Intellectual Property

A Reemergence of Regulation at the Interface Between Patents and Antitrust?

*By F. Scott Kieff and Hon. Gerald J. Mossinghoff**

At the end of 2001, the Federal Trade Commission and the Antitrust Division of the Justice Department announced plans for joint hearings "to develop a better understanding of how to manage the issues that arise at the intersection of antitrust and intellectual property law and policy."[1] The resulting hearings spanned almost the entire year of 2002, covered a wide range of topics, but placed particular emphasis on perceived problems in the patent system.[2] Although the impact of these hearings in 2003 and beyond may not be determined for some time, it has potential to be quite substantial. In the least, the record of these hearings will be an important resource for policy makers and commentators, among others. Yet a look back over the hearings reveals some flaws in their basic premises about patent law and practice that could seriously undermine the hearings' central goal of improved understanding. Many of these flaws are reminiscent of earlier efforts to regulate patents at the beginning of the past century. Those earlier efforts lead to the Congressional actions to codify our present patent system in the 1952 Patent Act and statutorily reverse the entire bodies of case law the earlier efforts had generated.

Fundamental review of the patent system at the beginning of the last century was centered on President Roosevelt's efforts to study what he termed "concentrated economic power" and the resulting Temporary National Economic Committee.[3] These in turn led to a gradual but steady erosion of patent rights throughout the courts. In particular, patent validity determinations became dependent upon an entirely tautological standard: to be patentable, an invention had to constitute what a judge considered to be an "invention." This standard became so vague and yet so difficult to satisfy that Justice Jackson remarked "[T]he only patent that is valid is one which this court has not been able to get its hands on."[4] In addition, asserting antitrust concerns, the courts had all but eliminated the patent law doctrines of contributory infringement and inducement of infringement, which had the intended effect of invalidating patent licenses to those who would have been potentially liable as a contributory or inducing infringer. In response, Congress passed the 1952 Patent Act, which codified the doctrines of contributory and induced infringement in Section 271 of the Patent Act and set forth an objective test for patentability called "nonobviousness" in Section 103 of the Patent Act.

The 1952 Patent Act marked a monumental change for the patent system. Both of its major innovations – the revival of contributory and induced infringement in Section 271 and the replacement of the subjective requirement for invention with the objective requirement of nonobviousness in Section 103 – have major implications for the interface between patents and antitrust. More specifically, when antitrust regulators consider questions like "are patents too broad?" they run the risk of ignoring the statute's objective standards of patentability. Similarly, when antitrust regulators consider questions like "are patent licenses or refusals to license permissible?" they run the risk of ignoring the statute's express safe harbors, which set forth what does not constitute misuse.

The Supreme Court itself took quite some time to recognize the importance of these innovations of the 1952 Act. Over ten years passed after implementation of the 1952 Act before the Supreme Court, in the famous *Graham* case, instructed lower courts to apply the framework of the new Section 103 requirement of nonobviousness.[5] Almost thirty years passed after implementation of the 1952 Act before the Supreme Court, in the famous *Dawson* case, instructed lower courts to apply the framework of the new Section 271 provisions about what does not constitute misuse.[6] Today's regulatory review of the patent system should not lightly set aside these hard fought innovations in the patent system, especially without offering some reason other than those already considered and rejected by Congress and the Court.

Oddly, a common "new reason" offered as a justification for reconsidering the patent system is that the existing patent system with its roots in yesterday's legislative and judicial views is necessarily ill adapted to today's new technologies. According to critics, for example, what could the Framers, or even the drafters of the 1952 Act, have envisioned about the internet? But the charge that the law must change to accommodate the new subject matters for which some patents are being sought today makes little sense. Among the many legal regimes that might possibly face a charge of not being designed to deal with new technologies, the patent system must have the best defense precisely because it is a legal system expressly designed with such unforeseen technologies in mind. Indeed, technologies that are so foreseeable as to be obvious are not patentable even under the new objective standard of patentability in Section 103, and certainly would not be patentable under the subjective standard used before the 1952 Act.[7]

Not only is the patent system well adapted for new technologies in theory, it turns out to work well with new technologies in practice. For example, the charge that today too many invalid patents have too strong of an *in terrorem* effect on industries where patents are only recently

being used, such as the business methods on the internet, is belied by the recent decision by the Federal Circuit to reverse the grant of a preliminary injunction in the *BarnesandNoble.Com* suit over the patent on one-click shopping because of potential obviousness not adequately considered by the district court.[8]

