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Nature, Knowledge, and Profit: The Yellowstone Bioprospecting Controversy and the Core Purposes of America's National Parks

Part 1

by

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Nature, Knowledge and Profit: The Yellowstone Bioprospecting Controversy and the Core Purposes of America's National Parks

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INTRODUCTION

In 1997, the National Park Service staged a gala celebration of the 125th anniversary of Yellowstone National Park, recognized internationally as the world's first national park.[1] The celebration included the announcement of an agreement allowing Diversa Corporation, a biotechnology company, to sample Yellowstone microorganisms.[2] With the growth of the biotechnology industry, microorganisms have become valuable commodities.[3] Companies like Diversa engage in "bioprospecting," exploring the world for microbes and other organisms with commercially exploitable traits.[4] Bioprospectors are particularly drawn to Yellowstone National Park because of

1. *See* Thomas Kupper, *Tiny Treasures: Biotech Scours Park for Microorganisms with Practical Benefits*, SAN DIEGO UNION-TRIB., Aug. 19, 1997, at C1.

2. *See id.*; *see also* Eliot Marshall, *Yellowstone Opens the Gates to Biotech*, 227 SCI. 1027 (1997). Diversa describes itself as "a world leader in the discovery and commercialization of biocatalysts (enzymes) . . . ." Diversa Corp., *Yellowstone Media Kit* (visited June 2, 1998) <http://www.diversa.com/mediakit/yellow.html>.

3. Bacteria and other microorganisms are the source of hundreds of products, with a total value of some tens of billions of dollars. *See* Charles C. Chester, *Controversy Over Yellowstone's Biological Resources*, ENV'T, Oct. 1, 1996, at 10.

4. Bioprospecting is the "exploration of biodiversity for commercially valuable genetic and biochemical resources." Walter V. Reid et al., *A New Lease on Life*, *in* BIODIVERSITY PROSPECTING: USING GENETIC RESOURCES FOR SUSTAINABLE DEVELOPMENT 1, 1 (Walter V. Reid et al. eds., 1993). Diversa has sent bioprospecting expeditions to Iceland, Costa Rica, and Indonesia. *See* Debbie Strickland, *Diversa's Enzyme Discovery Generates $21M in Financing*, BIOWORLD TODAY, Sept. 1998, at 4.

its hot springs and other thermal features. Microbe hunters hope the organisms, known as thermophiles or thermophilic microbes, that thrive in the high temperatures and harsh chemical conditions of Yellowstone's hot springs will contain enzymes that can survive similarly harsh industrial conditions.[5]

Yellowstone has already yielded one extremely valuable microbe. In the 1980s, researcher Kary Mullis developed a novel technique for rapidly copying minute amounts of DNA. This technique, called polymerase chain reaction (PCR), made it possible to identify and manipulate extremely small quantities of genetic material. To make PCR work, Mullis needed a DNA polymerase (the enzyme that copies DNA) tolerant of high temperatures. He found a suitable polymerase in *Thermus aquaticus*, a bacterium discovered in Yellowstone hot springs in the 1960s.[6] PCR brought Mullis the Nobel prize[7] and has become an essential tool of molecular biology, medical research, and law enforcement.[8] Patents on the technique and on Taq polymerase, the enzyme isolated from *T. aquaticus*, reportedly produce revenues exceeding $200 million annually.[9]

Park officials present the Diversa bioprospecting agreement as an unqualified positive. Yellowstone will receive cash and research assistance as well as future royalties should the

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5. *See* Chester, *supra* note 3, at 12.

6. *See, e.g.*, MICHAEL GROSS, LIFE ON THE EDGE: AMAZING CREATURES THRIVING IN EXTREME ENVIRONMENTS 103-04 (1998).

7. *See* PAUL RABINOW, MAKING PCR: A STORY OF BIOTECHNOLOGY 4 (1996).

8. Nobel laureate James Watson ranks polymerase chain reaction with cloning and DNA sequencing as an indispensable tool of molecular biological research. *See* Chester, *supra* note 3, at 13. PCR also allows DNA fingerprinting from minute samples. For brief descriptions of various applications of PCR, see Frank Clifford, *Simpson Case Boosts Microbe Conservation*, L.A. TIMES, Aug. 31, 1994, at A1. *See also* GROSS, *supra* note 6, at 103-04; John D. Varley, *Saving the Parts: Why Yellowstone and the Research It Fosters Matter So Much*, YELLOWSTONE SCI., Summer 1993, at 13-14.

