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## Creation of Life: A New Frontier for Liability?

*"at times, human ingenuity seems unable to control fully the forces it creates—that, with Hamlet, it is sometimes better, 'to bear those ills we have than fly to others that we know not of.'"*<sup>1</sup>

Within the last ten years, scientists have begun to "create" life in a process known as recombinant deoxyribose nucleic acid molecule research.<sup>2</sup> The research, more popularly known as DNA research or genetic engineering, involves cutting strands of DNA molecules and recombining the cut portions into one new DNA structure.<sup>3</sup> The new DNA structure is then inserted into a cell or microorganism in an attempt to have that cell or organism do something it previously was not capable of doing or to perform its usual activities more efficiently.<sup>4</sup> DNA research has been expanding at a rapid pace. Scientists are forecasting important breakthroughs in a number of fields as a result of this research.<sup>5</sup> Along with this increased activity has come an increasing amount of public attention.<sup>6</sup>

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1. *Diamond v. Chakrabarty*, 447 U.S. 303, 316 (1980).

2. The National Institutes of Health define recombinant DNA molecules as either (i) molecules which are constructed outside living cells by joining natural or synthetic DNA segments to DNA molecules that can replicate in a living cell, or (ii) DNA molecules that result from the replication of those described in (i) above.

45 Fed. Reg. 6724 (1980). See generally Anderson & Fletcher, *Gene Therapy in Human Beings: When is it Ethical to Begin?*, 303 NEW ENG. J. OF MEDICINE 1293, 1294 (1980) [hereinafter cited as Anderson & Fletcher]; Baker & Clough, *The Technological Uses and Methodology of Recombinant DNA*, 51 S. CAL. L. REV. 1009 (1978); Cline & Mercola, *The Potentials of Inserting New Genetic Information*, 303 NEW ENG. J. OF MEDICINE 1297 (1980) [hereinafter cited as Cline & Mercola]; Comment, *Genetic Manipulation: Research Regulation and Legal Liability Under International Law*, 7 CAL. W. INT'L L.J. 203 (1977) [hereinafter cited as *Genetic Manipulation*]; Note, *Recombinant DNA and Technological Assessment*, 11 GA. L. REV. 785 (1977) [hereinafter cited as *Recombinant DNA*].

3. See 45 Fed. Reg. 6724 (1980); *Genetic Manipulation*, *supra* note 2, at 206-07 & n.18; *Recombinant DNA*, *supra* note 2, at 791-93.

4. See *Genetic Manipulation*, *supra* note 2, at 206-07; *Recombinant DNA*, *supra* note 2, at 791-93.

5. San Francisco Chronicle, Oct. 31, 1980, at 4, col. 1; Wall St. J., Dec. 23, 1980, at 48, col. 1; see, e.g., *Genetic Manipulation*, *supra* note 2, at 206-07 n.16; Fletcher, *Ethics and Recombinant DNA Research*, 51 S. CAL. L. REV. 1131, 1137 (1977) [hereinafter cited as Fletcher].

6. See, e.g., San Francisco Chronicle, May 31, 1981, §D, at 1, col. 2; May 29, 1981, at 1, col.

The attention generated regarding genetic engineering has been focused on the potential benefits that have been predicted for DNA research. Scientists have been forecasting breakthroughs in the fields of medicine, food production and environmental cleanup that will result from their research.<sup>7</sup> The optimism shown by the scientific community has attracted a great deal of interest in the financial community as the financiers see the potential for large profits resulting from these developments.<sup>8</sup> While only a few of the potential breakthroughs have materialized as of the writing of this comment, the scientific and financial communities remain optimistic about the future of DNA research.

There is, however, opposition to genetic engineering which, in general, advances two arguments. One position is that it is neither morally nor ethically proper for man to attempt to modify life or to alter God's plan.<sup>9</sup> The other argument against genetic engineering is that the activity is not safe and presents a significant threat of injury both to the present population and to mankind in the future.<sup>10</sup> The United States Supreme Court in the landmark patent case of *Diamond v. Chakrabarty*,<sup>11</sup> though implored to do so,<sup>12</sup> refused to address the possible risks stating that "[t]he grant or denial of patents on microorganisms is not likely to put an end to genetic research or its attendant risks. . . [nor] will [it] deter the scientific mind from probing into the unknown any more than Canute could command the tides."<sup>13</sup>

Thus, it seems as if recombinant DNA research will continue and will increase in both scope and size.<sup>14</sup> With an increasing amount of

5; April 26, 1981, §A, at 6, col. 1; April 25, 1981, at 30, col. 1; April 6, 1981, at 54, col. 1; April 5, 1981, §D, at 2, col. 2; Jan. 15, 1981, at 18, col. 3; Jan. 14, 1981, at 16, col. 2; Jan. 13, 1981, at 48, col. 1; Dec. 31, 1980, at 1, col. 6; Dec. 23, 1980, at 6, col. 3; Dec. 23, 1980, at 19, col. 3; Dec. 18, 1980, at 27, col. 4; Dec. 4, 1980, at 12, col. 3; Dec. 4, 1980, at 1, col. 6; Oct. 31, 1980, at 4, col. 1; Wall St. J., May 5, 1981, at 25, col. 4; Jan. 14, 1981, at 16, col. 2; Dec. 31, 1980, at 1, col. 6; Dec. 23, 1980, at 19, col. 3; Dec. 18, 1980, at 27, col. 4; Dec. 4, 1980, at 12, col. 3.

7. See *Diamond v. Chakrabarty*, 447 U.S. 303, 305 (1980); Fletcher, *supra* note 5, at 1137; *Genetic Manipulation*, *supra* note 2, at 208-09; *Recombinant DNA*, *supra* note 2, at 792-93.

8. See, e.g., San Francisco Chronicle, May 31, 1981, §D, at 1, col. 2; April 26, 1981, §A, at 6, col. 1; April 6, 1981, at 54, col. 1; Dec. 4, 1980, at 37, col. 5; Oct. 31, 1980, at 4, col. 1; Wall St. J., May 5, 1981, at 25, col. 4; Jan. 14, 1981, at 16, col. 2; Dec. 23, 1980, at 19, col. 3; Dec. 18, 1980, at 27, col. 4; Dec. 4, 1980, at 12, col. 3.

9. This argument ultimately requires a personal decision and is, therefore, beyond the scope of this comment. See Fletcher, *supra* note 5, at 1133-34; *Recombinant DNA*, *supra* note 2, at 793 n.33. See also Anderson & Fletcher, *supra* note 2, at 1293-94 where the authors discuss ethical practices in general among the scientific community.

10. See generally Fletcher, *supra* note 5, at 1135; Friedman, *Health Hazards Associated with Recombinant DNA Technology: Should Congress Impose Liability Without Fault?*, 51 S. CAL. L. REV. 1355 (1978); *Recombinant DNA*, *supra* note 2, at 793.

11. 447 U.S. 303 (1980).

12. *Id.* at 316-17.

13. *Id.* at 317.

14. See *id.*; Fletcher, *supra* note 5, at 1133; Grobstein, *Regulation and Basic Research: Implications of Recombinant DNA*, 51 S. CAL. L. REV. 1181, 1196 (1978) [hereinafter cited as Grobstein]. See generally 45 Fed. Reg. 28909 (1980) (approvals for large scale experiments to be conducted by Eli Lilly Co. and Genentech, Inc.).

activity the danger of an accident will also escalate.<sup>15</sup> As a result, a need exists for a framework of liability in the event of personal injury or property damage.

This comment will address the applicability of California strict liability principles to genetic engineering "accidents." Two theories of strict liability will be advanced to apply to a hypothetical genetic engineering accident. The first is based on the premise that genetically created microorganisms can be deemed animals with known vicious or dangerous propensities.<sup>16</sup> The second theory will propose that DNA research is an abnormally dangerous activity according to the Restatement of Torts as applied in California.<sup>17</sup> In addition, the comment will show that the obstacle of proving causation may be overcome by a careful application of evidentiary principles established by the California courts. Finally, the suggestion will be made that DNA research carried on by state sponsored laboratories should not be protected by sovereign immunity and should, therefore, be subject to the same liability as the private laboratories engaged in this type of research.

Before launching into an analysis of the applicability of strict liability, a hypothetical accident scenario will be proposed. Because genetic research involves a wide spectrum of different host cells and microorganisms and includes work with bacteria, animal and plant cells,<sup>18</sup> "[i]t is not difficult to construct scenarios in which injury could result."<sup>19</sup> However, this discussion will be limited to a small range of accident situations in which a genetically engineered microorganism, capable of replication and produced in a laboratory by a scientist, escapes either through the air or water, in an experimental carrier, such as a mouse,

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15. The Guidelines of the National Institutes of Health, in fact, differentiate between large scale and small scale experiments because "the probability of escape from containment barriers normally increases with increasing scale." 45 Fed. Reg. 6724 (1980).

16. See, e.g., *Clowdis v. Fresno Flume & Irrigation Co.*, 118 Cal. 315, 320, 50 P. 373, 374 (1897); *Williams v. River Lakes Ranch Dev. Corp.*, 41 Cal. App. 3d 496, 501-02, 116 Cal. Rptr. 200, 204-05 (1974); *Talizin v. Oak Creek Riding Club*, 176 Cal. App. 2d 429, 437, 1 Cal. Rptr. 514, 518 (1959); *Heath v. Fruzia*, 50 Cal. App. 2d 598, 600, 123 P.2d 560, 562 (1942). See generally 4 B. WITKIN, SUMMARY OF CALIFORNIA LAW, *Torts*, §794 (8th ed. 1974 & Supp. 1980) [hereinafter cited as WITKIN]; CAL. JUR., *Animals*, §§71-76 (3d ed. 1973).

17. See, e.g., *Luthringer v. Moore*, 31 Cal. 2d 489, 499, 190 P.2d 1, 7 (1948); *Green v. General Petroleum Corp.*, 205 Cal. 328, 333-34, 270 P. 952, 954-55 (1928); *Smith v. Lockheed Propulsion Co.*, 247 Cal. App. 2d 774, 785, 56 Cal. Rptr. 128, 137 (1967); *Gallin v. Poulou*, 140 Cal. App. 2d 638, 645, 295 P.2d 958, 961 (1956); *Beck v. Bel Air Properties, Inc.*, 134 Cal. App. 2d 834, 841, 286 P.2d 503, 508-09 (1955). See also RESTATEMENT OF TORTS §§519, 520 (1938).