More generally, questions about patent scope in theory can be better understood when viewed in the context of the complex interactions in practice in the patent system between the rules for enforcing and obtaining patents, which operate dynamically through the crux of the patent – the claim – to ensure that patents have a scope that is "just right."[9] As Judge Giles Rich often said about patents, "the name of the game is the claim . . . [and] the function of claims is to enable everyone to know, without going through a lawsuit, what infringes the patent and what does not."[10] According to Judge Rich, claims present a fundamental dilemma for every patentee because "the stronger a patent the weaker it is and the weaker a patent the stronger it is."[11] By this dilemma, he meant that a broad patent claim is strong on offense because it covers more and therefore is more likely to be infringed, but it also is weak on defense because it may cover something in the prior art or fail to contain a sufficiently detailed disclosure, and therefore is more likely to be invalid; while a narrow claim is weak on offense, because it covers less and therefore is less likely to be infringed, but it also is strong on defense because it is less likely to cover something in the prior art or fail to contain a sufficiently detailed disclosure, and therefore also is less likely to be invalid.[12] In the least, this means that no patent is "too broad" without at the same time being invalid. What is more, this means that the patent applicant has a large incentive to make his own correct determination of validity and scope before filing, and this incentive causes patentees themselves to make decisions that tend to keep their own patent scope "just right" from a social perspective.[13]

Similarly, questions about patent licensing and misuse in theory can be better understood when viewed in the context of the patent system's actual rules for licensing that were codified in the 1952 Patent Act and recognized by *Dawson*. These rules maximize the likelihood that all those wanting use of whatever is covered by the patent will get it. Putative licensees who place a high value on such use and those who place a low value on such use are both attractive targets to a patentee as long as the patentee is allowed to set a different price for different users. This practice is called price discrimination. Patent law allows patentees to price discriminate among such licensees because this gives patentees a strong financial incentive to ensure all those desiring use get use; even a monopolist who can price discriminate will push output to the full competitive output level.[14] Such beneficial price discrimination can take place because patent law, and contract law, allow for the enforcement of the restrictive licenses needed to prevent arbitrage between low value and high value users.[15] In the presence of such a system, a patentee is rationally motivated to avoid posting an excessive price because to do so would scare away would-be paying customers and this result would be a money-losing venture.

Even where the user is not able to pay any positive price, the patentee may be rationally motivated to grant a license for free. The granting of a free license may provide the patentee with an inexpensive way to preserve the legal force of the patent property right for use in other transactions with paying customers.[16] The patentee may also be able to derive advertising benefits from such uses as long as they are successful uses and their low price does not cause customer-relations harm with the high-paying customer base.[17] Thus, even very low value users are likely to be able to obtain licenses from the patentee.

Some argue that while patentees may be rationally motivated to sell permission to each user, and while users may be rationally motivated to buy permission from patentees, such sales may not be consummated because of various market failures.[18] In response to these concerns, some commentators argue that patents should be protected by a liability rule[19] instead of a property rule. One type of liability rule often suggested is some form of compulsory license, either directly by granting to the patentee's competitors a right to use whatever is covered by the patent or indirectly by denying the patentee the ability to enforce the express statutorily granted "right to exclude others" set forth in Section 154(a)(1) of the Patent Act.

Indeed, there are already important liability rule provisions in patent law today. Otherwise infringing uses that are by or for the federal government enjoy sovereign immunity protection that essentially results in a compulsory licensing regime.[20] In addition, the high costs of litigation under the present rules of civil procedure and the ability for an infringer to be kept effectively judgment proof through corporate and bankruptcy laws may also operate as a form of liability rule gloss on the present property rule regime.[21]

Moreover, the political process provides several solutions for would-be licensees. They may prevail on the government simply to provide such use in particular cases.[22] They may alternatively prevail on the government to subsidize their ability to pay.[23]

But the basic statutorily mandated rule under Section 154(a)(1) is that patentees have full discretion to elect to exclude all others from practicing whatever is claimed in the patent.[24] The property rule nature of this provision has several beneficial effects.

