saturated carbons singly bonded to one another in between two methyl groups. Under the specification's definition, Scripps used the subscript a in the same way. Although the chemical unit identifiers at different positions of n will differ depending on their corresponding chemical units, a identifies how many chemical unit identifiers are linked together.

B

For similar reasons, we agree with the district court that a in $(X_n)_a$ counts chemical units. In the context of chemical libraries, the specification explains, "'a' . . . represents the *number of chemical units of X* forming the polymer A, i.e., the length of polymer A." '596 patent, col. 9, lines 9–11 (emphasis added); *see also id.*, col. 44, lines 9–11 (similar language in claim 11). We have no reason to believe that a in $(X_n)_a$ means something different elsewhere in the same patent. *See In re Varma*, 816 F.3d 1352, 1363 (Fed. Cir. 2016) ("[T]he principle that the same phrase in different claims of the same patent should have the same meaning is a strong one, overcome only if 'it is clear' that the same phrase has different meanings in different claims." (quoting *Fin Control Systems Pty., Ltd. v. OAM, Inc.*, 265 F.3d 1311, 1318 (Fed. Cir. 2001))). We so conclude following ordinary principles of internal-document coherence—part of the legal task of interpreting intrinsic

evidence. *See Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 135 S. Ct. 831, 841 (2015); *Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 789 F.3d 1335, 1342 (Fed. Cir. 2015).

C

We also agree with the district court that the value of a must be the same for both $(X_n)_a$ and $(Z_n)_a$. The claim language itself states, after introducing both $(X_n)_a$ and $(Z_n)_a$, that "a is *an* integer." '596 patent, col. 43, lines 13–14 (emphasis added). That definitional assertion about the previously used a logically refers without differentiation to both $(X_n)_a$ and $(Z_n)_a$ and means that it is the same integer for both $(X_n)_a$ and $(Z_n)_a$. And the two claim constructions we have already discussed effectively compel this conclusion, as those constructions reflect the definitional correspondence between C with its Z_n components and A with its X_n components.

We do not see how the relevant public could be expected to understand that a could differ for $(X_n)_a$ and $(Z_n)_a$ without some linguistic clue. There is none. If Scripps wanted to indicate that the lengths of polymer A and oligonucleotide C might differ, it could have done so in at least three ways. It could have used another variable, such as c, to represent the length of the oligonucleotide, which would generate the formula $(X_n)_a$–B–$(Z_n)_c$. Alternatively, Scripps could have used prime notation to differentiate between the different values of a, which would produce the formula $(X_n)_a$–B–$(Z_n)_{a'}$. Similarly, Scripps could have used sub-subscripts on a (*e.g.*, a_1 and a_2) to indicate that a might take on different values. Scripps did none of these things or anything comparable.

The specification confirms that a has the same value in both $(X_n)_a$ and $(Z_n)_a$—and not just through the interacting meanings of the effectively definitional provisions we have discussed. Every embodiment in the specification has the same value of a for both the chemical moiety and the oligonucleotide. *E.g.*, '596 patent, col. 6, line 1 (a = 4); *id.*, Fig.

2 (a = 3). And that symmetry necessarily flows from the specification's teaching of how to make the bifunctional molecules—building them according to "an alternating parallel synthesis procedure." *Id.*, col. 9, line 66, through col. 10, line 7. Because a unit identifier nucleotide sequence is always added to oligonucleotide C for every corresponding chemical unit added to polymer A, the synthetic procedure taught in the patent will always result in a uniform value of a.

D

Scripps points to only one fact about the patent that legitimately weighs against the above conclusions. It notes that defining a as the number of chemical units and chemical unit identifiers (*i.e.*, the maximum value of n) limits the length of polymer A to no more than eleven chemical units because claim 1 limits the values of n to between one and eleven. *See id.*, col. 4, lines 36–38 ($n = 1 + i$, where $0 \leq i \leq 10$). And yet claim 1, following the specification, states that the value of a ranges from four to fifty. *Id.*, col. 4, lines 41–42. In Scripps's view, this result means that a is not properly measured in chemical units or chemical unit identifiers and must have a smaller unit of measure.