18. See, e.g., 46 Fed. Reg. 16452, 17994 (1981); 45 Fed. Reg. 3552, 6718, 7182, 24968, 25366, 28904, 50524, 55924, 61874 (1980). These pages contain applications for permission to carry out various experiments. The genetically engineered creations have been placed in different insects, mice, and, in at least two situations, human beings, *Anderson & Fletcher, supra* note 2, at 1294-95; *Cline & Mercola, supra* note 2, at 1298-99.

19. 41 Fed. Reg. 38427 (1976) cited in *Recombinant DNA, supra* note 1, at 856.

an insect, or a laboratory worker.<sup>20</sup> It will be hypothesized that once outside the laboratory, the microorganism will infect a person or group of people or cause damage to crops or livestock. The injured party will then institute legal proceedings against the individual researcher, and the laboratory, private or public, that employs that scientist, seeking damages for the injury suffered. This comment, however, will not address any situation involving negligent, wilful, or improper disposal of modified organisms; any situations involving commercial production and distribution of genetically engineered microorganisms;<sup>21</sup> or any experimental or medical applications of genetic research in human beings.<sup>22</sup> Instead, this comment will focus on the availability of the principles of strict liability to an injured party.

### THE APPLICATION OF STRICT LIABILITY PRINCIPLES

The doctrine of strict liability originated in the English case of *Rylands v. Fletcher*.<sup>23</sup> That case held a landowner liable without regard to fault for damage caused by the escape of a non-natural accumulation of water from his land onto his neighbor's property.<sup>24</sup> Modernly, the principles of strict liability are applied in situations when an owner possesses an animal with known vicious or dangerous propensities;<sup>25</sup> in situations involving activities when there is a risk of harm that cannot be removed by the exercise of reasonable care;<sup>26</sup> and, most recently, in cases involving defectively manufactured products.<sup>27</sup> Strict liability is used most often when the risk of harm is great and the proof of causa-

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20. See *Genetic Manipulation*, *supra* note 2, at 204-05 where the following hypothetical is set up for an international situation:

Suppose that a scientist in a technologically advanced nation was to isolate what he believed to be the genetic information that causes normal cells to reproduce at an accelerated rate, resulting in malignant tumor growth. If this scientist should become careless, the isolated germ might escape the confines of the laboratory. A common abuse of laboratory procedure would permit the minute particule to be flushed down a laboratory sink before its reproductive process was disarmed. Since the sewer system very probably would harbor close relatives of the escaped germ, the propagation of deadly organisms would be expedited, resulting in instant contamination of the waterways. . . . Once unleashed into the waterways or atmosphere, the irrevocable path of a self-procreating germ would be devastating and unlimited.

21. At the present time there is no commercial production of genetically modified, useful micro-organisms. There are, however, indications that commercial production will become feasible in the near future. See Wall St. J., Mar. 16, 1981, at 10, col. 3.

22. While this comment does not address this situation, clinical research on humans, using insulin interferon, and synthetic growth hormones produced by genetically engineered micro-organisms, has begun. See San Francisco Chronicle, Mar. 4, 1981, at 4, col. 4; Wall St. J., Mar. 16, 1981, at 10, col. 3; Jan. 15, 1981, at 18, col. 4.

23. 3 H.L. 330 (1868). See generally W. PROSSER, HANDBOOK OF THE LAW OF TORTS 505 (4th ed. 1971) [hereinafter cited as PROSSER]; WITKIN, *supra* note 16, at §798.

24. 3 H.L. at 338. See generally PROSSER, *supra* note 23, at 496; WITKIN, *supra* note 16, at §798.

25. See generally PROSSER, *supra* note 23, at 496; WITKIN, *supra* note 16, at §794.

26. See generally PROSSER, *supra* note 23, at 505-16; WITKIN, *supra* note 16, at §799.

27. See generally PROSSER, *supra* note 23, at 656-57; WITKIN, *supra* note 16, at §809. This

tion is difficult.<sup>28</sup> Arguably, genetic engineering is such an activity. The nature of the risks involved in genetic engineering, however, is very much in dispute.<sup>29</sup> This section will apply the principles of strict liability to the genetic engineering accident scenario by characterizing the engineered organisms as animals with known, dangerous propensities.<sup>30</sup> Additionally, strict liability will be applied by characterizing DNA research as an abnormally dangerous activity.<sup>31</sup>

#### *A. DNA-modified Organisms as Animals with Dangerous Propensities*

California law provides that the owner of a wild animal is liable for injuries caused by that animal regardless of the amount of care exercised by the owner.<sup>32</sup> An owner is also liable for injuries caused by an animal, in his control, with known dangerous or vicious propensities<sup>33</sup> and for damage resulting from the trespass of livestock.<sup>34</sup> While at first

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comment does not address products liability as a theory for recovery since no genetically engineered product has reached the market. See note 21 *supra*.

28. See generally Prosser, *supra* note 23, at 494.

29. See 45 Fed. Reg. 61874 (1980). There appear to be two widely divergent viewpoints regarding the risks involved in recombinant DNA research. One viewpoint, the so-called "worse case" theory, maintains that genetic research poses a serious threat of a catastrophic epidemic. Basically, this argument derives from the fact that the basic carrier, the bacteria *Escherichia coli*, is a common inhabitant of the human intestinal tract which can be easily absorbed into the human system. Once in the body, *E. coli* has the ability to easily exchange genetic material with other cells causing any variety of reactions. See generally *Genetic Manipulation*, *supra* note 2, at 207 n.19, 208; *Recombinant DNA*, *supra* note 2, at 793 n.33.

In addition, science has established that bacteria pose the greatest risk of infection in humans. This tends to lend support to the above position. See generally Grobstein, *supra* note 14, at 1183-84; McGarity, *Contending Approaches to Regulating Laboratory Safety*, 28 U. KAN. L. REV. 183, 190-93 (1980) [hereinafter cited as McGarity].

On the other hand, most of the researchers involved in this DNA research judge the risk as minimal or nonexistent—at a level roughly equal to that of infectious disease research that has been carried out for a number of years. This must be tempered by the realization that infectious disease and virus research has resulted in a number of accidents and subsequent illnesses even though the researchers involved had exercised due care. See generally Fletcher, *supra* note 5, at 1135-36; McGarity, *supra*, at 190-93; *Genetic Manipulation*, *supra* note 2, at 205.

Finally, it should be noted that scientists themselves have pointed out that their knowledge of cells and how they work is exceedingly elementary and there is a possibility that the introduction of new cells will interfere with the normal functions of the host cell. They have also acknowledged that the introduction of some beneficial cells may also bring undesired and possibly lethal cells into the host organism. See generally Anderson & Fletcher, *supra* note 2, at 1296; San Francisco Chronicle, Dec. 3, 1980, at 6, col. 2.

30. See note 16 *supra*.

31. See note 17 *supra*.

32. See, e.g., *Gooding v. Chutes Co.*, 155 Cal. 620, 624-25, 102 P. 819, 821 (1909); *Opelt v. Al G. Barnes Co.*, 41 Cal. App. 776, 779, 183 P. 241, 242 (1919). See generally WITKIN, *supra* note 16, at §794; CAL. JUR., *Animals*, §§71-76 (3d ed. 1973).

33. See, e.g., *Clowdis v. Fresno Flume & Irrigation Co.*, 118 Cal. 315, 320, 50 P. 373, 374 (1897); *Talizin v. Oak Creek Riding Club*, 176 Cal. App. 2d 429, 437, 1 Cal. Rptr. 514, 518 (1959); *Heath v. Fruzia*, 50 Cal. App. 2d 598, 600, 123 P.2d 560, 562 (1942).

34. See *Williams v. River Lakes Ranch Dev. Corp.*, 41 Cal. App. 3d 496, 501-02, 116 Cal. Rptr. 200, 204 (1974). See generally WITKIN, *supra* note 16, at §794A. This comment does not specifically address trespassing livestock although a unique argument could be made based on the definition of livestock in the *Williams* opinion. In that case the court defined livestock to include: "[all animals] normally susceptible of confinement within boundaries without seriously impairing their utility and the intrusion of which upon the land of others normally causes harm to the land

glance these theories appear to have no applicability to a discussion of genetic engineering, a closer examination will reveal that they are indeed appropriate frameworks for a cause of action brought because of a genetic engineering accident.

The term "animal" in California law refers to all animal life other than man and, in general, signifies an inferior or irrational sentient being capable of voluntary or self-motion.<sup>35</sup> Much genetic research is conducted on mice and other small animals and insects,<sup>36</sup> all of which clearly fit within this definition. The bulk of the research, however, is conducted using bacteria.<sup>37</sup> The commonly accepted definition of "bacteria" classifies bacteria as a plant species.<sup>38</sup> There are, however, certain characteristics of bacteria, primarily mobility, that are consistent with the California definition of an animal. Since bacterium is non-human, animate and capable of independent motion, it would qualify as an "animal" under California law. Once this is established, the theories of strict liability governing animals become available to a plaintiff injured by a genetic engineering accident.

### 1. *Wild Animals*

The first of these theories provides that an owner of a wild animal will be held strictly liable for injuries caused by that animal while in the owner's possession.<sup>39</sup> The courts *presume* that wild animals are dangerous.<sup>40</sup> Whether microorganisms converted by genetic engineering can be considered wild animals depends on whether courts will broadly or narrowly define "wild animal."

By one definition, a wild animal is an animal which is not by custom devoted to the service of mankind at the time and in the place in which it is kept.<sup>41</sup> On the other hand, Webster's dictionary defines "wild" as

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or to crops thereon." 41 Cal. App. 3d at 502 n.3, 116 Cal. Rptr. at 204 n.3. These genetically engineered micro-organisms are normally confined within containment barriers, either naturally or artificially created, *see* 45 Fed. Reg. 6724 (1980) (prescribing containment levels), and carry out their functions therein. If they were to escape from those barriers and intrude upon someone's land it appears that this would normally cause harm to that land, the crops thereon, or any person thereon. *See* note 29 *supra*.

