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PANNING FOR BIOTECHNOLOGY GOLD: REACH-THROUGH ROYALTY DAMAGE AWARDS FOR INFRINGING USES OF PATENTED MOLECULAR SIEVES

James Gregory Cullem *

* The author is a 1999 graduate of the Franklin Pierce Law Center in Concord, N.H. He received his B.S. in biochemistry from the University of California at Davis, and was a research associate at both Chiron Corporation and the J. David Gladstone Institute of Virology & Immunolgy. He has served as a part-time patent clerk at New England Biolabs, Inc. and is registered to practice before the USPTO. The author wishes to thank Professor Karl Jorda and Brian Carey at the Franklin Pierce Law Center for their review of the manuscript.

I. Introduction

The modern biotechnology revolution inspires and expands man's inquiry into the fundamental working of the human body. At the center of this revolution are research tools andtechniques that foster and promote discovery. Among the next generation of such research tools are methods used to screen for, and identify, novel, specific compounds for known molecular targets, descriptively named "molecular sieves." In many ways, these innovations mirror the panning sieves of the Gold Rush era: their primary value lies not in their actual presence, but rather in the compounds they isolate. These modern molecular sieves separate biotechnology "gold" from a pool of worthless matter. The isolated biotechnological gold is hopefully tomorrow's commercially successful therapeutic or drug. When infringed, patented molecular sieves - whose primary value and utility lie not in their existence but in the molecular entities they isolate - present a unique challenge for remedy formulation.

Because the value of molecular sieves far exceeds their intrinsic worth, the lost-sales-revenue or royalty calculations currently used by the patent system inadequately address a patentees' losses due to infringe-

[*554] ment, especially when the infringer first identifies a valuable drug. This comment examines the conundrum outlined above and presents a suggestion for its resolution.

At this time, research innovations indicate a trend towards "rational" drug discovery, in which a target (e.g., a receptor), with known biochemical importance, is used to screen for ligands which represent potential therapeutics. n1 These methods allow efficient and high-throughput screening of candidates because of the specific "hook" they employ. They are, according to one commentator, the "preferred first level screening tool in the pharmaceutical industry." n2 Thus, fashioning an appropriate remedy for the infringement of molecular sieve patents will address a problem that is likely to increase rather substantially in the near future.

II. Historical Development

As a historical note, developments arising out of the Human Genome Project and the discovery of cell-signaling cascades have greatly influenced such screening methods. The Human Genome Project focuses attention on comparing cell types at the genetic level, and through the creation of sequence databases such as GenBank, enables researchers to identify potentially critical genetic differences or similarities between cell types. The recognition that expressed genes in a given cell could be identified by their corresponding RNA transcripts led to the rapid sequencing of expressed sequence tags ("ESTs"), which continue to accelerate identification of critical genes. For example, comparison of ESTs between normal and cancerous lung cells may indicate that the latter are highly expressive of a certain gene.

In turn, the expression products (proteins) of such identified critical genes become the tools used to search for ligands that may affect the action of that product. For example, a transcription promoter identified as differentially and highly expressed in cancerous cells may be used to screen for compounds which inhibit it. Alternatively, the expressed genes themselves may be used to identify compounds that regulate their expression. n3

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Likewise, the discovery ofcell-signaling cascades exposed and identified, among other things, conserved cell surface receptors. Such receptors participate in processes as diverse as viral entryinto cells, and cell growth or differentiation in response to cytokines. Thus,these receptors are highly useful tools for identifying unknown ligands that bind them, and represent potentially valuable anti-viral or immunogenic agents. Indeed, conserved cell surface receptors "are becoming increasingly interesting as primary targets for drugs." n4

The value of comparative analysis between populations finds support in the fledgling field of genomics, where much of the current impetus towards rational drug discovery manifests itself. Companies such as Millennium Pharmaceuticals, Inc. (Cambridge, Massachusetts), n5 Myriad Genetics, Inc. (Salt Lake City, Utah), n6 and Cadus Pharmaceuticals Corp. (Tarrytown, New York) n7 are successfully developing and applying novel genomic comparison methods to screen for and identify drug candidates.