First, this strong right to exclude is essential for allowing the U.S. patent system to achieve its central goal, which is to provide an economic tool for promoting public access to new technologies.[25] The patent right to exclude use of whatever is covered by the patent

claims operates to increase such use by facilitating ex ante investment in the complex, costly, and risky commercialization activities required to turn nascent inventions into new goods and services. This right to exclude competitors who have not shared in bearing the initial costs of commercialization provides incentives for the holder of the invention and the other players in this market to come together in an organized way and incur the costs necessary to facilitate commercialization of the patented invention.

Second, this strong right to exclude others from using a particular patented technology may have the beneficial effect of inducing even more new technologies. To the extent that some would-be licensees may not be able to obtain permission for use despite manifesting some willingness to pay some positive price,[26] the presence of such potential customers and the potential for an independent patent each provide incentives for others to bring to market some alternative non-infringing substitute.[27]

Third, the ability to exclude use through a patent also provides individual actors with a legal alternative to self-help approaches that may have greater pernicious impact on the ability to obtain use.[28] For example, courts wisely enforce patent licenses that restrict buyers of patented seeds to a single use in producing a commercial crop for harvest – as opposed to allowing the crop to fully mature into subsequent seed – because sellers would alternatively be motivated to employ so-called "terminator technologies" that stop germination but could unintentionally spread to plants for which germination is desired.

Ensuring some particular use determined to be in the public interest – such as ensuring access by scientists to new research tools – through a switch in the patent system towards over-all liability rule treatment should be avoided because the remedies discussed earlier are available, and because such a shift will frustrate the patent system's ability to promote the commercialization of beneficial technologies, including such research tools. The use of liability rules would lead to a net increase in social cost and frustrate the very efforts for ordering and bargaining around patents that are necessary to generate output of patented inventions in the first instance, thereby decreasing over-all social access to new technologies.[29] As recognized by Merges, it is precisely because private parties have a comparative advantage over courts in valuing patents and patented inventions that a property rule is likely to work better than a liability rule according to the established test for choosing between the two types of regimes.[30]

Indeed, patents can be quite effective in easing the breakdowns in exchanges that might take place among members of the basic science community over attempts to exchange cell lines, reagents, or protocols.[31] While a patentee might be motivated to suppress subsequent work in order to avoid criticism, discredit, or helping a competitor, a patentee alternatively might be selfishly motivated to encourage subsequent work in the hope of obtaining peer confirmation and acceptance of the patentee's work and theories, or even simply for fame. More importantly, the essential comparison to be made when evaluating the potential pernicious impact of patents is between the patent regime on one hand and on the other had the alternative regime of no patent availability. There has been a very positive correlation between increased patent activity in the basic biological research community and the enormous growth of the entire biotechnology industry since the 1980 shift in case law through the *Chakrabarty* decision, which spawned the vast use of patents in that sector.[32] The ability for patents to contribute net benefit can be understood through economic models that elucidate the differences between so-called thin markets and thick markets, and suggest that the failed exchanges elucidated by patent critics are types of market failures that are likely to have more pernicious impact in markets that are thinner. In the context of the basic biological science community, the relevant comparison is between the regime in which patents are available for basic biological research and one in which they are not. In the absence of patents, the market in this community can be viewed as a market for kudos.[33] With patents, the market includes both kudos and cash. Scientists are given unfettered access to the entire worldwide financial community through the market characterized by kudos plus patents, which brings immense amounts of, and diversity in sources of, funding and other resources to the basic biological research community. Patents on research tools thereby facilitate rather than frustrate the important exchanges that are in the public interest.

Finally, today's regulators must not disregard the remarkable success the U.S. patent system has enjoyed in achieving its central goal, which is to provide an economic tool for promoting public access to new technologies through their commercialization. The drafters of our present patent system, the 1952 Patent Act, had precisely this concern for commercialization in mind when drafting the statute and were motivated by the specific fear that, for example, the handicapped in need of a recently invented wheelchair might nevertheless not find one available for purchase if the patent system did not provide an incentive for it to be brought to market. In achieving this central goal, the system achieves a number of other important economic objectives, from encouraging investment in capital, to promoting domestic and foreign trade, and making new products and services available to the public. This increases consumer welfare, because consumers get access to more goods and services, and it increases producer welfare because producers make profits. These gains from trade are exactly the key components of total social welfare. Regulators' efforts to squeeze some extra social welfare out of the system by tinkering with the principles of patent law should be mindful of the historical context through which those principles worked their way into our present patent system via Congressional and court action so as to avoid

inadvertently returning our innovation economy to the way it was after the Great Depression of the early 20th Century.