35. *See* CAL. JUR., *Animals*, §1 (3d ed. 1973). *See also* BLACK'S LAW DICTIONARY 80 (5th ed. 1979) which defines animal as "[n]on-human, animate being which is endowed with the power of voluntary motion. Animal life other than man."

36. *See, e.g.*, 45 Fed. Reg. 3552, 6718, 7182, 24968, 25366, 28904, 50524, 55924, 61874 (1980); Anderson & Fletcher, *supra* note 2, at 1294-95; Cline & Mercola, *supra* note 2, at 1298.

37. *See* Grobstein, *supra* note 14, at 1183; *Genetic Manipulation*, *supra* note 2, at 207.

38. WEBSTERS NEW COLLEGIATE DICTIONARY 82 (8th ed. 1979).

39. 41 Cal. App. 3d at 501-02, 116 Cal. Rptr. at 204-05; *Baugh v. Beatty*, 91 Cal. App. 2d 786, 791, 205 P.2d 671, 674 (1949); *Opelt v. Al G. Barnes Co.*, 41 Cal. App. 776, 779, 183 P. 241, 242 (1919). *See generally* RESTATEMENT OF TORTS §507 (1938).

40. *See Gooding v. Chutes Co.*, 155 Cal. 620, 623, 102 P. 819, 821 (1909); 91 Cal. App. 2d at 791, 205 P.2d at 674; 41 Cal. App. at 779, 183 P. at 242. *See generally* WITKIN, *supra* note 16, at §794.

41. RESTATEMENT OF TORTS §506(1) (1938). Although California has not explicitly adopted

“growing or produced without the aid and care of man.”<sup>42</sup> Under the Webster’s definition, the microorganisms converted by genetic engineering are not *wild* animals since they are produced *with* the aid of man.<sup>43</sup> The Restatement of Torts definition, which is much broader than the Webster’s definition, could include microorganisms since they are “not by custom devoted to the service of mankind.”<sup>44</sup> While this would result in a finding that the microorganisms themselves are “wild,” this would not provide an answer regarding the nature of the *manmade* microorganism. The question has not been addressed by any court but it seems that the imposition of man’s control would remove these genetically-altered microorganisms from the definition of a wild animal. Therefore, this theory of liability apparently provides no assistance.

## 2. *Animals with Dangerous Propensities*

The second theory of strict liability for animals holds an owner liable for the injuries caused by a domestic animal in his control with *known* vicious or dangerous propensities.<sup>45</sup> The California courts require a finding that the “person in control knew or *should have known* that the animal had such a propensity” before strict liability will be imposed.<sup>46</sup> The courts do not necessarily allow an animal the proverbial “one bite” before its owner is said to have knowledge of the animal’s dangerous propensity. Instead, the courts require the owner to be aware of the dangerous tendencies of the animal.<sup>47</sup> Thus, if the owner knows or should know through the exercise of reasonable care that the animal has dangerous propensities, strict liability may be applicable.<sup>48</sup> Moreover, it is the knowledge of the dangerous propensity, not the manner in which the animal is kept, that gives rise to the liability.<sup>49</sup>

When applying this theory to DNA research, the dangerous propensities of genetically engineered microorganisms must be ascertained.

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this provision, it has held the following to be “wild animals”: *Ex parte* Bailey, 155 Cal. 472, 101 P. 441 (1909) (fish); *Ex parte* Kenneke, 136 Cal. 527, 69 P. 261 (1902) (quail); *Garcia v. Gunn*, 119 Cal. 315, 51 P. 684 (1897) (wild goats); *People v. Truckee Lumber Co.*, 116 Cal. 397, 48 P. 374 (1897) (fish); *Kellog v. King*, 114 Cal. 378, 46 P. 166 (1896) (game birds); 91 Cal. App. 2d 786, 205 P.2d 671 (chimpanzees); 41 Cal. App. 776, 183 P. 241 (leopards).

42. WEBSTER’S NEW COLLEGIATE DICTIONARY 1330 (8th ed. 1979).

43. See text accompanying notes 2-4 *supra*.

44. See RESTATEMENT OF TORTS §506, Comment a (1938). Compare RESTATEMENT OF TORTS §506(1) (1938) with WEBSTER’S NEW COLLEGIATE DICTIONARY 1330 (8th ed. 1979).

45. See, e.g., *Williams v. River Lakes Ranch Dev. Corp.*, 41 Cal. App. 3d 496, 501-02, 116 Cal. Rptr. 200, 204 (1974); *Talizin v. Oak Creek Riding Club*, 176 Cal. App. 2d 429, 437, 1 Cal. Rptr. 514, 518 (1959).

46. 176 Cal. App. 2d at 437, 1 Cal. Rptr. at 518 (emphasis added).

47. *Id.* at 437, 1 Cal. Rptr. at 517-18.

48. *Id.*

49. *Opelt v. Al G. Barnes Co.*, 41 Cal. App. 776, 779, 183 P. 241, 242 (1919).



The dangerous attributes inherent in DNA modified organisms derive from the nature of the basic host cell used, the bacteria *Escherichia coli* (commonly known as *E. coli*), and the ability of bacteria to infect easily the human system.<sup>50</sup> The introduction of genetically altered microorganisms into the human body is likely to cause a variety of reactions within the body, some of which may prove to be lethal.<sup>51</sup> In addition, evidence from virus and infectious disease research has established that there is a risk of escape and subsequent infection despite the best efforts of the scientists involved.<sup>52</sup> Thus, genetically created microorganisms do pose a risk to human health;<sup>53</sup> scientists, even though they minimize the risk<sup>54</sup> should be charged with knowledge of the dangerous propensities of genetic research.<sup>55</sup> As a result, even though scientists are careful about containing these organisms, if an organism escapes, liability should attach for any injuries caused thereby under principles of strict liability.

Before an owner may be held strictly liable for damage caused by an animal, however, California law requires that the injury be within the type of harm that normally occurs when a dangerous animal is involved.<sup>56</sup> This does not require that one type, or a limited number, of injuries be assigned to each animal, but that the harm be within the scope of the risk created.<sup>57</sup> Since these principles of causation are equally applicable to all theories of strict liability, they will be discussed in a separate section below.<sup>58</sup> First, an alternative framework for strict liability, one based on abnormally dangerous activities will be considered.

### *B. The Applicability of the Doctrine of Abnormally Dangerous Activity*

California courts adopted the principles of strict liability for injuries caused by an abnormally dangerous activity in 1928:

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50. See note 29 *supra*.

51. Anderson & Fletcher, *supra* note 2, at 1296; San Francisco Chronicle, Dec. 3, 1980, at 6, col. 2.

52. See McGarity, *supra* note 29, at 190-93. See also *Genetic Manipulation*, *supra* note 2, at 205 where it is pointed out: "The incidence of laboratory produced-infections, 5000 in the past thirty years, suggests that the eventual escape of such an organism can be expected." *But see* Fletcher, *supra* note 5, at 1136.

53. See note 29 *supra*.

54. Grobstein, *supra* note 14, at 1184.

55. See, e.g., Palmquist v. Mercer, 43 Cal. 2d 92, 99, 272 P.2d 26, 30 (1954); Kersten v. Young, 52 Cal. App. 2d 1, 6, 125 P.2d 501, 504 (1942) (imposing a *duty* on livery stablekeepers to inform themselves of the habits and disposition of horses kept for use).

56. Williams v. River Lakes Ranch Dev. Corp., 41 Cal. App. 3d 496, 499, 507, 116 Cal. Rptr. 200, 202, 208 (1974). See PROSSER, *supra* note 23, at 498.

57. See 41 Cal. App. 3d at 506-07, 116 Cal. Rptr. at 208.

58. See text accompanying notes 117-163 *infra*.

Where one, in the conduct and maintenance of an enterprise lawful and proper in itself, deliberately does an act under known conditions, and, with knowledge that injury may result as to another, proceeds, and injury is done to the other as a direct and proximate consequence of the act, however carefully done, the one who does the act and caused the injury should, in all fairness, be required to compensate the other for damage done.<sup>59</sup>

This principle is now embodied in the Restatement of Torts Section 519.<sup>60</sup> The Restatement provides that a person carrying on an ultrahazardous activity is liable for injury to other persons, land, or chattels resulting from that activity regardless of the degree of care exercised by the person.<sup>61</sup> While retaining the substance of the First Restatement, the Restatement Second changed from an ultrahazardous standard to a standard based on an abnormally dangerous activity.<sup>62</sup> Whether an activity is abnormally dangerous is a question of law.<sup>63</sup> The Restatement Second lists the following six factors to aid the court in this determination:

- (1) existence of a high degree of risk of some harm to the person, land or chattels of others;
- (2) likelihood that the harm that results from it will be great;
- (3) inability to eliminate the risk by the exercise of reasonable care;
- (4) extent to which the activity is not a matter of common usage;
- (5) inappropriateness of the activity to the place where it is carried on; and
- (6) extent to which its value to the community is outweighed by its dangerous attributes.<sup>64</sup>

The greater number of these factors the court finds the more likely the activity will be treated as abnormally dangerous.<sup>65</sup> A court, however, may choose not to explicitly mention each of these factors preferring instead to find the activity “obviously and plainly ultrahazardous,”

59. *Green v. General Petroleum Corp.*, 205 Cal. 328, 333-34, 270 P. 952, 955 (1928).

60. *See, e.g.*, *Luthringer v. Moore*, 31 Cal. 2d 489, 499, 190 P.2d 1, 7 (1948); *Smith v. Lockheed Propulsion Co.*, 247 Cal. App. 2d 774, 785, 56 Cal. Rptr. 128, 137 (1967); *Gallin v. Poulou*, 140 Cal. App. 2d 638, 645, 295 P.2d 958, 962 (1956); *Beck v. Bel Air Properties, Inc.*, 134 Cal. App. 2d 834, 841, 286 P.2d 503, 508-09 (1955). *See generally* RESTATEMENT OF TORTS §§519, 520 (1938).