A cursory search of U.S. patent titles pertaining to such screening methods identified over forty-two issued patents in the past three years alone, a tally that does not accountfor patents which may claim such methods without stating so in their titles. Representative titles include: "Methods for screening of test compounds for inhibiting binding of a CD4-HIV1 complex to a chemokine receptor" (New York Blood Center) No. 5,798,206; "Tetracycline-reflux pump inhibitor screening methods" (American Cyanamid Company) No. 5,789,188; "Method of screening compounds which inhibit P. gingivalis lipopolysaccharide from inhibiting the extravasation of leukocytes" (Bristol-Myers Squibb Company) No. 5,712,102; "Method of screening for antimitotic compounds using the cdc25 tyrosine phosphatase" (Cold Spring Harbor Laboratory) No. 5,695,950; "Method of screening for ligands to a receptor-type tyrosine kinase" (Amrad Corporation Ltd.) No. 5,674,691; and "Method for screening potentially therapeutically effective antiviral agents" (SyStemix, Inc.) No. 5,645,982. Industry literature indicates that companies such as IGEN International, Inc. (Gaithersburg, Maryland) n8 and ICOS Corp. (Bothwell, MA) continue to file similar patents.

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Along with the great potential of next-generation research tools comes the need to procure patent protection to recoup the expenses associated with their discovery and development. Since a patent may be infringed during its term, inventors weighing the merits of patenting against the advantages of trade secrecy must consider what remedies are available to redress patent infringement. The adequacy infringement remedies is a critical element for encouraging disclosure and commercialization of innovations, the cornerstones of our patent system.

Patented biotechnological molecular sieves present a dilemma for those trying to determine appropriate infringement remedies. As these tools sometimes have a value greater than their own direct worth, their infringement (in instances where the infringer concomitantly identifies a valuable drug) seems inadequately redressed by the lost sales revenues or royalty damages implemented by the patent system. This comment examines and presents a solution to this problem.

III. Infringement Damages: Overview

A. "Adequate Compensation" vs. "Reasonable Royalty"

A patentee is entitled to damages for infringement under *35 U.S.C. § 284,* which states in relevant part:

Upon finding for the claimant the court shall award the claimant damages adequate to compensate for the infringement, but in no event less than a reasonable royalty for the use made of the invention by the infringer . . . . When the damages are not found by a jury, the court shall assess them." n9

As § 284 clearly mandates, adequacy is the touchstone of an appropriate infringement damage award. n10 The language of the statute implicitly contemplates situations where the calculation of damages "adequate to compensate" the patentee is difficult or impossible. In such situations, a reasonable royalty sets the floor for acceptable compensation to the patentee. n11 Likewise, § 284 appears to exclude a reasonable royalty damage award where such an award would inadequately compensate the patentee for the specific infringement.

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The "adequate compensation" mandate of § 284 is a crucial and unresolved issue which is central to the ability of courts to make appropriate damage award determinations for infringement of patented molecular sieves. An inherent difficulty exists in devising adequate awards for such technologies because the infringing use does not involve producing a quantifiable competing or infringing product. Similarly, resorting to a reasonable royalty award may fail to adequately compensate the patentee if the royalty fails to account for the value of any drug identified via infringing use of the molecular sieve. This failure is especially apparent when the technology has greater value in what it does than what it is; any royalty based onthe latter will fall short of compensating the patentee for the loss of bargaining power associated with the former.

It is important to note that the Supreme Court has stated that infringement damages may not exceed the difference between the "pecuniary condition" of the patentee before and after the infringement. n12 In the context of drug discovery tools, this limitation prevents the patentee from recovering the full profits the infringer makes from salesof a drug identified by the patented molecular sieve. However, as will be discussed later, this limit does not preclude the patentee from being awarded a percentage of such profits, where such a "reach- through" royalty would have been included in a license to the infringer.

The flexibility of damage calculations under § 284 allows courts to craft specificand appropriate damage awards for infringementof patented molecular sieves. As discussed below, inadequacies in the current award determinations for biotechnology infringement suggest the need for an alternative calculus in order to "adequately compensate" the patentee under the statute.