We do not think that this consequence should be given enough weight to override the compelling support for the district court's conclusions about the a terms—including the notation used in the claim language, the intertwined definitions of the specification, and the embodiments and synthesis method taught in the specification. We note that the district court's conclusions do not produce an actual inconsistency within the claim language. They mean only that the limited range of n effectively further narrows the requirement that a be an integer from four to fifty. That is odd, suggesting some lack of care in drafting, but it is not an internal contradiction. Moreover, there is already odd, careless drafting in claim 1. Scripps agrees that there is no explanation for the claim's saying that n is $i + 1$, with i

ranging from zero to ten, rather than simply saying that n ranges from one to eleven. *See* Oral Arg. at 30:58–31:11.

In addition, a somewhat similar oddity arises for claim 2 under Scripps's nucleotide-counting construction of the a term on the C side. Claim 2 recites that each chemical unit identifier may be up to eight nucleotides long. '596 patent, col. 43, lines 15–17. Applying Scripps's construction of a, claim 2 would contemplate an oligonucleotide in which a is eighty-eight, which far exceeds the limit of fifty set by independent claim 1. Of course, the necessarily present limit of claim 1 would restrict claim 2, but that would still be an odd bit of drafting, leaving a suggestion of permissibly exceeding fifty further limited by a requirement not to do so.

In these circumstances, Scripps's point about limiting the possible values of a is not enough to overcome the otherwise clear claim language and explicit interacting definitions in the specification, along with the embodiments and synthesis method taught in the specification. Accordingly, we agree with the district court's rulings on the a terms.

III

We have considered Scripps's other arguments but do not find them persuasive. It is undisputed that our agreement with the district court regarding the a terms suffices for us to affirm the district court's judgment. We therefore affirm that judgment, without considering the court's construction of the *linker molecule* phrase.

The parties shall bear their own costs.

AFFIRMED

NOTE: This disposition is nonprecedential.

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CLEVENGER, *Circuit Judge*, dissenting.

I

The Scripps Research Institute owns U.S. Patent No. 6,060,596 ("the '596 patent"), which recites an inventive molecule intended to improve the efficiency and effectiveness of the drug discovery process—the search "for novel bioactive chemicals." '596 patent col. 1 ll. 15–34; *id.* col. 2 ll. 48–54. The purpose of the invention is the construction of so-called "bifunctional molecules" that have two main chemical components that serve two distinct functions. *Id.* col. 2 ll. 48–67; *id.* col. 3 ll. 1–17. The first component is a chemical moiety that serves as a novel bioactive chemical

candidate. *Id.* col. 3 ll. 12–23. The second is a genetic tag that uniquely identifies the specific chemical moiety. *Id.* The '596 patent refers to the chemical moiety as a polymer A and to the genetic tag as an oligonucleotide C. *Id.*; *id.* col. 4 ll. 43–54. The invention connects those two functional groups using a linker molecule B, thereby constructing the inventive bifunctional molecule. *Id.* col. 4 ll. 26–30. Thus, A—B—C is a formula that represents the bifunctional molecule. *Id.*

The '596 patent provides "[p]olymer A can be any monomeric chemical unit that can be coupled and extended in polymeric form." *Id.* col. 4 ll. 46–47. The specification further states the linear series of chemical units making up polymer A is represented by the formula $(X_n)_a$, wherein "X" is a single chemical unit, "n" is an integer between 1 and 11 that identifies the position of a given chemical unit X within polymer A, and "a" is an integer from 4 to 50 that defines the length of polymer A. *Id.* col. 4 ll. 31–42. The '596 patent provides oligonucleotide C is represented by the formula $(Z_n)_a$, wherein "Z" is a unit identifier nucleotide sequence that identifies the chemical unit X at position n, "n" is an integer between 1 and 11 that identifies the position of Z within oligonucleotide C, and "a is an integer as described previously to connote the number of chemical unit identifiers in the oligonucleotide." *Id.* col. 5 ll. 56–65. The length of a unit identifier nucleotide sequence Z "can be from about 2 to about 10 nucleotide[]" bases. *Id.* col. 6 ll. 12–14.