9. *See* GROSS, *supra* note 6, at 104; Chester, *supra* note 3, at 13. This number undoubtedly overestimates the value of Taq polymerase itself. Hoffmann-LaRoche holds more than 70 patents related to PCR, not all of which depend on the use of Taq polymerase. *See* J. St. George, *Status Report: Taq Patent Dispute*, 275 SCI. 1348 (1997). The worldwide market for Taq polymerase itself has been estimated at $80 to $85 million. *See* Marcia Barinaga, *Promega Wins Round in Fight Over Taq*, 273 SCI. 1039 (1996). However, the patent specific to purified Taq polymerase is currently the subject of litigation. *See id.*; J. St. George, *supra*. In addition to Taq polymerase, Yellowstone microbes reportedly have already yielded products useful in perfume manufacture, brewing, and wood-pulp production. *See, e.g.*, Robin McKie, *The Bugs in a Cup of Old Faithful Can Eat Tyres, Copy DNA and Make Scent. But Now Business Must Pay Up*, THE OBSERVER, Mar. 29, 1998, at O13; Joby Warrick, *Yellowstone: A Gold Mine of Microbes*, WASH. POST, July 12, 1998, at A1.

venture lead to any commercial products.[10] The money could help close gaps in the park's chronically inadequate budget.[11] Park officials are painfully conscious that Yellowstone has received no financial return from the discovery of *Thermus aquaticus* or its valuable DNA polymerase and anxious not to miss the next such opportunity.[12] They insist that the financial benefits of the agreement come at no cost because Diversa's activities will have no detectable physical or biological impact on the park. Only very small samples will be removed, under the supervision of park personnel and out of public view.[13] Essentially, Diversa will take only genetic information, leaving the park ecosystem intact. Furthermore, Diversa and other companies have already been conducting exactly the same kind of sampling without giving the park anything in return.[14]

As park officials have framed the issues, any objection seems irrational. Bioprospecting will not harm the physical resources of the park. It will generate sorely needed revenue.

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10. *See* Russ Hoyle, *In Hot Pursuit of Extremophiles*, 16 NATURE BIOTECHNOLOGY 312 (1998).

11. *See* Frank Clifford, *supra* note 8, at A1 (citing Park officials who describe budget as insufficient to protect park resources).

12. *See generally* Warrick, *supra* note 9, at A1. Yellowstone managers believe that some 13 thermophilic microorganisms already isolated from the park may have commercial applications. *See* Christopher Smith, *Yellowstone Park's Deal: Some Call It "Bioptracy"*, SALT LAKE TRIB., Nov. 9, 1997, at A1. The Park Service makes little effort to hide the dollar signs in its eyes. *See, e.g.*, YELLOWSTONE CENTER FOR RESOURCES, 1995 ANNUAL REPORT 9 (1996) [hereinafter 1995 ANNUAL REPORT] ("[T]here is currently no mechanism by which the park can receive any compensation for [bioprospecting]."); Thomas D. Brock, *The Road to Yellowstone–and Beyond*, 49 ANN. REV. MICROBIOLOGY 1, 19 (1995) ("'When you see the money that's being made,' says Yellowstone research chief John Varley, 'that's hard for a starving bureaucrat to overlook.'"); NATIONAL PARK SERVICE, YELLOWSTONE NATIONAL PARK STRATEGIC PLAN (unpaginated) (1997) (on file with author) ("Like all native park species, these microscopic organisms are preserved and protected within the public domain for the purposes of enjoyment and education. At present, however, the park and the tax-paying public receive no portion of the patent royalties associated with research and discoveries based on park specimens."). Interestingly, the parks are not alone in feeling cheated of PCR profits. *See* Nicholas Wade, *After the 'Eureka,' a Nobelist Drops Out*, N.Y. TIMES, Sept. 15, 1998, at B9 (stating that PCR inventor Mullis is angry because Cetus paid him only $10,000 for discovering the technique, then sold the rights to Hoffmann-LaRoche for $300 million).

13. *See infra* notes 28-33.

14. *See, e.g.*, Christopher Smith & Stephen Siegel, *Microbe Deal Lands Park in Hot Water*, SALT LAKE TRIB., Mar. 6, 1998, at A1; Warrick, *supra* note 9, at A1. In 1995, Yellowstone National Park issued approximately 40 permits allowing collection of thermophiles in the park; about half of those projects were conducted or funded by biotechnology companies. *See* 1995 ANNUAL REPORT, *supra* note 12, at 9. Bioprospecting also has been ongoing in at least two other national parks, including Mammoth Cave and Carlsbad Caverns, without any payment. *See* Clifford, *supra* note 8, at A1.