B. Experimental Use: A Narrow Exception

While some commentators assert that molecular sieves epitomize the basic laboratory research tools that should be exempt from infringement liabilityunder the common law "experimental use" exception, such infringing use is unlikely to be excused. Traditionally, this narrow experimental use exception has applied to "experimentation with a patented inventionin order to understand the principles upon which it works for purely philosophical purposes or for amusement." n13 In

[*558] contrast, the infringement of a patented molecular sieve for the purpose of identifying and commercially exploiting drug candidates clearly falls outside the scope of the exception. Indeed, this distinction runs parallel with the observation that "once the experimentation turns to adapting the invention for use in the experimenter's business, the line has been crossed [from research to commercial exploitation] and liability for infringement may result." n14

IV. A Possible Damage Calculus

A. Lost Profits

One of the common damage awards available under *35 U.S.C. § 284* is lost profits. Lost profits may be an appropriate and adequate way to compensate the patentee where an infringer produces a competing product or uses a patented process to produce a competing product. In either case, the lost-profit award relies on decreased sales or eroded prices of the patented good (or good produced by the patented process) resulting from infringement. n15

The very nature of the lost-profit award makes this traditional remedy inappropriate for addressing infringement of the technologies discussed here. In the case of infringement of a patented molecular sieve, infringement results not in the form of a competing sieve that leads to lost sales or decreased prices of the patentee's molecular sieve. Rather, the damage suffered by the patentee is the loss of bargaining power the patentee would have had to negotiate deals with the infringer. Unfortunately, the patentee will likely be unable to show that "but for" the infringement, the patentee himself would have identified the same drug candidate with corresponding financial success.

Consequently, in the absence of any quantifiable lost opportunity, such as sales of a competing product, the lost-profits damage calculus seems ill-suited to adequately compensate for the infringement of a patented molecular sieve.

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B. Reasonable Royalty

A reasonable-royalty damage award is "used where there is no other suitable means of ascertaining damages," n16 and, as discussed previously, represents the floor of allowable damages under *35 U.S.C. § 284.* n17 In contrast to proof of actual royalty rates from past or existing licenses, n18 the reasonable royalty represents the "hypothetical results of hypothetical negotiations between the patentee and the infringer (both hypothetically willing) at the time infringement began." n19 This so-called willing licensor/willing licensee test reflects the belief that both the patentee/licensor and the infringer/licensee reap mutual benefits from voluntary trade in the form of a license agreement. n20

Rather than applying a strict mathematical formula, courts have generally acknowledged that the calculation of a reasonable royalty requires careful consideration of all relevant, case-specific facts. n21 This ensures that the royalty does not exceed what a licensee would have paid for the use of the technology and represents the value of the infringed technology over the next best alternative. n22

Perhaps the most famous and accepted set of relevant factors are those enumerated by the court in Georgia-Pacific Corp. v. U.S. Plywood Corp., n23 and subsequently modified in Honeywell v. Minolta: n24

[the parties'] relative bargaining strengths; the anticipated amount of profits that the prospective licensor reasonably thinks he would lose as a result of licensing the patent as compared to the anticipated royalty income; the anticipated amount of net profits that the prospective licensee reasonably thinks he will make; the commercial past performance of the invention in terms of public acceptance and profits; the market to be tapped; and any other economic factor

[*560] that normally prudent businessmen would, under similar circumstances, take into consideration in negotiating the hypothetical license. n25

While determining a reasonable royalty based on the Georgia-Pacific factors concentrates on the expectations of the parties prior to infringement as opposed to the actual profits of the infringer, n26 the determination ultimately concludes with the "court's best guess at what is fair." n27

In calculating a reasonable royalty award for infringement of patented molecular sieves, some Georgia-Pacific factors will receive great weight, while others will receive none at all. For example, since many novel drug discovery tools, such as molecular sieves, were previously unavailable in the research industry, commercial past performance of the invention may be irrelevant. Further, the number of previous licenses for the technology may be insufficient to prove an established royalty rate. n28 Likewise, if the patentee is not active in the pharmaceutical market (e.g., a small research firm or university), anticipated profits foregone by licensing the technology will be given little weight because the patentee's intention to utilize the technology themselves to identify and market drug candidates is not evident.

On the other hand, factors such as the relevant target market and the licensee's expected profits will likely be significant in determining an appropriate and fair reasonable royalty. Indeed, at least one commentator has noted that the "more modern approach" to royalty calculation, adopted by the Honeywell court (in modifying the Georgia-Pacific approach), includes these factors, along with the relative bargaining strengths of the parties involved. n29 Similarly, factors such as the utility and advantages of the technology over alternative technologies and the portion of realizable profits creditable to the technology are likely to be

[*561] important in determining the royalty rate. n30 This is especially true in the case of molecular sieves, since the potential market may represent a billion- dollar-a-year pharmaceutical product market and the licensed technology may be the only practicable way to develop marketable products.