Claim 1 is the only independent claim in the '596 patent, and it is representative of the claims at issue in this appeal. It recites "[a] bifunctional molecule according to the formula A—B—C," with additional limitations repeating the sub-formulas and definitions provided in the specification, including $(X_n)_a$ represents polymer A, $(Z_n)_a$ represents oligonucleotide C, and "a" is an integer from 4 to 50. *Id.* col. 43 ll. 1–14.

II

A

To apply the invention as claimed, we must determine how to measure the length "a". Specifically, our task is to determine the units of measurement for the length "a". Do we measure A and C by the number of chemical units[1] X and Z? Or do we measure by the number of monomers in each X and Z? If the claim language or the specification clearly identified the units of measurement, and thus answered that question, our analysis would be complete. Unfortunately, and not uncommonly, neither the claims themselves nor the specification expressly supply an answer.

B

The district court and the majority conclude that we must measure polymer A and oligonucleotide C by the number of chemical units X and Z, respectively. Simply put, "a" is an integer that represents the number of chemical units. The majority provides four justifications for its construction. First, it cites a statement in the specification that, with respect to oligonucleotide C and the formula $(Z_n)_a$, "a is an integer as described previously to connote the number of chemical unit identifiers in the oligonucleotide." Maj. Op. at 7–8. The majority reads that sentence to mean "a" is the number of chemical units Z in the oligonucleotide chain, as a matter of inventor lexicography. Second, it cites a statement in the specification that the library of bifunctional molecules is represented by the formula V^a, wherein "'a' . . . represents the number of chemical units of X

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[1] Throughout the remainder of this opinion, I use "chemical unit" to refer to both a single chemical unit of X and a unit identifier nucleotide sequence Z. And I use "monomer" to refer to both the individual monomers that comprise X and the nucleotide bases that comprise Z.

forming the polymer A, i.e., the length of polymer A." *Id.* at 9–10. The majority reads that part of the specification to be a definitive answer to the appropriate units of measurement for length "a" across all formulas in the '596 patent that rely on length "a" as a variable. Third, the majority points to the claim language itself, which provides "a is an integer." *Id.* at 10. It uses that language as proof that "a" must be a single integer that is the same across all formulas disclosed in the patent. Last, the majority contends its construction is consistent with "ordinary chemical nomenclature." *Id.* at 9.

However, the majority readily admits, as it must, that its construction reads out a substantial part of the '596 patent's claims. *Id.* at 11–12. In fact, the construction it adopts reads out 83% of the claimed range of "a". Although the patent claims are clear that "a" can be any integer from 4 to 50, under the district court's and majority's construction, "a" can only be an integer from 4 to 11. By measuring "a" by chemical units of X and Z, "a" can be no greater than the maximum number of chemical units, which is the maximum value of n, which everyone agrees is 11. Contrary to the express claim language, "a" can never be greater than 11; it can never be an integer from 12 to 50.

According to this court's almost cardinal rule of claim construction, "[c]laims must be 'interpreted with an eye toward giving effect to all terms in the claim'" and avoiding "a claim construction which would render a claim limitation meaningless." *Becton, Dickinson & Co. v. Tyco Healthcare Grp., LP*, 616 F.3d 1249, 1257 (Fed. Cir. 2010) (citations omitted); *see also Bicon, Inc. v. Straumann Co.*, 441 F.3d 945, 951 (Fed. Cir. 2006) (holding a patent claim construction that reads limitations out of a claim is "contrary to the principle that claim language should not [be] treated as meaningless"); *Tex. Instruments Inc. v. U.S. Int'l Trade Comm'n*, 988 F.2d 1165, 1171 (Fed. Cir. 1993) (refusing to adopt a claim construction that would read an express limitation out of the claims "because '[c]ourts can

neither broaden nor narrow claims to give the patentee something different than what he has set forth'" (citation omitted)). So this case boils down to whether the support the majority cites for its claim construction is enough to justify eviscerating most of a claim limitation—83% of the claimed range of possible "a" values. It is not.