* F. Scott Kieff is John M. Olin Senior Research Fellow in Law, Economics, and Business, Harvard Law School, and Associate Professor, Washington University School of Law. Hon. Gerald J. Mossinghoff is Senior Counsel to the intellectual property law firm of Oblon, Spivak, McClelland, Maier & Neustadt and was formerly Assistant Secretary of Commerce and Commissioner of Patents and Trademarks. Comments are welcome and may be sent to fskieff.91@alum.mit.edu (permanent address).

Footnotes

1. *See*, FTC Press Release: Muris Announces Plans for Intellectual Property Hearings, available at http://www.ftc.gov/opa/2001/11/iprelease.htm (last visited Dec. 15, 2002).

2. *See*, Competition and Intellectual Property Law and Policy in the Knowledge-Based Economy, available at http://www.ftc.gov/opp/intellect/index.htm (last visited Dec. 15, 2002) (home page for the hearings, showing specific dates, topics, and participants for each panel).

3. *See generally*, F. Scott Kieff, *Property Rights and Property Rules for Commercializing Inventions*, 85 Minn. L. Rev. 736-746 (2001) (briefly reviewing history of the patent system through the 20th century with a particular focus on the historical foundation for the present patent system codified in the 1952 Patent Act as a response to the steady erosion of the patent system).

4. *Jurgensen v. Ostby & Barton Co.,* 335 U.S. 560, 572 (1949) (Jackson, J., dissenting).

5. *Graham v. John Deere Co.,* 383 U.S. 1, 17-18 (1965):

> Under § 103 the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or nonobviousness, these inquiries may have relevancy.

The relevant inquiry for an obviousness determination is whether the prior art as a whole suggested the claimed invention, and indicated to a person having ordinary skill in the art a reasonable expectation of success in achieving the claimed invention. The obviousness requirement exists in addition to the novelty requirement – if an invention is fully disclosed in a single prior art reference it is invalid for lack of novelty under Section 102. Analysis under the Section 103 obviousness requirement operates somewhat similarly to that under the Section 102 novelty requirement; but instead of all elements of the patent claim existing in a single item of prior art (the test for a determination of novelty), a determination of obviousness will lie where the elements of the claim are spread among two or more pieces of prior art, as long as those pieces of prior art also provide a motivation or suggestion to be combined along with a reasonable expectation of success in achieving the claimed invention when combined. See *In re Dow Chem. Co.* 837 F.2d 469 (Fed. Cir. 1988). Although there is some language in the *Graham* opinion to suggest that the 1952 Act did *not change* the law, it is important to note that the opinion ties the statutory objective standard of nonobviousness to 18th century case law that employed a similar objective standard while specifically rejecting the 19th century case law that employed a subjective standard.

6. *Dawson Chem. v. Rohm and Haas,* 448 U.S. 176 (1980), (holding no misuse where the holder of a patent on method of using a chemical as a herbicide charges customers of the herbicide above market price for the chemical itself and sues competing chemical company for contributory infringement).

7. *See*, F. Scott Kieff, In response to the Notice for Public Hearings and Opportunity for Comment, Comments Regarding Competition & Intellectual Property, Summary of Proposed Testimony, *available at* http://www.ftc.gov/os/comments/intelpropertycomments/harvardlaw.pdf (last visited Dec. 10, 2002) (hereinafter Kieff Statement); *see also* Testimony of F. Scott Kieff on April 10, 2002 before joint FTC/DOJ hearings on Competition and Intellectual Property, available at http://www.ftc.gov/opp/intellect/020410trans.pdf (last visited Dec. 10, 2002).

8. *See* Statement of Hon. Gerald J. Mossinghoff Senior Counsel, Oblon, Spivak, McClelland, Maier & Neustadt Presented To The Federal Trade Commission & Department of Justice in Hearings on Competition & Intellectual Property Law and Policy in The Knowledge-Based Economy Feb. 6, 2002 (available at http://www.ftc.gov/os/comments/intelpropertycomments/mossinghoffgeraldj.pdf) (last visited Dec. 10, 2002) (citing *Amazon.com, Inc. v. Barnesandnoble.com, Inc.,* 239 F.3d 1343 (Fed.Cir., 2001)); *see also* Testimony of The Honorable Gerald J. Mossinghoff on Feb. 6, 2002 before joint FTC/DOJ hearings on Competition and Intellectual Property, available at http://www.ftc.gov/opp/intellect/020206ftc.pdf (last visited Dec. 10, 2002) (same).