Given the variety of factors that a court considers in determining an appropriate reasonable royalty in light of the hypothetical willing licensor/willing licensee presumption, it seems likely that an award could be fairly well-tailored to compensate a patentee for infringement of a patented molecular sieve. However, because these novel drug discovery tools are unlikely to have market presence prior to infringement, careful consideration shouldbe given to the value of the technology in the market to be tapped. Furthermore, any probative evidence of the value of the technology's use n31 would be helpful. Such probative evidence would include information on drugs successfully identified via the infringing use, an indication whether the hypothetical license would have been exclusive, and the existence or absence of practical alternative technologies.

In many instances, the value of a license to use a patented molecular sieve in the absence of practicable alternative technologies would be high, and could be specifically evidenced by the "smoking gun" of the infringement: a marketed drug candidate identified by infringing use of the molecular sieve. In fact, the infringement suits contemplated by this comment will likely be brought only when the infringing use results in the introduction of a successful new drug into the marketplace. Therefore, a reasonable royalty award reflecting this high hypothetical license value seems appropriate and fair for novel drug discovery tools.

As discussed below, the traditional reasonable-royalty calculation suffers from one significant shortcoming when applied to patented molecular sieves: it fails to take into consideration the likelihood that the patentee, possessing a unique and valuable research tool (but one expected to generate few short-term license royalties), would have sought a percentage of future profits resulting from the use of the technology - so called "reach-through royalties" - when licensing to the infringer. This additional factor in calculating an appropriate royalty rate that adequately compensates the patentee appears consistent with the Honeywell/Georgia- Pacific allowance for "any other economic factor that normally prudent businessmen would . . . take into consideration in negotiating the hypothetical license." n32

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C. "Reach-Through" Royalties

Another way to compensate a patentee for infringement is to award the patentee a percentage of the profits realized by theinfringer's use of the patented technology. The patentee's vehicle for sharing in the "profitability pie," n33 aside from a straight royalty on sales of licensed technology, is a royalty on future sales of unpatented products developed via use of the patented technology. Such reach- through royalties have been increasingly used in licenses involving biotechnology research tools n34 and, according to one commentator, were used by Stanford University in licensing pioneering recombinant technology protected by two patents. n35

Reach-through royalties, by their very nature, are unlikely to be agreed to by a licensee in situations where the patentee/licensor can be remunerated through more traditional avenues, such as straight royalties on product sales. However, in situations where no other suitable royalty base exists, reach-through royalties may be the only way for a patentee to benefit from licensing patented technology. n36 In the biotechnology field, reach-through royalties allocate value to nascent research tools, in anticipation of the potentially lucrative outcomes of research projects centered about them. n37

In the case of patented drug discovery tools, a reach-through royalty consideration will likely be a relevant "economic factor" under Honeywell/Georgia- Pacific. At least one commentator has noted that potential damage awards based on reach-through royalties may threaten innovating firms on the receiving end of infringement suits. n38 Conveniently, including a reach-through royalty to arrive at an appropriate damage award will be subject to the hypothetical licensing agreement analysis, which focuses on negotiations prior to infringement. The acceptability of such a reach-through royalty for a hypothetical licensee would depend on the "contribution of the research tool to the final value of the product." n39

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Alternately, in situations where the hypothetical licensee would not have agreed to a reach-through royalty (e.g., a pharmaceutical company with a clearly established licensing policy against such royalties), a court could still find that the licensee would have agreed to a large up-front licensing fee instead. The size of such an up-front fee would be tied to the profits the licensee expected to make as a result of using the patented technology, and would reflect their confidence in the technology's ability to fulfill that expectation. In effect, then, a percentage of the profits realized by the infringer might take the form of a large up-front licensing fee, and an infringement damage award reflecting this up-front fee would adequately compensate the patentee.

Thus, for patented molecular sieves that represent the only practicable means of identifying drug candidates to tap potential multi-million dollar markets, reach-through royalties can serve as a central factor in calculating an appropriate infringement damage award under *35 U.S.C. § 284*. The inclusion of hypothetical reach-through royalties in the calculation of damages would most likely occur within the context of a reasonable-royalty determination. However, for new research tools with limited market penetration, the reach-through royalty may be the most relevant of the factors examined, and may represent the ultimate reasonable royalty.