61. RESTATEMENT OF TORTS §519 (1938). The text of Section 519, in pertinent part, reads: [O]ne who carries on an ultrahazardous activity is liable to another whose person, land or chattels the actor should recognize is likely to be harmed by the unpreventable mis-carriage of the activity for harm resulting thereto from that which makes the activity ultrahazardous, although the utmost care is exercised to prevent the harm.

62. *See Recombinant DNA*, *supra* note 2, at 817; *compare* RESTATEMENT (SECOND) OF TORTS §519 (1977) with RESTATEMENT OF TORTS §519 (1938).

63. 31 Cal. 2d at 496, 190 P.2d at 5; 247 Cal. App. 2d at 785, 56 Cal. Rptr. at 137. *See also* RESTATEMENT (SECOND) OF TORTS §519, Comment a (1977).

64. RESTATEMENT (SECOND) OF TORTS §520 (1977).

65. *See id.* § 520, Comment f.

without indicating the path taken to that conclusion.<sup>66</sup> The criteria is useful, however, as a framework to establish genetic engineering as an abnormally dangerous activity.

1. *The Applicability of the Restatement (Second) Factors to Genetic Engineering*

The first factor of the Restatement Second criteria requires a finding of a high degree of risk of *some* harm to a person, land or chattels.<sup>67</sup> The risks of genetic engineering are presently a matter of dispute as scientists engage in a trial and error process of measuring the risks.<sup>68</sup> There are, however, some facts known that establish a high degree of risk in genetic engineering. First, the basic carrier, the bacteria *E. coli*, is a normal inhabitant of the human intestinal system and is easily assimilated into the body.<sup>69</sup> Second, bacteria presents the *greatest* risk of infection in humans.<sup>70</sup> Finally, evidence from virus and infectious disease research has established that there is a risk of escape and subsequent infection *inherent* in laboratory research.<sup>71</sup> These three factors taken together, seem to indicate that there is indeed a high risk of some harm to people as a result of the nature of the modified DNA microorganisms. Thus, the first factor of the Restatement Second criteria seems to support a finding that genetic engineering is an abnormally dangerous activity.

The second factor in the Restatement analysis requires a finding that there is a likelihood of great harm.<sup>72</sup> This does not require that the resulting harm be catastrophic or in fact cause death; rather, it only speaks of a *likelihood* of great harm. The California courts have found a variety of activities abnormally dangerous because of the injuries or property damage caused.<sup>73</sup> In most cases, the courts have reached their decision through the use of hindsight.<sup>74</sup> This decision making process creates difficulties in ascertaining what injury or property damage is sufficiently great within the meaning of the Restatement. Past decisions

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66. See *Boyd v. White*, 128 Cal. App. 2d 641, 654, 276 P.2d 92, 100 (1954).

67. RESTATEMENT (SECOND) OF TORTS §520(a) (1977).

68. See note 29 *supra*.

69. See note 29 *supra*.

70. See note 52 *supra*.

71. See note 52 *supra*.

72. RESTATEMENT (SECOND) OF TORTS §520(b) (1977).

73. See, e.g., *Luthringer v. Moore*, 31 Cal. 2d 489, 190 P.2d 1 (1948) (fumigation with hydrocyanic acid gas); *Green v. General Petroleum Corp.*, 205 Cal. 328, 270 P. 952 (1928) (oil well blowout); *Smith v. Lockheed Propulsion Co.*, 247 Cal. App. 2d 774, 56 Cal. Rptr. 128 (1967) (rocket engine testing); *McKenna v. Pacific Elec. Ry. Co.*, 104 Cal. App. 538, 286 P. 445 (1930) (blasting).

74. See note 73 *supra*. This same approach has been applied in strict products liability cases, see *Barker v. Lull Eng'r Co.*, 20 Cal. 3d 413, 429, 573 P.2d 443, 454, 143 Cal. Rptr. 225, 236 (1978).

in California have found damage to a water well,<sup>75</sup> illness due to a fumigation gas,<sup>76</sup> and damage to property due to the use of explosives to be sufficiently great harm.<sup>77</sup> The decisions of the courts, however, seem to be based on the knowledge of the actor that an injury may result regardless of the care exercised<sup>78</sup> and on the unusual nature of the activity involved.<sup>79</sup> Genetic engineering would probably be considered more unusual than either the use of explosives or the application of a fumigation gas. As noted previously, the researchers do have, or should be held to have, knowledge that an injury may result regardless of the care exercised.<sup>80</sup> Thus, this second factor in the Restatement criteria seems to support a finding that genetic engineering is an abnormally dangerous activity.

The next step in the analysis requires a finding that the risk of injury cannot be eliminated by the exercise of reasonable care.<sup>81</sup> The standard of reasonable care at the present time appears to be the Guidelines of the National Institutes of Health<sup>82</sup> (hereinafter referred to as NIH Guidelines), first promulgated in 1976.<sup>83</sup> When a dangerous activity is involved the standard of care should be relatively high;<sup>84</sup> whether the NIH Guidelines constitute a sufficient standard is difficult to ascertain considering their short duration and the brief period of time science has been involved in genetic research of this type.<sup>85</sup> Since their adoption, however, the NIH Guidelines have been relaxed three times<sup>86</sup> and are constantly being modified to exclude certain experi-

75. See 205 Cal. at 333-34, 270 P. at 955.

76. See 31 Cal. 2d at 498, 190 P.2d at 6-7.

77. See 104 Cal. App. 538, 286 P. 445. But see *Houghton v. Loma Prieta Lumber Co.*, 152 Cal. 500, 93 P. 82 (1907). See generally WITKIN, *supra* note 16, at §§803, 804, 805.

78. See 205 Cal. at 333-34, 270 P. at 955. See also RESTATEMENT (SECOND) OF TORTS §520 (1977).

79. See 31 Cal. 2d at 500, 190 P.2d at 8; 247 Cal. App. 2d at 785, 56 Cal. Rptr. at 137. See also RESTATEMENT (SECOND) OF TORTS §520 (1977).

80. See text accompanying notes 50-55 *supra*.

81. RESTATEMENT (SECOND) OF TORTS §520(c) (1977).

82. See 45 Fed. Reg. 6724 (1980).

83. 41 Fed. Reg. 27911 (1976). See *Recombinant DNA*, *supra* note 2, at 794-98. The Guidelines prescribe levels of containment for different classifications of experimental host cells. 45 Fed. Reg. 6725-6732 (1980). This two-tiered system is designed to provide two different safety systems. *Id.* at 6730. See *Recombinant DNA*, *supra* note 2, at 795-96. The Guidelines, however, only apply to those researchers receiving NIH funds and those who voluntarily choose to comply. 45 Fed. Reg. 6746 (1980).

In two recent cases, scientists who were receiving NIH funds lost their funding for violating the Guidelines. The scientists soon found other sources of funding with one of the many private companies involved in DNA research. See *San Francisco Chronicle*, May 29, 1981, at 1, col. 5; Mar. 23, 1981, at 7, col. 5.

It is also interesting to note that NIH is considering ending the Guidelines altogether. See *San Francisco Chronicle*, Apr. 25, 1981, at 30, col. 1.

84. See *Ambriz v. Petrolane Ltd.*, 49 Cal. 2d 470, 477, 319 P.2d 1, 5 (1957).

85. See generally *Recombinant DNA*, *supra* note 2, at 797.

86. Compare 45 Fed. Reg. 6724 (1980) with 43 Fed. Reg. 60107 (1978); compare 43 Fed. Reg. 60107 (1978) with 41 Fed. Reg. 27911 (1970).

ments or to waive various requirements for specified experiments.<sup>87</sup> Some scientists argue that since no accidents have occurred under the NIH Guidelines reasonable care has eliminated the risk.<sup>88</sup> This conclusion appears inaccurate for a number of reasons. First, these guidelines are drawn up by the very scientists performing the research,<sup>89</sup> apparently, the regulations have been relaxed because the scientists are seeking to expand their research with minimal interference.<sup>90</sup> In addition, compliance with these guidelines is *voluntary* and any enforcement is carried out by committees composed of the researcher's peers.<sup>91</sup> The NIH Guidelines are, therefore, of dubious quality as a standard against which to measure reasonable care. Assuming, however, that the scientist complies with all the NIH Guidelines and has exercised reasonable care in all other respects, this may not eliminate the risk. Bacteria are capable of independent motion, as are other organisms and animals used in the experiments, and even the most careful scientist may not be able adequately to contain the movements of these organisms. There is also evidence from research with viruses and chemicals that escape is possible regardless of the efforts of the scientist.<sup>92</sup> The presence of an unavoidable risk of this sort in genetic engineering is precisely the risk the Restatement Second addresses.<sup>93</sup> Thus, the third factor of the Restatement also supports the conclusion that DNA research is an abnormally dangerous activity.

The fourth factor in the Restatement Second criteria looks to whether an activity is a matter of common usage.<sup>94</sup> An activity is a matter of common usage if the activity is customarily carried on by many people in the community.<sup>95</sup> Genetic engineering, however, is

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87. See note 18 *supra*.

88. Grobstein, *supra* note 14, at 1184.

89. See generally Swazey, Sorenson, and Wong, *Risks and Benefits, Rights and Responsibilities: A History of the Recombinant DNA Research Controversy*, 51 S. CAL. L. REV. 1019, 1036-53 (1978).

90. *Cf.* 46 Fed. Reg. 16452, 17994 (1981) (actions taken by NIH to allow experiments at a lower containment level than was originally established).

91. 45 Fed. Reg. 6746 (1980). There are at least two states, however, which have made compliance mandatory. See MD. PUB. HEALTH CODE ANN. §§898-910 (1980); N.Y. PUB. HEALTH LAW §§3220-3223 (1980).

92. See McGarity, *supra* note 29, at 190-93; *Genetic Manipulation, supra* note 2, at 205. *But see* Fletcher, *supra* note 5, at 1135-36.

93. RESTATEMENT (SECOND) OF TORTS §520, Comment h (1977).

94. *Id.* §520(d). See *Luthringer v. Moore*, 31 Cal. 2d 489, 498, 190 P.2d 1, 7 (1948).