9. Kieff Statement, *supra* note 7, at 9-10.

10. *See*, *e.g.*, Giles S. Rich, *The Extent of the Protection and Interpretation of Claims—American Perspectives*, 21 Int'l Rev. Indus. Prop. & Copyright L. 497, 499, 501 (1990) (quoted in *Hilton Davis Chem. Co. v. Warner-Jenkinson Co.,* 62 F.3d 1512, 1539 (Plager, J., joined by Archer, J., Rich, J., and Laurie, J., dissenting) (emphasis in original).

11. *See*, *e.g.*, Giles S. Rich, *The Proposed Patent Legislation: Some Comments*, 35 Geo. Wash. L. Rev. 641, 644 (1967) (responding to proposed legislation S. 1042 and H.R. 5924, 90th Cong. (1967) and Report of the President's Commission on the Patent System (1966)).

12. *Id*. (explaining patentee's dilemma, or in his words, "puzzle").

13. Kieff Statement, *supra* note 7, at 10. *See also* Testimony of The Honorable Pauline Newman on Feb. 6, 2002 before joint FTC/DOJ hearings on Competition and Intellectual Property, available at http://www.ftc.gov/opp/intellect/020206ftc.pdf (last visited Dec. 10, 2002) (noting how patentees rationally elect to spend money obtaining and enforcing those patents expected to yield a judgment of validity and infringement).

14. Kieff, *supra* note 3, at 727-32 (showing how the patent system's facilitation of tie-ins and other forms of price discrimination where technological and economic factors alone might prevent price discrimination together provide incentives for the patentee to elect to keep output at competitive levels).

15. *Id*. The prevention of arbitrage is essential for price discrimination to work. For example, those obtaining senior citizen discounts could sell their low price tickets to patrons who would otherwise have to pay full price if movie theatres did not require some proof of age on admission, which may be as simple as looking at the ticket holder.

16. F. Scott Kieff, *Facilitating Scientific Research: Intellectual Property Rights and the Norms of Science - A Response to Rai & Eisenberg*, 95 NW. U. L. Rev. 691, 705 (2001) (discussing a property owner's rational decision to allow free users so as to avoid the cost of monitoring low value uses while preserving the full scope of the property right for other high value uses).

17. Giving away product to the poor will force the patentee to wrestle with a delicate customer-relations balance. On the one hand, paying customers may be offended to learn of the availability of a price that is lower, or even zero. On the other hand, paying customers may be motivated to buy when they learn of both the patented technology's success and the patentee's seemingly charitable contributions. Although it may seem crass to call such a contribution "charitable," since its purpose is the facilitation of some other objective (charg-

ing a higher price to some customers), presumably every donation willingly made to a charitable cause by a rational actor is done to further some objective of that actor and not to further only someone else's objective. While the net impact of these competing forces is uncertain, the patentee's desires to preserve value while avoiding transaction costs that are discussed *infra* note 16 will likely tip the net balance of incentives to be towards the use of such free licenses in certain cases.

18. This argument and its implications are explored in depth in the important works by Eisenberg et al. *See*, *e.g.*, Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCIENCE 698 (1998) (arguing that patents can deter innovation in the field of basic biological research); Rebecca S. Eisenberg, *Property Rights and the Norms of Science in Biotechnology Research*, 97 YALE L.J. 177 (1987) (exploring potential negative impact of patent rights on scientific norms in the field of basic biological research); Rebecca S. Eisenberg, *Patents and the Progress of Science: Exclusive Rights and Experimental Use*, 56 U. CHI. L. REV. 1017 (1989) (exploring an experimental use exemption from patent infringement as a device for alleviating potential negative impact of patent rights on scientific norms in the field of basic biological research); Rebecca S. Eisenberg, *Public Research and Private Development: Patents & Technology Transfer in Government-Sponsored Research*, 82 VA. L. REV. 1663 (1996) (offering preliminary observations about the empirical record of the use of patents in the field of basic biological research and recommending a retreat from present government policies of promoting patents in that field).

19. An entitlement enjoys the protection of a property rule if the law condones its surrender only through voluntary exchange. The holder of such an entitlement is allowed to enjoin infringement. An entitlement has the lesser protection of a liability rule if it can be lost lawfully to anyone willing to pay some court-determined compensation. The holder of such an entitlement is only entitled to damages caused by infringement. *See* Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089 (1972); *see also* Jules L. Coleman & Jody Kraus, *Rethinking the Theory of Legal Rights*, 95 YALE L.J. 1335 (1986).