Although it is beyond the scope of this discussion, the actual reach-through royalty rate needs to be calculated. Since patented molecular sieves represent a relatively new technology, however, there will likely be little information available on the "going reach-through rate" for such licenses. n40 One approach may be to rely on a rule-of-thumb royalty rate. n41 Another approach allows courts to accept expert testimony on the reach-through royalty rate than economically prudent negotiators would have agreed to, given the value of the potential market and the lack of alternative technologies.

V. An Argument for Tapping Future Sales of Drugs Discovered by Infringing Use

Lost profits and traditional reasonable royalty awards (i.e., those failing to consider the value of products developed via the infringing use) do not adequately compensate the owner of an infringed patented drug

[*564] discovery tool, such as a molecular sieve. In contrast, a damage calculus that contemplates reach-through royalties or up-front licensing fees on drugs that have yet to be identified and developed seems an appropriate and fair means of adequately compensating the patentee. In the context of the current reasonable-royalty determination based on the Honeywell/Georgia-Pacific framework, such reach-through royalties represent one of those "other economic factor[s] that normally prudent businessmen would, under similar circumstances, take into consideration in negotiating the hypothetical license." n42

Including a reach-through royalty component in a reasonable- royalty determination is appropriate because the true value of these research tools is not readily apparent until the research projects employing them culminate in the identification of effective, lucrative drugs. In such instances, hindsight allows one to ascertain the value of the drug discovery tool, especially where there is no alternative screening technology and the drug enjoys great commercial success.

Nonetheless, when infringement occurs, the clock must be turned back to a pre- infringement period to assess what the parties would have done as willing licensor/patentee and licensee. During pre-infringement, there is no traditional royalty base the patentee can rely on in calculating the value of a license. There are no immediate product sales, based either on the licensed technology or on unpatented products produced by the technology. Yet a vast potential market exists and significant profits may be realized from identifying and subsequently developing a drug candidate using the patented discovery tool. This very profit potential - and the particular value of the molecular sieve in attaining it - drives the infringer to use the technology. As a hypothetical licensee, the infringer probably would have agreed to a reach-through royalty on future sales of drugs identified via the technology, especially since there would have been no other appropriate royalty base.

Still, if a hypothetical licensee would not have accepted a reach-through royalty, calculating a reach-through royalty can still be useful in determining the value of an agreeable up-front licensing fee. Obviously, in licensing the molecular sieve, the patentee would have expected a larger up-front license fee if the hypothetical licensee would not have agreed to a reach-through royalty. The total up-front fee would reflect the market value of the drugs that the parties expected to be identified via the patented screening tool. Hence, a hypothetical reach-through

[*565] royalty rate determination would assist in estimating the hypothetical up-front fee required in its stead. For example, if the infringing use results in identification of a druggenerating profits of $ 10 million per year, and a reasonable reach-through royalty would have been $ 1 million per year (ten percent),then an up-front licensing fee approaching the $ 1 million per year reach-through royalty would likely be required.

In instances where infringement of a molecular sieve continues for an extended time without identifying a promising drug candidate, it might seem counterintuitive to consider a reach-through royalty when calculating an appropriate damage award. However, as the Supreme Court held in Aro Manufacturing, the determination of a reasonable royalty must be made without regard to whether the defendant has "gained or lost by his unlawful acts." n43 The corporations and researchers utilizing gene-based drug discovery technologies are sophisticated business people, well aware of the value of the molecular sieves used to identify marketable drug candidates. As licensees, they would have assumed the risk of not identifying successful drugs through the use of the licensed technology. Therefore, they would likely have agreed to a reach-through royalty provision in exchange for the use of the patented technology, and a damage award calculus should include such a royalty, regardless of the infringer's success or failure to profit from his wrongdoing.

Lastly, an important factor in the damage calculus suggested in here is whether the hypothetical license granted by the patentee would have been exclusive or non- exclusive. Under Georgia-Pacific, exclusivity is a factor in the calculation of any reasonable royalty. n44 Exclusivity is particularly relevant to drug discovery technology licenses, because the nature of screening tools implies that licensees will compete with each other to some extent in the race to identify drug candidates.Whereas an exclusive licensee of such technology might be willingto agree to a reach-through royalty provision, a non-exclusive licensee would not be as willing, especially in a highly competitive research area. Thus, in determining whether a reach-through royalty should be included in the reasonable royalty calculation, proper weight should be given to whether the patentee has granted licenses on the drug discovery technology to others, or would have done so as a hypothetical licensor.