95. The California courts have held the following not to be matters of common usage: *Luthringer v. Moore*, 31 Cal. 2d 489, 190 P.2d 1 (1948) (fumigation with hydrocyanic gas); *Green v. General Petroleum Corp.*, 205 Cal. 328, 270 P. 952 (1928) (oil well blowouts); *Smith v. Lockheed Propulsion Co.*, 247 Cal. App. 2d 774, 56 Cal. Rptr. 128 (1967) (testing of a rocket engine); *McKenna v. Pacific Elec. Ry. Co.*, 104 Cal. App. 538, 286 P. 445 (1930) (blasting in a residential area). Contrast the above with the following activities found to be matters of common usage: *Ramsey v. Marutamaya Ogatsu Fireworks Co. Ltd.*, 72 Cal. App. 3d 516, 140 Cal. Rptr. 247 (1977) (fireworks); *Clark v. DiPrima*, 241 Cal. App. 2d 823, 51 Cal. Rptr. 49 (1966) (irrigation water); *Gallin v. Poulou*, 140 Cal. App. 2d 638, 295 P.2d 958 (1956) (garage construction); *Beck v.*

carried on by a relatively small number of highly trained scientists;<sup>96</sup> although there is some suggestion that high school students will soon be able to splice together DNA molecules in their high school laboratories,<sup>97</sup> the infrequency with which DNA research presently occurs supports the proposition that genetic engineering is not a matter of common usage.

The fifth criterion in the Restatement looks to the appropriateness of the place where the activity is being conducted.<sup>98</sup> From a narrow perspective, a laboratory seems to be an appropriate place to carry out genetic research.<sup>99</sup> The courts, however, do not take such a narrow view when looking at the location of the activity.<sup>100</sup> Instead, a court will examine the *area* in which the activity occurs.<sup>101</sup> Thus, the use of explosives in a residential community is considered abnormally dangerous while blasting in an isolated area would probably not be.<sup>102</sup> In addition, some courts have, in unusual circumstances, found an activity abnormally dangerous even though the activity appeared to have been carried on in the *most* appropriate place.<sup>103</sup> Genetic engineering is carried on in the laboratories of large universities and private businesses. Almost all of these laboratories are located in or near population centers where there is a higher probability of someone coming in contact with an escaped microorganism.<sup>104</sup> Therefore, genetic engineering appears to be analogous to the use of explosives in a residential area because the genetic laboratories are in a *location* likely to cause harm. As a result, the location of genetic engineering laboratories near population centers should be held to be an inappropriate place under the criteria established by the Restatement Second.

The sixth and final factor of the Restatement test requires a court to weigh the value of the activity to the community against the risks presented to that community.<sup>105</sup> As discussed earlier, the potential benefits of DNA research are staggering.<sup>106</sup> There are, however, only a

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Bel Air Properties, Inc., 134 Cal. App. 2d 834, 286 P.2d 503 (1955) (earth moving); Boyd v. White, 128 Cal. App. 2d 641, 276 P.2d 92 (1954) (aviation).

96. *Accord*, 31 Cal. 2d at 498, 190 P.2d at 7.

97. *See generally* Fletcher, *supra*, at 1133.

98. RESTATEMENT (SECOND) OF TORTS §520(e) (1977).

99. *See* Friedman, *supra* note 10, at 1362.

100. *See* note 79 *supra*.

101. *See* note 73 *supra*.

102. *See* 247 Cal. App. 2d at 786-87, 56 Cal. Rptr. at 138. *Compare* McKenna v. Pacific Elec. Ry. Co., 104 Cal. App. 538, 543, 246 P. 445, 446 (1930) *with* Houghton v. Loma Prieta Lumber Co., 152 Cal. 500, 504, 93 P. 82, 84 (1907).

103. *See* 247 Cal. App. 2d at 786-87, 56 Cal. Rptr. at 138.

104. *See* note 8 *supra*.

105. RESTATEMENT (SECOND) OF TORTS § 520(6) (1977).

106. *See* note 7 *supra*.

few cases where these potentials have been realized.<sup>107</sup> In weighing the value of the current risks, however, the court should take into consideration the future of DNA research. Since there is a possibility that genetic research may save many lives and alleviate much suffering, this should weigh heavily in favor of continued research.<sup>108</sup> In this way, DNA research is similar to the research that eventually led to the elimination of small pox and, on that basis, probably should continue.

The position of genetic engineering today can be analogized to the situation of the airplane in the first half of the twentieth century.<sup>109</sup> The courts, because of the uncertainty over the risks involved in air travel, treated the airplane as an abnormally dangerous activity.<sup>110</sup> As the safety record of air travel lengthened, the courts slowly shifted away from this position and today the airplane is not considered ultrahazardous.<sup>111</sup> A similar approach should apply to genetic research in light of the uncertain nature of the risk involved; a court should weigh these risks heavily until a safety record is established. By doing this, the court has flexibility to modify later the application of strict liability. At the same time, however, the courts will be able to protect the public from the risks currently ascertainable. Thus, presently, the final factor in the Restatement Second criteria supports a finding that genetic engineering is an abnormally dangerous activity.

## 2. *Balancing the Restatement (Second) Factors*

Neither the Restatement view nor the California courts require all these factors be present to find an activity abnormally dangerous as a matter of law.<sup>112</sup> The California Supreme Court, in *Luthringer v. Moore*,<sup>113</sup> held that an activity may be ultrahazardous for any one of three reasons: the instrumentality used to carry on the activity; the na-

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107. See note 7 *supra*. Even some of the potentials that have been realized are of dubious quality. Recent evidence has indicated, for example, that genetically engineered and produced interferon produces a positive response in only 25-40 percent of the patients treated with it. In addition, the substance has a variety of side-effects not unlike the side-effects in traditional chemotherapy treatments. The results, in fact, appear to be no more effective or painless than the traditional treatments. The problem is further complicated by new information that the human body produces 8 to 10 different types of interferon and science does not know yet which of these is or will be the most effective against cancer. See Wall St. J., Mar. 24, 1981, at 6, col. 1. *But see* Wall St. J., June 19, 1981, at 35, col. 5 in which the Department of Agriculture announced that a genetically engineered and produced vaccine has been successfully developed that will fight hoof and mouth disease in livestock.

108. To date, however, genetic engineering has not resulted in any life saving discoveries. See notes 7 and 107 *supra*.

109. See generally WITKIN, *supra* note 16, at §807(1).

110. See *id.*

111. In California, this change was announced in *Boyd v. White*, 128 Cal. App. 2d 641, 655, 276 P.2d 92, 100 (1954). See generally WITKIN, *supra* note 16, at §807(2).

112. See *Luthringer v. Moore*, 31 Cal. 2d 489, 498-99, 190 P.2d 1, 7 (1948); RESTATEMENT (SECOND) OF TORTS §520, Comment f (1977).

113. 31 Cal. 2d 489, 190 P.2d 1 (1948).

ture of the subject matter; or the condition which the activity creates.<sup>114</sup> Similarly, the Restatement asks if the risk created is so unusual, due to its magnitude or the circumstances surrounding it, to justify the imposition of strict liability.<sup>115</sup> An “important factor is that certain activities under certain conditions may be so hazardous to the public generally, and of such relative frequent occurrence, that it may well call for strict liability as the best public policy.”<sup>116</sup> In light of this statement, the unusual nature of genetic engineering, and the analysis under the Restatement Second criteria, genetic engineering appears to qualify as an abnormally dangerous activity for which strict liability should apply. The inquiry, however, does not end here because, as mentioned before, the injured party is required to show that the injury was *caused* by the abnormally dangerous activity or by the dangerous animal.

#### THE EVIDENTIARY PROBLEMS OF CAUSATION

An injured party faces two major evidentiary problems in a genetic engineering accident situation. First, the plaintiff must establish that the injury claimed was caused by a genetically engineered microorganism. Thereafter, the plaintiff must prove a reasonable causal connection between the injury suffered and the acts of the defendants.<sup>117</sup> The inability of the plaintiff to bring forth sufficient evidence establishing these two factors would prove fatal to the plaintiff's lawsuit because the courts have stated that the imposition of strict liability does not make the defendant an insurer against all the ills of society.<sup>118</sup> Therefore, to prevent the researcher from becoming an insurer against any illness suffered by a neighbor of the laboratory, the plaintiff must establish these two causal factors.

In a genetic engineering accident case, these two evidentiary obstacles may be very difficult to overcome because real, concrete evidence

114. *Id.* at 500, 190 P.2d at 8.

115. See RESTATEMENT (SECOND) OF TORTS §520, Comment f (1977).

116. *Smith v. Lockheed Propulsion Co.*, 247 Cal. App. 2d 774, 785, 56 Cal. Rptr. 128, 137 (1967).

117. There is one further causal question, albeit beyond the scope of this comment, present in a genetic engineering accident case. Imagine a situation when four laboratory workers are exposed to a DNA modified microorganism while at work in the laboratory on a Friday afternoon. Each worker goes off to a weekend away from home; the first going to New York, the second two to a conference in San Francisco, and the fourth to a professional sporting event. As a result, each of the four comes in contact with hundreds of people, spreading the mutant strain to thousands, possibly millions. If the laboratory were required to shoulder the responsibility for all of the injured people, it is quite likely that it would be put out of business and no one would receive a meaningful recovery.

In order to insure that such a drastic result does not occur, it might be appropriate to provide a statutory limitation on the total amount that can be recovered. This comment, however, takes no position on the need for such a statute, leaving the discussion to another author.

118. See *Cronin v. J.B.E. Olson Corp.*, 8 Cal. 3d 121, 133-34, 501 P.2d 1153, 1162, 104 Cal. Rptr. 433, 442 (1972).



may be impossible to find.<sup>119</sup> This section will analyze these two evidentiary problems and the applicability of judicially created doctrines designed to ease, but not to eliminate, the plaintiff's evidentiary burden in related situations.<sup>120</sup>

### A. *The Burden of Proof*

The judicial doctrines regarding the burden of proof are well developed in the areas of products liability, in negligence through the doctrine of *res ipsa loquitur*, and, to a lesser extent, in the area of abnormally dangerous activities. An analogy may be drawn from the development of proof in these areas that may be helpful to an understanding of the evidentiary problems facing an injured plaintiff in a genetic engineering accident case. Additionally, reliance by the party on circumstantial evidence and the policy justifications advanced for aiding the plaintiff's burden of proof will be examined as a method of overcoming these evidentiary problems.