20. 28 U.S.C. § 1498 (1994) (providing limited waiver of sovereign immunity for acts of infringement by or for the federal government and instead allowing suits against the government in the U.S. Court of Federal Claims for a reasonable royalty).

21. As explained more fully in Kieff, *supra* note 3:

Concerning procedure, litigation costs may be high enough to prevent the patentee from seeking court intervention against an infringer. Concerning substance, the limitations on liability that are available to a would-be infringer through the use of the corporate form or bankruptcy laws, for example, may encourage acts of infringements that are essentially judgment proof.

Id. at 734 n.154.

22. *See supra* text accompanying note 20. The recent public demand for the patented drug Cipro® to treat anthrax infection provides an example from the healthcare arena of just such behavior. *See*, *e.g.*, Terence Chea, *Vaccines Are Hot Topic, But Not Hot Investment*, WASH. POST, Dec. 13, 2001, at E1. "At the height of the anthrax crisis, government officials considered overriding German drugmaker Bayer AG's Cipro patent to purchase pills at a better price. Under threat of losing its patent, Bayer agreed to sell the government the antibiotic at half price." *Id*.

23. *See* Douglas Gary Lichtman, *Pricing Prozac: Why the Government Should Subsidize the Purchase of Patented Pharmaceuticals*, 11 HARV. J.L. & TECH. 123, 124-25 (1997) (arguing that the government should offer a cash subsidy to any consumer who values a patented good above marginal cost but is unwilling or unable to pay to such a price). *Cf.* Kieff, *supra* note 3, at 716 n.91 (noting that such proposals face the distortion and implementation concerns generally raised against subsidies).

24. While patentees are free to elect to give permission for such use, which is called giving a license, at present under U.S. law, patentees are not compelled to license anyone, including members of the basic science community. Nor does present U.S. law afford any type of fair use or *pro bono publico* exception that might otherwise exempt members of that community from liability.

25. Kieff, *supra* note 3 (showing the patent right to exclude is essential for ensuring commercialization of new technologies).

26. *See id*. at 731 (discussing possibility that some licensees may not be able to obtain permission to use the patented invention).

27. *See* DONALD S. CHISUM ET AL., PRINCIPLES OF PATENT LAW 75-76 (2d ed. 2001) 75-76 (discussing incentive to design around patented inventions).

28. F. Scott Kieff, *Patents for Environmentalists*, 9 WASH. U.J.L. & POL'Y 307, 315-317 (Invited symposium piece for National Association of Environmental Law Societies annual meeting, March 15-17, 2002 at Washington University School of Law) (discussing benefits of patents over self help).

29. Kieff, *supra* note 3, at 732-36 (showing how the potential infringements induced by a liability rule will discourage investment in the commercialization process *ex ante* and may even result in a net destruction of social wealth if the collective costs of entry and exit across infringers exceed the social surplus otherwise created by the invention).

30. *Id*. at 734 n.152. (citing Robert P. Merges, *Of Property Rules, Coase, and Intellectual Property*, 94 COLUM. L. REV. 2655, 2664 (1994)).

31. *See*, F. Scott Kieff, *Facilitating Scientific Research: Intellectual Property Rights and the Norms of Science - A Response to Rai & Eisenberg*, 95 NW. U. L. REV. 691 (2001).

32. *See Diamond v. Chakrabarty,* 447 U.S. 303 (1980) (holding living organisms not per se unpatentable).

33. It is well recognized that scientists generally have treated reports of a scientist's work as a form of intellectual property, serving as one type of currency in the market for scientific kudos. *See*, *e.g.*, Jerome R. Ravetz, SCIENTIFIC KNOWLEDGE AND ITS SOCIAL PROBLEMS 245 (1996). Kudos can take many forms, including publication in prestigious journals, citation by peers, general prestige, the award of research grants, academic appointments and tenure, and salary. *Id*. at 245-72. And scientists have demonstrated countless ingenious methods for staking out, defending, and even pirating this form of intellectual property. Market failures would be expected to be worse in the market for only scientific kudos for at least three reasons: kudos are much less fungible; there are fewer potential valuators; and there is less total fungible wealth.