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VI. Relevant Case Law

No federal case law exists that discusses the calculation of a reasonable royalty in the context of patented drug discovery tools such as molecular sieves, or that contemplates reach-through royalties in award determinations. This lack of on- point case law reflects the nascent nature of the technology itself, as well as the relatively infrequent use of reach-through royalties outside the biotechnology research tool licensing market.

However, as previously noted, the increasing number of patents issued on these novel drug discovery tools and the correspondingly vast potential licensing market will surely result in an increased number of infringement actions involving this technology. Courts deciding these cases will increasingly be called upon to determine appropriate damageawards for infringing uses of patented molecular sieves. Hopefully, the future adjudication of cases involving this specific biotechnology will clarify what damages adequately compensate the patentee for infringement, and whether reach-through royalties are appropriately included in the damage calculus.

Certainly, the development of this body of law will significantly affect the terms upon which patentees grant licenses on drug discovery tools in the future. Considering the public benefit of these novel research tools in developing new drugs, it is crucial for courts to develop a damage calculus which is fair to the patentee and will continue to encourage the disclosure and licensing of these tools via the patent system.

VII. Conclusion

The current patent infringement damage calculus under *35 U.S.C. § 284* provides a poor remedy for compensating the owner of a patented drug discovery tool. While traditional remedies such as lost profits or a reasonable royalty work well in most instances, they are inadequate for biotechnology research tools because the value of these tools lies in discovering novel drug candidates. This value is not readily quantifiable since at the time molecular sieves are introduced to the research market, drug candidates have not yet been identified. Thus, difficulties arise when there are no competing product sales from which to determine lost profits, and when determining an appropriate royalty base for a reasonable royalty calculation.

A better and more appropriate damage calculus should include a reach-through royalty that would have been agreed to by a willing licensor and licensee in a hypothetical license prior to infringement. Since the

[*567] value of molecular sieves reflectsthe potential market value of the drugs identified in the future through use of the screening technology, a reach-through royaltyallows the patentee to receive fair compensation when no other traditional royalty base exists. The inclusion of reach-through royalties as a factor in determining a reasonable royalty for molecular sieves is appropriate, because it allows the patentee to be adequately compensated for infringement, asrequired by *35 U.S.C. § 284.*

n1 Philippe Ducor, New Drug Discovery Technologies and Patents, 22 Rutgers Computer & Tech. L.J. 369, 388 (1996).

n2 Id. at 388-89.

n3 IGEN International, Inc. is one example of a company currently developing such technology. See IGEN introduces screening method to discover gene-related drugs, 12 BIOTECH Patent News, Sept. 1998, at 2.

n4 Ducor, supra note 1, at 382 n.59.

n5 See Millennium aligns with two large biomedical research firms, 12 BIOTECH Patent News, Aug. 1998, at 1.

n6 See Myriad Genetics awarded patent for key gene-discovery technologies, 12 BIOTECH Patent News, Aug. 1998, at 4.

n7 See Cadus announces grant of first patent in Cadus name, BIOTECH Patent News, Aug. 1998, at 8.

n8 See supra note 3.

n9 *35 U.S.C. 284* (1994) (emphasis added).

n10 See Charles E. Lipsey & Amy L. Tsui Collins, Patent Infringement in the Field of Biotechnology, in Understanding Biotechnology Law: Protection, Licensing, and Intellectual Property Policies 239, 276 (Gale R. Peterson ed., 1993).

n11 See, e.g., Mark A. Glick, The Law and Economics of Patent Infringement Damages, 10 Utah B.J., Mar. 1997, at 11, 11; Brent Rabowsky, Recovery of Lost Profits on Unpatented Products in Patent Infringement Cases, *70 S. Cal. L. Rev. 281, 288 (1996).*

n12 Glick, supra note 11, at 11 (citing *Aro Mfg. Co. v. Convertible Top Replacement Co., 377 U.S. 476, 507, 141 U.S.P.Q. (BNA) 681, 694 (1964)).*

n13 Lipsey & Tsui Collins, supra note 10, at 273 (citing *Roche Prods., Inc. v. Bolar Pharm. Co., 733 F.2d 858, 221 U.S.P.Q. (BNA) 937 (Fed. Cir. 1984)).*

n14 Id.; see also Kenneth J. Burchfiel, Biotechnology and the Federal Circuit 15.4, at 365 (1995); for a good review of the issues, see Suzanne T. Michel, The Experimental Use Exception to Infringement Applied to Federally Funded Inventions, 7 High Tech. L.J. 369 (1992).