#### I. *Analogy to Strict Products Liability*

The doctrine of strict liability for defects in products was born in the now famous concurring opinion of Justice Traynor in *Escola v. Coca-Cola Bottling Co.*<sup>121</sup> in 1944. Justice Traynor stated that public policy demands that responsibility for injuries due to defective products, even in the absence of negligence, be fixed wherever it will most effectively reduce the hazards to life and health.<sup>122</sup> From this the courts have developed doctrines regarding the burden of proof required to satisfy this public policy.<sup>123</sup> Thus, in a leading products liability case, the California Supreme Court stressed the importance of the development of the allocation of the burden of proof in products liability since "one of the principal purposes behind the strict products liability doctrine is to relieve an injured plaintiff of many of the onerous evidentiary burdens inherent in a negligence cause of action."<sup>124</sup> The principal method em-

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119. Since, for the most part, the organisms are very small, it is unlikely that an inexperienced party could distinguish these altered organisms from normal organisms. In addition, unless the illness suffered is severe, a party may not realize that a genetically altered microorganism could be responsible.

120. *E.g.*, *Barker v. Lull Eng'r Co., Inc.*, 20 Cal. 3d 413, 431, 573 P.2d 443, 455, 143 Cal. Rptr. 225, 237 (1978); *Cronin v. J.B.E. Olson Corp.*, 8 Cal. 3d 121, 134-35, 501 P.2d 1153, 1163, 104 Cal. Rptr. 433, 443 (1972) (shifting the burden of proof to the defendant upon the raising of a reasonable inference of causation); *Dimond v. Caterpillar Tractor Co.*, 65 Cal. App. 3d 173, 182, 134 Cal. Rptr. 895, 901 (1976); *Smith v. Lockheed Propulsion Co.*, 247 Cal. App. 2d 774, 780, 56 Cal. Rptr. 128, 134 (1967) (allowing proof of causation circumstantially).

121. 24 Cal. 2d 453, 150 P.2d 436 (1944).

122. *Id.* at 462, 150 P.2d at 440.

123. See note 120 *supra*.

124. 20 Cal. 3d at 431, 573 P.2d at 455, 143 Cal. Rptr. at 237. See *Greenman v. Yuba Power Products, Inc.*, 59 Cal. 2d 57, 63-64, 377 P.2d 897, 901, 27 Cal. Rptr. 697, 701 (1963).

ployed to relieve the injured party of this onerous burden allows the plaintiff to use circumstantial evidence to establish a reasonable inference that the injury was the result of the activity or product in question.<sup>125</sup> The courts look to the facts established by the plaintiff and ask if a reasonable inference can be drawn from those facts that the injury was due to the defendant's activity.<sup>126</sup> If reasonable minds may differ as to whether the evidence establishes causation, the question must be answered by the trier of fact.<sup>127</sup> On the other hand, if the inference is based on mere speculation or conjecture, the court may find a want of causation as a matter of law.<sup>128</sup>

In a genetic engineering case, the injured party should be required to bring forward sufficient circumstantial evidence to raise a reasonable inference that the injury was caused by the defendant's research. As illustrated below, this evidence may take many forms.

Probably the most persuasive evidence that could be introduced would be the remains of a genetically altered microorganism. This may be difficult because of the size of these organisms and the unlikelihood that the injured party could distinguish an altered organism from a normal one.<sup>129</sup> The presence of the carrier of the altered DNA organism, such as a mouse, would serve the same purpose without these problems. In the absence of this type of evidence, however, an injured party must turn to less direct forms of evidence.

The introduction of expert testimony regarding the nature of the injury and the likelihood that the injury was caused by a genetically altered organism would be a good example of an indirect form of proof. Expert testimony could possibly establish that there is no other conceivable source of plaintiff's injury and, therefore, that there is a strong probability that modified DNA organisms are responsible for the injury. This type of evidence is not unlike the circumstantial evidence introduced in products liability cases when the actual defective item was destroyed.<sup>130</sup> The injured party in the defective product case only needs to foreclose the probability, to a reasonable degree of certainty,

125. See, e.g., 65 Cal. App. 3d at 177, 134 Cal. Rptr. at 901; 247 Cal. App. 2d at 780, 56 Cal. Rptr. at 134.

126. See 65 Cal. App. 3d at 182, 134 Cal. Rptr. at 901; 247 Cal. App. 2d at 780, 56 Cal. Rptr. at 134.

127. See note 124 *supra*.

128. See 247 Cal. App. 2d at 780, 56 Cal. Rptr. at 134.

129. See note 119 *supra*.

130. In a products liability case the plaintiff establishes: (1) how the item was acquired; (2) that the product was used in the manner in which it was intended to be used; and (3) that the plaintiff suffered an injury that resulted from the use of the product. From these three factors a reasonable inference is created that the product was defective before the plaintiff purchased the product. See *Luque v. McLean*, 8 Cal. 3d 136, 141, 501 P.2d 1163, 1166-67, 104 Cal. Rptr. 443, 446-47 (1972); *Pike v. Frank G. Hough Co.*, 2 Cal. 13d 465, 475, 467 P.2d 229, 236, 85 Cal. Rptr. 629, 636 (1970); *Greenman v. Yuba Power Products, Inc.*, 59 Cal. 2d 57, 64, 377 P.2d 897, 901, 27

that any party other than the defendant was responsible.<sup>131</sup> Similarly, the plaintiff in a genetic engineering situation ought to be required to foreclose, through the use of circumstantial evidence, the probability that the injury was due to anything other than a DNA modified microorganism.

## 2. *Analogy to res ipsa loquitur*

The doctrine of *res ipsa loquitur* provides another useful analogy when developing a case based on a genetic engineering mishap. Traditionally, the doctrine of *res ipsa loquitur* gives rise to a presumption of negligence upon a showing of the following three elements:

- (1) the accident must be caused by an agency or instrumentality under the exclusive control of the defendant;
- (2) the accident must be of the type which ordinarily does not happen in the absence of negligence; and
- (3) [the act] must not have been due to any voluntary act of the plaintiff.<sup>132</sup>

While this comment does not address negligence as a cause of action, the notion of creating a presumption regarding causation upon a showing of certain facts may be very useful. Similar to *res ipsa* when the plaintiff raises a rebuttable presumption of negligence, a plaintiff in a genetic engineering situation, by showing that the injury is not likely to have been caused by anything other than the defendant's research, should gain the benefit of a rebuttable presumption that the injury suffered is due to a genetically altered microorganism. This does not suggest, however, that the plaintiff will be raising a presumption of negligence; rather, the plaintiff is seeking to establish, with reasonable certainty, that it is *more likely than not* that a genetically engineered microorganism is responsible for the illness. In addition, a plaintiff may be able to introduce evidence that raises a reasonable inference that the microorganisms could have escaped only from a nearby genetic engineering laboratory. This should give rise to a rebuttable presumption that a microorganism did indeed escape from a genetic laboratory. Upon establishing these two presumptions, one of causation and one of the escape, the court should shift the burden of proof to

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Cal. Rptr. 697, 701 (1963); *Culpepper v. Volkswagen of America, Inc.*, 33 Cal. App. 3d 510, 519, 109 Cal. Rptr. 110, 116 (1973).

131. See generally *Barker v. Lull Eng'r Co., Inc.*, 20 Cal. 3d 413, 431, 573 P.2d 443, 455, 143 Cal. Rptr. 225, 237 (1978).

132. B. WITKIN, CALIFORNIA EVIDENCE §260 (2d ed. 1966). See *Jiminez v. Sears, Roebuck & Co.*, 4 Cal. 3d 379, 385, 482 P.2d 681, 683, 93 Cal. Rptr. 769, 773 (1971) (discussing how *res ipsa loquitur* can be used in a products liability case).

The doctrine of *res ipsa loquitur* in a genetic engineering accident situation was discussed and dismissed in *Recombinant DNA*, *supra* note 2, at 814.

the defendant, allowing the defendant to introduce evidence to rebut these presumptions. As in products liability actions, this does not require that the defendant prove non-causation, but only that the defendant introduce sufficient evidence to put the plaintiff's evidence in doubt.<sup>133</sup> The causation question is then decided by the trier of fact.

### 3. Policy Justifications for Shifting the Burden of Proof to the Defendant

The courts have advanced a number of reasons for shifting the burden of proof to the defendant. In *Cronin v. J.B.E. Olson Corp.*,<sup>134</sup> a leading products liability case, the court stated that the

very purpose of our pioneering efforts in this field was to relieve the plaintiff from problems of proof inherent in pursuing negligence . . . remedies, and thereby 'to insure that the costs of injuries resulting from defective products are borne by the manufacturers.'<sup>135</sup>

In the more recent decision of *Barker v. Lull Engineering Co.*,<sup>136</sup> the California Supreme Court pointed out that the party seeking to escape liability for an injury proximately caused by the product design, using a cost-benefit analysis, should bear the burden of persuading the trier of fact that the product should not be judged defective.<sup>137</sup> And in *Cho v. Kempler*,<sup>138</sup> the court stated, "the requirement for explanation is not too great a burden to impose upon those who wield the instruments of injury and whose due care is vital to life itself."<sup>139</sup> These opinions establish that the California courts do not believe that shifting the burden of proof to the defendant is too heavy a burden to place on the defendant in appropriate circumstances.<sup>140</sup>

In addition, some courts justify shifting the burden of proof to the defendant on the notion that the defendant may have superior knowledge that would enable him to establish a lack of causation.<sup>141</sup> Similarly, the defendant may have access to information to which plaintiff does not.<sup>142</sup> For instance, the court may shift the burden of proof regarding causation in situations when the defendant may be able to prove that he did not or could not have manufactured the injury caus-

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133. See generally B. WITKIN, CALIFORNIA EVIDENCE §260A (2d ed. 1966 & Supp. 1977).

134. 8 Cal. 3d 121, 501 P.2d 1153, 104 Cal. Rptr. 433 (1972).