C

The '596 patent does not specify the units of measurement for "a" as used in either $(X_n)_a$ or $(Z_n)_a$. Although the specification instructs "a is an integer as described previously to connote the number of chemical unit identifiers in the oligonucleotide," '596 patent col. 5 ll. 63–65, that does not necessarily mean "a" *is* the number of chemical unit identifiers in the oligonucleotide, or that the patentee so defined the term. The word "connote" means "to signify in addition to its exact explicit meaning" or "to imply, indicate, or involve as an attribute: bear as connotation – contrasted with *denote*." *Connote*, Webster's Third New International Dictionary (Unabridged ed. 1993). It does not mean "is." In fact, when the patentee wanted to give notice that some variable in a formula "is" a certain quantity, the patentee knew how to say so. The specification tells us in no uncertain terms that "A *is* a chemical moiety," "B *is* a linker molecule," "C *is* an identifier oligonucleotide," "X *is* a single chemical unit in polymer A," "n *is* a position identifier for X in polymer A," "a *is* an integer from 4 to 50," and "Z *is* a unit identifier nucleotide sequence within oligonucleotide C." '596 patent col. 4 ll. 26–29, 35–36, 41–42 (emphasis added); *id.* col. 4 ll. 59–60 (emphasis added). Under those circumstances, the patentee's choice of the word "connote" rather than the word "is" implies the patentee intended those two words to carry different meanings. Moreover, ascertaining the length "a" based on monomers "connotes" the number of chemical unit identifiers Z in oligonucleotide C just as well as measuring the length "a" by chemical units. One necessarily knows the number of Zs if she knows the number of monomers in each

Z and the total number of monomers "a". As a result, the majority's suggestion that Scripps's construction of "connote," which is consistent with the dictionary definition, is somehow in tension with its regular use in the scientific context is unpersuasive.

Nor does the discussion in the '596 patent of "a" as used in the library formula V^a resolve the proper construction of "a" as used in $(X_n)_a$ or $(Z_n)_a$. The specification tells us that, with respect to the library formula V^a, "'a' is an exponent to V and represents the number of chemical units of X forming the polymer A, i.e., the length of polymer A." *Id.* col. 9 ll. 7–11. But that does not mean "a" has those same units in the formulas $(X_n)_a$ and $(Z_n)_a$. In fact, there is reason to believe "a" is *not* measured in chemical units as used in $(X_n)_a$ and $(Z_n)_a$, despite being so measured as used in V^a.

The size of the library is based on the number of different possible polymer As, which is based on the total number of unique combinations of the available chemical unit Xs. V is the size of the alphabet, which simply is the number of available chemical unit Xs used to construct polymer A. And "a" is the number of chemical unit Xs in polymer A. For example, if there are two chemical units available for use and each polymer contains three chemical unit Xs, the size of the library V^a is 2^3, or 8 bifunctional molecules. There are eight unique ways to arrange the two available chemical unit Xs to construct a three-chemical-unit polymer A in that example. What do we notice? The library is built based on chemical units, not monomers. Indeed, the number of monomers in each chemical unit X is irrelevant. The size of the library depends on only the arrangement of chemical unit Xs, irrespective of what is inside each X.