n15 Lipsey & Tsui Collins, supra note 10, at 276- 78; see also Rabowsky, supra note 11, at 289.

n16 Wesley Kobylak, Annotation, Factors to be Considered in Determining a "Reasonable Royalty" for Purpose of Calculating Damages for Patent Infringement Under *35 USCS 284, 66 A.L.R. Fed. 186 2*[c], at 193 (1984).

n17 Rabowsky, supra note 11, at 286.

n18 Kobylak, supra note 16, 2[c], at 193.

n19 Glick, supra note 11, at 15 (quoting *Mahurkar v. C.R. Bard, Inc., 79 F.3d 1572, 1579, 38 U.S.P.Q.2d (BNA), 1288, 1292 (Fed. Cir. 1996);* see also Rabowsky, supra note 11, at 283.

n20 Glick, supra note 11, at 15.

n21 Kobylak, supra note 16, 2[b] at 192.

n22 Glick, supra note 11, at 16.

n23 *318 F. Supp. 1116, 166 U.S.P.Q. (BNA) 235 (S.D.N.Y. 1970),* modified on other grounds, *446 F.2d 295, 170 U.S.P.Q. (BNA) 369 (2d Cir. 1971).*

n24 Civil Nos. 87-4847, 88-1624 (D.N.J. Jan. 28, 1992).

n25 Lipsey & Tsui Collins, supra note 10, at 278 (quoting *Georgia-Pacific, 318 F. Supp. at 1121, 166 U.S.P.Q. at 239);* see also Glick, supra note 11, at 15 & n.23; Karl F. Jorda, Patent Infringement Remedies in the United States: Are They Out of Control?, Paper for "Symposium on Intellectual Property Laws and Systems," sponsored by the International Association for the Protection of Industrial Property (AIPPI), Japanese Group, Gotenba City, Japan (Sept. 6, 1997), at 9 (citing Honeywell, jury instructions at 69).

n26 Lipsey & Tsui Collins, supra note 10, at 279.

n27 Robert L. Baechtold, Reasonable Royalty, in Damages and Other Remedies in Patent Litigation, pt. I, at 24-25 (American Conference Institute, 1994).

n28 Glick, supra note 11, at 17 n.23; see also Gerald Sobel, Developments in Patent Law at the Federal Circuit, in Trademark Licensing and Litigation 1997, at 811, 1011 (PLI Pats., Copyrights, Trademarks & Lit. Prop. Course Handbook Series No. 477, 1997); see also Kobylak, supra note 16, 4[a], at 198-99.

n29 Jorda, supra note 25, at 9.

n30 Glick, supra note 11, at 16-17.

n31 Id.

n32 Lipsey & Tsui Collins, supra note 10, at 278; see also Jorda, supra note 25, at 9.

n33 Glick, supra note 11, at 15.

n34 Rebecca S. Eisenberg, Technology Transfer and the Genome Project: Problems with Patenting Research Tools, 5 Risk 163, 172 (1994).

n35 Ducor, supra note 1, at 459 n.488.

n36 John H. Barton, Patents and Antitrust: A Rethinking in Light of Patent Breadth and Sequential Innovation, *65 Antitrust L.J. 449, 462 (1997).*

n37 Eisenberg, supra note 34, at 170-71.

n38 Id. at 174.

n39 Ducor, supra note 1, at 459.

n40 See generally Kobylak, supra note 16, 4[f].

n41 Glick, supra note 11, at 15 (discussing a rule of thumb that allocates twenty-five to thirty-three percent of the profits to the patentee) (citing Robert Goldscheider, The Licensing Law Handbook (1993-94)).

n42 Lipsey & Tsui Collins, supra note 10, at 278 (citing *Georgia-Pacific Corp. v. U.S. Plywood Corp., 318 F. Supp. 1116, 1121, 166 U.S.P.Q. (BNA) 235, 239 (S.D.N.Y. 1970),* modified on other grounds, *446 F.2d 295, 170 U.S.P.Q. (BNA) 369 (2d Cir. 1971);* Jorda, supra note 25, at 9 (citing Honeywell v. Minolta, Civil Nos. 87-4847, 88-1624 (D.N.J. Jan. 28, 1992)).

n43 Glick, supra note 11, at 11 (citing *Aro Mfg. Co. v. Convertible Top Replacement Co., 377 U.S. 476, 141 U.S.P.Q. (BNA) 681 (1964)).*

n44 568.