135. *Id.* at 133, 501 P.2d at 1162, 104 Cal. Rptr. at 442.

136. 20 Cal. 3d 413, 573 P.2d 443, 143 Cal. Rptr. 225 (1978).

137. *Id.* at 431-32, 573 P.2d at 455, 143 Cal. Rptr. at 237.

138. 177 Cal. App. 2d 342, 2 Cal. Rptr. 167 (1960).

139. *Id.* at 348, 2 Cal. Rptr. at 171.

140. See notes 134, 136, 138 *supra*.

141. See *Sindell v. Abbott Laboratories*, 26 Cal. 3d 588, 598, 607 P.2d 924, 928, 163 Cal. Rptr. 132, 136 (1980); 20 Cal. 3d at 431, 573 P.2d at 455, 143 Cal. Rptr. at 237. See generally B. WITKIN, CALIFORNIA EVIDENCE §262 (2d ed. 1966).

142. See note 141 *supra*.

ing substance.<sup>143</sup>

The rationale behind the shifting of the burden to the best risk taker was explained in *Smith v. Lockheed Propulsion Co.*<sup>144</sup> where the court pointed out that since the defendant was engaged in an enterprise for profit, the defendant was in the best position to spread the loss among the members of the public.<sup>145</sup> The court believed that there was no basis in reason or in justice requiring an innocent party to bear the loss when that loss should be more properly charged against our complex and dangerous society.<sup>146</sup> Similarly, in the area of products liability, the courts have emphasized that the cost of injury to the innocent party may be overwhelming and needless since the risk of loss can be insured against by the manufacturer as a cost of doing business.<sup>147</sup> The paramount policy these decisions seek to promote is to protect otherwise defenseless victims and to spread throughout society the cost of compensating them for their injuries.<sup>148</sup> This same essential rationale has been expressed in cases involving animals with dangerous propensities<sup>149</sup> and is summed up by the Restatement of Torts as follows: "The defendant's enterprise, in other words, is required to pay its way by compensating for the harm it causes, because of its special, abnormal and dangerous character."<sup>150</sup>

The purpose of strict liability, to allocate the burden of harm in circumstances when damage of some sort is virtually inevitable, would be served by finding genetic engineering accidents subject to strict liability.<sup>151</sup> The unusual and dangerous nature of the activity makes DNA research much like the escape of poisonous gas which was held to be the subject of strict liability in *Luthringer v. Moore.*<sup>152</sup> Indeed, the potential for profits from genetic engineering places DNA research within the reasoning of *Smith v. Lockheed Propulsion Co.*<sup>153</sup> and the products liability cases.<sup>154</sup> Similarly, the defendant scientist, intimately involved with DNA research, will have superior knowledge as against an unso-

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143. See 26 Cal. 3d at 598, 607 P.2d at 928, 163 Cal. Rptr. at 136 (1980). See generally *Ybarra v. Spangard*, 25 Cal. 2d 486, 154 P.2d 687 (1944).

144. 247 Cal. App. 2d 774, 56 Cal. Rptr. 128 (1967).

145. *Id.* at 785, 56 Cal. Rptr. at 137.

146. *Id.*

147. *Price v. Shell Oil Co.*, 2 Cal. 3d 245, 251 n.5, 466 P.2d 722, 725 n.5, 85 Cal. Rptr. 178, 181 n.5 (1970).

148. *Id.* at 251, 466 P.2d at 726, 85 Cal. Rptr. at 182.

149. *Williams v. River Lakes Ranch Dev. Co.*, 41 Cal. App. 3d 496, 507, 116 Cal. Rptr. 200, 207 (1974).

150. RESTATEMENT (SECOND) OF TORTS §519, Comment d (1977).

151. See *id.* See generally PROSSER, *supra* note 23, at 494; WITKIN, *supra* note 16, at §799.

152. 31 Cal. 2d 489, 500, 190 P.2d 1, 8 (1948).

153. 247 Cal. App. 2d 774, 785, 56 Cal. Rptr. 128, 137 (1967).

154. See, e.g., *Barker v. Lull Eng'r Co., Inc.*, 20 Cal. 3d 413, 573 P.2d 443, 143 Cal. Rptr. 225 (1978); *Dimond v. Caterpillar Tractor Co.*, 65 Cal. App. 3d 173, 134 Cal. Rptr. 895 (1976).

phisticated plaintiff,<sup>155</sup> and is, therefore, in a better position to deal with the burden of proof on the causation issue. Therefore, the courts should not hesitate to apply the evidentiary doctrines that allow the shifting of the burden of proof to the defendant.

### B. The Proper Defendant

Once the plaintiff is able to determine that his injury is the result of DNA research, the plaintiff must establish that the defendants chosen are the parties responsible for that injury. Additionally, if the party is injured by an act of a governmental entity he must overcome the governmental defense of sovereign immunity, a significant obstacle to compensation.

Under California law, the injured party is required to establish a reasonable causal connection between the activity of the defendant and the harm suffered.<sup>156</sup> The California Supreme Court, in *Sindell v. Abbott Laboratories*,<sup>157</sup> has apparently established an outer limit as to what constitutes this reasonable causal connection. In that case, a woman whose mother had taken the drug diethylstilbestrol (commonly known as DES) was allowed to pursue a cause of action against five drug manufacturers. The court reasoned that if the five manufacturers had supplied the majority of the DES at the time the mother had taken the drug, this fact would establish a sufficient connection between the injuries sustained and the acts of the defendants.<sup>158</sup> In an area with more than one source of genetic engineering activity, when the plaintiff can establish a connection in time and distance to these multiple sources of DNA research, the *Sindell* reasoning may be successfully applied to shift the burden of proof to the defendant manufacturers since they are in a better position to deal with the elements of proof of a causal connection. The primary reason for applying the *Sindell* reasonable connection reasoning is based on the likelihood that the injury-causing microorganisms escaped from one of the laboratories. This provides some protection to the defendants since the individual defendants may be dropped from the lawsuit when they introduce evidence indicating that they could not be responsible for the plaintiff's injury.<sup>159</sup> For example, the particular defendant could show that he was not do-

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155. See text accompanying notes 141-143 *supra*.

156. See *Sindell v. Abbott Laboratories*, 26 Cal. 3d 588, 600, 607 P.2d 924, 930, 163 Cal. Rptr. 132, 138 (1980); *McCreery v. Eli Lilly & Co.*, 87 Cal. App. 3d 77, 82, 150 Cal. Rptr. 730, 733 (1978).

157. 26 Cal. 3d 588, 607 P.2d 924, 163 Cal. Rptr. 132 (1980).

158. *Id.* at 597, 607 P.2d at 928, 163 Cal. Rptr. at 145.

159. *Id.*

ing DNA research at the time in question or that the research that was occurring could not possibly result in the injury claimed.

When there is only one laboratory in the area, the *Sindell* rationale is inapplicable and the injured party must establish a reasonable connection between the injuries sustained and the activities of that laboratory. The court, however, should allow the use of the evidentiary presumptions discussed above for this purpose as well.<sup>160</sup>

In general, a plaintiff is entitled to control his case by "proceeding against the party or parties whom he feels to be most clearly liable."<sup>161</sup> In a genetic engineering "accident" the parties most clearly liable seem to be the scientist and his employer. An employer is liable for the torts of his employees committed in the scope of their employment under the doctrine of *respondeat superior*.<sup>162</sup> An employee is always liable for his own torts regardless of whether the employer is liable as well.<sup>163</sup> These principles are equally applicable to strict liability situations, both ultrahazardous activities and dangerous animals and thus, recovery may be sought from both the individual researcher and his employer.

### 1. *The Defense of Governmental Immunity*

Much presently ongoing genetic research is being carried out in state-sponsored and state-owned facilities. For instance, both the Universities of California at Davis<sup>164</sup> and at Los Angeles<sup>165</sup> are currently engaged in genetic research. The University of California is also part owner of one of the first patents issued for a DNA research discovery.<sup>166</sup> This state involvement makes it necessary for an injured party to overcome the defense of sovereign immunity if a cause of action against a government sponsored laboratory is to be successful.

In California all government tort liability is governed by statute<sup>167</sup> contained in the California Tort Claims Act.<sup>168</sup> The California

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160. See text accompanying notes 121-133 *supra*.

161. *Balding v. D.B. Stutsman, Inc.*, 246 Cal. App. 2d 559, 562, 54 Cal. Rptr. 717, 719 (1966) (citing *Thornton v. Luce*, 209 Cal. App. 2d 542, 551-52, 26 Cal. Rptr. 393, 399 (1962)). See also *General Electric Co. v. State of Cal. ex rel Dep't. Pub. Works*, 32 Cal. App. 3d 918, 926, 108 Cal. Rptr. 543, 548 (1973).

162. See generally 1 B. WITKIN, SUMMARY OF CALIFORNIA LAW, *Agency and Employment* §155 (8th ed. 1974 & Supp. 1980).

163. CAL. CIV. CODE §2343(3). See generally WITKIN, *supra* note 16, at §24.

164. See Wall St. J., Jan. 13, 1981, at 48, col. 1.

165. See San Francisco Chronicle, May 29, 1981, at 1, col. 5. See also San Francisco Chronicle, Mar. 23, 1981, at 7, col. 5 (University of California, San Diego); Wall St. J., Dec. 31, 1980, at 1, col. 6 (University of California, San Francisco).

166. See San Francisco Chronicle, Dec. 4, 1980, at 1, col. 1; Wall St. J., Dec. 31, 1980, at 1, col. 6; Dec. 4, 1980, at 12, col. 3. The other party to the patent is Stanford University.

167. *Susman v. City of Los Angeles*, 269 Cal. App. 2d 803, 808, 75 Cal. Rptr. 240, 243 (1969).