The same is not true of polymer A, represented by $(X_n)_a$, or oligonucleotide C, represented by $(Z_n)_a$. Counting length "a" in monomers for purposes of $(X_n)_a$ and $(Z_n)_a$ is more consistent with the specification. The specification in several

instances discusses with seeming importance the number of monomers in polymer A and in oligonucleotide C. The '596 patent states "[p]olymer A can be any *monomeric* chemical unit that can be coupled and extended in polymeric form," "[a] typical length [for unit identifier nucleotide sequence Z] can be from about 2 to about 10 nucleotides," "[a] typical and exemplary unit identifier nucleotide sequence [Z] is based on the commaless code having a length of six nucleotides (hexanucleotide) per chemical unit," "an identifier oligonucleotide [preferably] has at least 15 nucleotides in the tag (coding) region for effective hybridization," "length of the identifier oligonucleotide" is based on "considerations of the complexity of the library, the size of the alphabet of chemical units, and the length of the polymer length [sic] of the chemical moiety," "the unit identifier nucleotide sequence is 6 nucleotides" and the sequence characteristics of the oligonucleotide Z such as length are described by the number of monomeric nucleotide bases. *Id.* col. 4 ll. 46–47 (emphasis added); *id.* col. 6 ll. 12–13, 61–63, 64–67; *id.* col. 7 ll. 1–3, *id.* col. 28 ll. 4–5; *id.* col. 29–42. Are we to believe the patentee, despite discussing over and over again the importance of the monomeric composition of the chemical units, intended to capture *nowhere* in the formulas $(X_n)_a$ or $(Z_n)_a$ the number of monomers in polymer A and oligonucleotide C? Unlike the library size, the number of monomers in polymer A and oligonucleotide C is relevant. The majority's construction treats the information as irrelevant.

The majority is not troubled by the fact that its construction ignores that meaningful monomer information because, in its view, "the specification nowhere says that a in the formulas refers to the number of nucleotides in the overall oligonucleotide C, *i.e.*, $(Z_n)_a$." Maj. Op. at 8. The majority mistakenly contends, while the specification "use[s] nucleotides to measure the length of the individual 'unit identifier[s],' *i.e.*, each Z_n," it "does not use nucleotides as the unit for a, or even label a the 'length' of C, having

defined that variable in terms of 'the number of chemical unit identifiers.'" *Id.* The '596 patent defines C as the "identifier oligonucleotide" and Z as the "unit identifier nucleotide sequence." '596 patent col. 5 ll. 56–60. Although the specification makes reference to the length of the unit identifier oligonucleotide Z in terms of nucleotides, it also refers to the length of the identifier oligonucleotide C in terms of nucleotides. *See, e.g.*, *id.* col. 6 ll. 64–66 ("[P]referably, an *identifier oligonucleotide* has at least 15 *nucleotides* in the tag (coding) region for effective hybridization. *In addition*, considerations of the complexity of the library, the size of the alphabet of chemical units, and the length of the polymer length of the chemical moiety all contribute *to length of the identifier oligonucleotide* as discussed in more detail herein." (emphasis added)). In fact, the patent discusses building both polymer A and identifier oligonucleotide C based on their monomeric composition, not based on their chemical units X and Z. *See id.* col. 26 ll. 17–21 ("The conjugate can be lengthened by alternating cycles of addition of *nucleotides* and *amino acids*. The following alternating cycles are repeated until the conjugate has desired *length* amino acid polymer [*i.e.*, A] and oligonucleotide polymer [*i.e.*, C]." (emphasis added)); *id.* col. 26 ll. 34–36 ("The cycle of [the steps] above adding alternate *nucleotides* and *amino acids* can be repeated until the conjugate has polymers of the desired *length* and structure." (emphasis added)).

Furthermore, the majority overlooks critical facts when it contends that "a" is nowhere tied to the length of oligonucleotide C, which is instead defined in terms of its unit identifier Zs. Polymer A, represented by the formula $(X_n)_a$, is defined the same way as oligonucleotide C: in terms of its chemical unit Xs. And yet the specification tells us in a separate place that variable "a" is the length of polymer A. The same is true of oligonucleotide C, which the specification describes as being represented by the formula $(Z_n)_a$, where "a is an integer as described previously," and

"a" was previously described as the length of the polymer. *Compare* '596 patent col. 4 ll. 31–42, *with id.* col. 5 ll. 56–65. There is no reasonable basis for treating the length of polymer oligonucleotide C any differently than the length of polymer A.

The fact that the claims recite "a is *an* integer" does not resolve the proper construction of "a" either. The majority adopts Illumina's argument in its brief that, because the claims say "a is *an* integer," that proves "a" is a single integer that must be the same number across all formulas recited in the '596 patent. Maj. Op. at 10; Appellee's Br. at 19–20. But the fact that "a" is an integer simply means it is a whole number, not a fraction. And that is all we can take it to mean. That must be true in light of the claim language, which also says "n" is defined by the formula "1+i, where i is an integer from 0 to 10." '596 patent col. 43 ll. 10–12. We know that "i," and thus "n" by association, is not always the same number; it necessarily changes with every chemical unit X and Z that is added to the polymer chain A and oligonucleotide chain C. How can we reach a contrary conclusion for the same language with respect to "a"?

Nor do general chemical naming conventions determine the proper construction of "a". The majority treats as a decided issue that the proper construction of the variable "a" and the formulas "$(X_n)_a$" and "$(Z_n)_a$" should comport with "ordinary chemical nomenclature." Maj. Op. at 9. Not so. While no one disputes the ordinary rules for naming compounds in the chemical arts, which Illumina made record evidence through its expert, Scripps's expert testified that variable "a", formula "$(X_n)_a$", and formula "$(Z_n)_a$", do not have a conventional meaning in the art. J.A. 1280–81. The testimony from Scripps's expert suggests, regardless of the ordinary chemical nomenclature, the formulas in the '596 patent do not necessarily follow it. And there is good reason to believe that may be true. Although both the formulas $(X_n)_a$ and $(Z_n)_a$ use the same "a", they do not necessarily

represent the same value because we do not know the units of measurement. Therefore, on this record, it is disputed whether "a" as used in the formulas "$(X_n)_a$" and "$(Z_n)_a$" should be construed consistent with general chemical naming conventions. And the district court did not resolve that dispute of fact in the record. This court should not decide that factual dispute now on appeal. For those reasons, the majority's reliance on "ordinary chemical nomenclature" is most seriously misplaced. Maj. Op. at 9.

Finally, and most importantly, measuring length "a" by monomers rather than chemical units neither broadens nor limits the claim language. It operationalizes all aspects of the claim, and thus indisputably is more consistent with the claimed invention. To the extent the majority relies on the rule that the same claim term in different parts of a claim are generally given the same meaning, Maj. Op. at 9–10, that principle is overcome "if it is clear that the same phrase has different meanings in different claims [or claim limitations]," *In re Varma*, 816 F.3d 1352, 1363–64 (Fed Cir. 2016) (internal quotation marks and citation omitted). The patentee clearly intended "a" to have different meanings among the formulas if giving "a" the same meaning across all formulas reads out 83% of an express claim limitation.

The majority argues that we should ignore the restriction in the scope of claim 1 effected by the construction it adopts because claim 2 suffers from "a somewhat similar oddity." Maj. Op. at 12. That argument has no force. Claim 2 recites "[t]he bifunctional molecule of claim 1 wherein said unit identifier nucleotide sequence Z has a length of from 2 to 8 nucleotides." '596 patent col. 43 ll. 15–17. The majority latches onto an argument Illumina made in its appellate brief that applying Scripps's construction of "a" might cause the oligonucleotide recited in claim 2 to reach a length of eighty-eight, which exceeds the length limit of fifty established by independent claim 1. Maj. Op. at 12; Appellee's Br. at 23. In doing so, the majority is led

astray by a red herring. It is of course true that "a" and "n" cannot *simultaneously* have their maximum values for a given bifunctional molecule. If that were not the case, "a" would readily exceed fifty as the majority suggests. Fortunately, the claims do not require that "a" and "n" be able to simultaneously achieve their maximum values. What matters to make use of the entire scope of claims 1 and 2 is that "a" and "n" can have their minimum and maximum values *individually* for any given hypothetical bifunctional molecule. The argument Illumina makes, and the majority adopts, simply demonstrates that the claims of the '596 patent have boundaries, as all claims must. Illumina's construction makes 83% of the claimed range of "a" inaccessible in all cases. Meanwhile, Scripps's construction makes accessible the entire claimed range of "a" and "n" values. Unlike the construction adopted by the majority, Scripps's construction breathes life into all aspects of all the claims of the '596 patent.