168. See CAL. GOV'T CODE §§810-996.6. For a general presentation of the California Torts

Supreme Court severely limited the defense of sovereign immunity in *Muskopf v. Corning Hospital District*<sup>169</sup> and *Lipman v. Brisbane Elementary School District*<sup>170</sup> deciding that “[t]he rule of governmental immunity for tort is an anachronism, without rational basis, and has existed only by the force of inertia.”<sup>171</sup> Since these two cases, California courts have agreed that “in governmental tort cases, ‘the rule is liability, immunity is the exception’.”<sup>172</sup> The enactment of the Tort Claims Act in 1963 did not reinstate tort immunity.<sup>173</sup> Rather, the Tort Claims Act was intended to accomplish the following:

- (a) to make public entities liable when their employees were liable;
- (b) to continue the immunity granted to public employees for discretionary acts within the scope of their employment; and (c) to create liability when injury was caused by failure to perform a mandatory duty.<sup>174</sup>

From this, one may infer that if the employee would be liable for his act, the government institution employing him will also be liable.<sup>175</sup> This liability only arises, however, if the action of the employee would have created a cause of action against the employee notwithstanding the Tort Claims Act.<sup>176</sup> The statute also provides that when a public employee is granted immunity by statute, the public entity will also be immune.<sup>177</sup>

Under the California statutes, an employee is not liable for any injury resulting from the exercise of discretion vested in that employee, regardless of whether that discretion was abused.<sup>178</sup> California courts have interpreted “discretionary act” narrowly since nearly all acts by a

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Claims Act, *see generally* CONTINUING EDUCATION OF THE BAR, GOVERNMENT TORT LIABILITY (1980).

169. 55 Cal. 2d 211, 359 P.2d 457, 11 Cal. Rptr. 89 (1961).

170. 55 Cal. 2d 224, 359 P.2d 465, 11 Cal. Rptr. 97 (1961).

171. 55 Cal. 2d at 216, 359 P.2d at 460, 11 Cal. Rptr. at 92.

172. *Ramos v. County of Madera*, 4 Cal. 3d 685, 692, 484 P.2d 93, 98, 94 Cal. Rptr. 421, 426 (1971); *Johnson v. State*, 69 Cal. 2d 782, 798, 447 P.2d 352, 363, 73 Cal. Rptr. 240, 251 (1968); *Muskopf v. Corning Hosp. Dist.*, 55 Cal. 2d 211, 219, 359 P.2d 457, 462, 11 Cal. Rptr. 59, 64 (1961); *Sava v. Fuller*, 249 Cal. App. 2d 281, 284, 57 Cal. Rptr. 312, 313 (1967).

173. *Elson v. Public Util. Comm’n*, 51 Cal. App. 3d 577, 587, 124 Cal. Rptr. 305, 311 (1975).

174. *Id.*

175. The statute provides:

(a) A public entity is liable for injury proximately caused by an act or omission of an employee of the public entity within the scope of his employment if the act or omission would, apart from this section, have given rise to a cause of action against that employee or his personal representative.

(b) Except as otherwise provided by statute, a public entity is not liable for an injury resulting from an act or omission of an employee of the public entity where the employee is immune from liability.

CAL. GOV’T CODE §815.2.

176. *Id.* §815.2(b).

177. *Id.* §§815.2(b), 820.2.

178. *Id.* §820.2.



government employee involve some discretion.<sup>179</sup> The California Supreme Court has defined discretionary activity as that activity related to *basic* policy decisions; those sometimes characterized as the planning, as opposed to the operational, level of decision making.<sup>180</sup>

In order for an injured plaintiff to recover from a governmental entity, he must establish that the genetic researcher is not protected by this discretionary immunity doctrine. When a government entity makes the decision to *commence* genetic research, this seems to be a basic policy decision involving planning level decision making. This initial decision, therefore, would probably be exempt from suit even if the decision to commence DNA research were poorly made.<sup>181</sup> The *implementation* of the research, on the other hand, involves the operational level of decision making.<sup>182</sup> The day-to-day performance of this research admittedly involves some discretion but these decisions are not *basic* policy decisions<sup>183</sup> and thus, "public policy demands. . . that government be held to the same standard of care the law requires of its private citizens in the performance of duties imposed by law or assumed."<sup>184</sup> Thus, the governmental entity should be judged by the same standards as a private research entity in a genetic engineering accident situation.

A second rationale put forward for the discretionary act immunity is that fear of reprisal for carrying out governmental duties should not hamper the decision making activities of public employees.<sup>185</sup> In a genetic research situation, however, the government employee is not being exposed to any greater liability than the private scientist; the reprisal would not be for the decision making but for the day-to-day performance of an abnormally dangerous activity with full knowledge of the risks inherent in that type of endeavor. Thus, the imposition of strict liability does not hamper the discretionary act immunity rationale.

The imposition of liability on a public entity also serves the risk spreading rationale since

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179. See, e.g., *Ramos v. County of Madera*, 4 Cal. 3d 685, 693, 484 P.2d 93, 99, 94 Cal. Rptr. 421, 427 (1971); *Wheeler v. County of San Bernadino*, 76 Cal. App. 3d 841, 848, 143 Cal. Rptr. 295, 300 (1978); *Susman v. City of Los Angeles*, 269 Cal. App. 2d 803, 818, 75 Cal. Rptr. 240, 249-50 (1969).

180. See 4 Cal. 3d at 693, 484 P.2d at 99, 94 Cal. Rptr. at 427 (1971); *Johnson v. State of California*, 69 Cal. 2d 782, 793-94, 447 P.2d 352, 360, 73 Cal. Rptr. 240, 248 (1968).

181. See CAL. GOV'T CODE §820.2. See also *McCorkle v. City of Los Angeles*, 70 Cal. 2d 252, 261, 449 P.2d 453, 460, 74 Cal. Rptr. 389, 396 (1969).

182. See 70 Cal. 2d at 261, 449 P.2d at 460, 74 Cal. Rptr. at 396.

183. See note 179 *supra*.

184. *Sava v. Fuller*, 249 Cal. App. 2d 281, 290, 57 Cal. Rptr. 312, 317 (1967).

185. See 69 Cal. 2d at 792, 447 P.2d at 359-60, 73 Cal. Rptr. at 247-48; *Lipman v. Brisbane Elementary School Dist.*, 55 Cal. 2d 224, 229, 359 P.2d 465, 467, 11 Cal. Rptr. 97, 99, (1961); *Elson v. Public Util. Comm'n*, 51 Cal. App. 3d 577, 584-85, 124 Cal. Rptr. 305, 309 (1975).

[i]t would be unjust in some circumstances to require an individual injured by official wrongdoing to bear the burden of his loss rather than distribute [the loss] through the community. . . . Unless the Legislature has clearly provided for immunity, the important societal goal of compensating injured parties for damages . . . must prevail.<sup>186</sup>

In *Muskopf v. Corning Hosp. Dist.*,<sup>187</sup> the fact that the defendant hospital was "an entity legally and financially capable of satisfying a judgment" was one of the reasons that convinced the court to restrict the availability of sovereign immunity in California.<sup>188</sup> By the same token, if the state university owns and is licensing a patent, that university has also become an entity "financially capable of satisfying a judgment."<sup>189</sup> In addition, a strong argument can be made that if this research is significantly beneficial to the human race, spreading the risk among all taxpayers is a better option than denying the innocent plaintiff recovery.<sup>190</sup> In sum, if the government chooses to engage in genetic engineering, the Tort Claims Act, as it has been interpreted by the courts, should provide a basis for holding the governmental entity financially responsible. Thus, the doctrine of sovereign immunity, as it exists today in California, should not serve to immunize a governmental entity engaged in genetic research.<sup>191</sup>

#### CONCLUSION

This comment has taken the view that an accident involving genetic engineering should be governed by the principles of strict liability as provided for animals with known dangerous propensities<sup>192</sup> or for abnormally dangerous activities.<sup>193</sup> Due to the unusual nature of DNA research and the inherent risks involved, this comment has suggested that the evidentiary doctrines that allow the shifting of the burden of proof to the defendant should be available to the innocent, injured party to ease, but not to eliminate, the difficulties involved in the proof of causation.<sup>194</sup> These evidentiary doctrines will aid a plaintiff in estab-

186. 4 Cal. 3d at 692, 484 P.2d at 98, 94 Cal. Rptr. at 426 (1971).

187. 55 Cal. 2d 211, 359 P.2d 457, 11 Cal. Rptr. 89 (1961).

188. *Id.* at 216, 359 P.2d at 459, 11 Cal. Rptr. at 91.

189. *Id.*

190. See RESTATEMENT (SECOND) OF TORTS §520, Comment h (1977).

191. There has been some support for a statutory limit on liability for genetic engineering accidents patterned after the Price Anderson Act, 42 U.S.C. §2110. Unlike the situation of nuclear power, however, where from the beginning, the awesome destructive power of a nuclear accident stifled the development of nuclear power, the risks in genetic engineering have not stifled growth. See notes 6, 8 *supra*. But, as noted earlier, such a statutory limit may be necessary to achieve meaningful recoveries. See note 117 *supra*.

192. See text accompanying notes 32-58 *supra*.

193. See text accompanying notes 59-116 *supra*.

194. See text accompanying notes 117-163 *supra*.

lishing that his injury is the result of DNA research activity and, similarly, they will aid the plaintiff in identifying the source of the harm. Finally, this comment has asserted that research conducted by a governmental entity should not be protected by the doctrine of sovereign immunity under California law.<sup>195</sup>

This comment does not suggest, however, that this research be discontinued. The utility of genetic research may be such that the defendant is socially justified in continuing.<sup>196</sup> The inherent risk, however, requires that the research be carried on at the peril of the *defendant* rather than at the expense of an innocent person injured as a result of the activity.<sup>197</sup> Simply stated, the defendant researcher engaged in an activity of this sort must pay his own way.<sup>198</sup> This comment has taken the view that the best way to achieve this goal is to impose strict liability on the party doing the research. In this way, the loss is spread among the public as a cost of doing business and the innocent party is not required to bear the entire cost of an injury best chargeable against a complex and dangerous society.<sup>199</sup>

*David M. Gilmore*

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195. See text accompanying notes 164-191 *supra*.

196. See RESTATEMENT (SECOND) OF TORTS §520, Comment h (1977).

197. See text accompanying notes 134-155 *supra*.

198. RESTATEMENT (SECOND) OF TORTS §519, Comment d (1977).

199. *Smith v. Lockheed Propulsion Co.*, 247 Cal. App. 2d 774, 785, 56 Cal. Rptr. 128, 137 (1967).