III

The majority does not address the district court's construction of the claim phrase "B is a linker molecule operatively linked to A and C" because both parties agreed that the appeal would be resolved if we affirmed either of the district court's constructions. Maj. Op. at 6–7, 12. Because I disagree with the district court's and majority's construction of "a", I also address the district court's construction of the "linker molecule" phrase.

Before the district court issued its claim construction order, the U.S. Patent and Trademark Office ("PTO") issued a decision denying Illumina's petition for *inter partes* review of the '596 patent. In that decision, the PTO construed the "linker molecule" phrase to mean "linker molecule B (1) links to A and to C, (2) allows for alternative addition of nucleotides and amino acids to itself, and (3) is capable of coupling to and decoupling from a solid support without cleaving either the polypeptide or oligonucleotide

from linker molecule B." J.A. 977. The PTO recognized that the ability of linker molecule B to alternatively add nucleotides and amino acids, as well as its ability to couple to and decouple from a solid support, were not limitations recited in the claims. But it reasoned those limitations were expressly recited in the specification, and Scripps made them necessary attributes of the linker molecule during prosecution of grandparent patent application 07/860,445 ("the '445 application") and parent application 08/665,511 ("the '511 application") by using those limitations as bases to distinguish the invention over the prior art. The district court adopted wholesale the PTO's construction of the "linker molecule" phrase and the PTO's associated analysis. In doing so, the district court erred.

I do not find fault with most of the district court's "linker molecule" construction. Linker molecule B must link to A and to C, it must allow for alternative addition of chemical species to itself, and it must be capable of coupling to and decoupling from a solid support without cleaving either A or C from the linker molecule. But there is no justification for limiting polymer A as recited in the claims of the '596 patent to polypeptides composed of amino acids. "In general, prosecution disclaimer will only apply to a subsequent patent if that patent contains the same claim limitation as its predecessor." *Regents of Univ. of Minn. v. AGA Med. Corp.*, 717 F.3d 929, 943 (Fed. Cir. 2013). Unlike the claims at issue in the grandparent '445 application and the parent '511 application, which restrict A to polypeptides, the claims of the '596 patent are broader because they allow A to be any polymer. Claim 3 of the '596 patent makes clear that polymer A is not limited to polypeptides made up of amino acid monomers. '596 patent col. 43 ll. 18–20. And during prosecution of the application that led to the '596 patent, unlike the prosecutions of the earlier ancestral patent applications, Scripps did not disavow claim scope with respect to linker molecule B. Therefore, the district court's construction of the "linker molecule" phrase is

incorrect to the extent it limits linker molecule B to those chemical species that connect with polypeptides composed of amino acids.

IV

The majority disregards significant rules of engagement by failing to apply the claim construction principles oft-repeated in our precedent. *See, e.g.*, *Merck & Co. v. Teva Pharm. USA, Inc.*, 395 F.3d 1364, 1372 (Fed. Cir. 2005) ("A claim construction that gives meaning to all the terms of the claim is preferred over one that does not do so."). As a result, it repeats the same mistake made by the district court, upholds a construction that unduly lops off 83% of a claim limitation without adequate justification, and dismisses a competing construction that everyone (including the district court) agrees is technically correct. By actually applying our claim construction principles, I would reach the correct constructions, vacate the district court's erroneous interpretations of "a" and "B is a linker molecule operatively linked to A and C", and remand for further proceedings.

As a parting aside, looking back over almost thirty years of deciding patent appeals, I hate to think of how many patents should have been neutered because their inventors could have used more precise claim language. With respect, I dissent.