Furthermore, it coincides with growing domestic and international enthusiasm for economic conservation incentives in general, and bioprospecting in particular.[15] Nonetheless, objections surfaced even before the agreement was signed,[16] and a lawsuit challenging the agreement was soon filed.[17]

The Diversa controversy is interesting on at least three different levels. At the most specific level, the agreement is a prototype for a host of future bioprospecting deals. Yellowstone officials estimate that Yellowstone alone could enter into as many as 30 or 40 such deals.[18] Some 100 additional federal properties may be sources of thermophiles,[19] and many others may harbor other potentially valuable organisms.[20] Before the Park Service jumps wholesale into the business of bioprospecting, some conscious reflection on the overall effects of this new policy on the national park system would be desirable.

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15. *See, e.g.*, WALTER V. REID ET AL., BIODIVERSITY PROSPECTING: USING GENETIC RESOURCES FOR SUSTAINABLE DEVELOPMENT v (Walter V. Reid et al. eds., 1993); Charles R. McManis, *The Interface Between International Intellectual Property and Environmental Protection: Biodiversity and Biotechnology*, 76 WASH. U. L.Q. 255, 270 (1998); Laura Tangley, *Ground Rules Emerge for Marine Bioprospectors*, 46 BIOSCIENCE 245, 245 (1996); Daniel M. Bodansky, *International Law and the Protection of Biological Diversity*, 28 VAND. J. TRANSNAT'L L. 623, 632-33 (1995); Victor M. Marroquin-Merino, *Wildlife Utilization: A New International Mechanism for the Protection of Biological Diversity*, 26 LAW & POL'Y INT'L BUS. 303 (1995); Karen Anne Goldman, *Compensation for Use of Biological Resources Under the Convention on Biological Diversity: Compatibility of Conservation Measures and Competitiveness of the Biotechnology Industry*, 25 LAW & POL'Y INT'L BUS. 695, 706-07 (1994); Michael A. Gollin, *Using Intellectual Property To Improve Environmental Protection*, 4 HARV. J.L. & TECH. 193, 216 (1991). At least two commentators expressed support for commercial bioprospecting in U.S. national parks prior to this agreement. *See* John R. Adair, *The Bioprospecting Question: Should the United States Charge Biotechnology Companies for the Commercial Use of Public Wild Genetic Resources?*, 24 ECOLOGY L.Q. 131, 133 (1997); Chester, *supra* note 3, at 10, 11 (arguing that Yellowstone's microorganisms offer a potential "win-win-win" situation for combining conservation, science, and economic development).

16. *See* Smith, *supra* note 12, at A1.

17. *See infra* notes 49-59 and accompanying text. Others, though not going quite so far, voiced their disapproval. *See* Smith, *supra* note 12, at A1. Two influential members of Congress demanded a detailed explanation of the financial arrangements and of the Park's authority to enter into the Diversa agreement. *See* Christopher Smith, *Hansen Demands Details of Deal Between Yellowstone and Bio Firm*, SALT LAKE TRIB., Mar. 17, 1998, at A6.

18. *See* Jim Robbins, *Putting Old Faithful to the Test*, HOUSTON CHRON., Oct. 20, 1997, at 6 (crediting John Varley, director of the Yellowstone Center for Resources, the park's research arm, with that estimate).

19. *See* Craig Elliott, *Yellowstone Wilderness Profile, Spring 1998* (last modified Apr. 6, 1998) <http://www.yellowstoneassociation.org/wpspring98.htm>.

20. *See, e.g.*, Smith, *supra* note 12, at A1 (reporting other national parks that have geothermal features "are becoming increasingly attractive to 'microbe' hunters"). Bioprospecting reportedly is already in progress in at least two other national parks. *See* Clifford, *supra* note 8, at A1.

Moving to a broader picture, this agreement comes at a time when both the Park Service and Congress are reconsidering the place of science in the national parks.[21] While both bodies have been deluged with calls for more and better science, the Diversa controversy reveals that scientific research in the parks is not a uniformly benign activity. In fact, scientific research has more than one face. It can be a means of appreciating nature or a means of putting nature to instrumental use for human benefit. It can be a strongly public activity, one which puts communication above almost all other considerations, or it can be an essentially private activity in which information is hoarded for individual gain. Appreciative, public science is entirely aligned with the functions of national parks but instrumental, private science is not. Existing Park Service regulations turn out to be roughly attuned to the distinction, but seem to be widely ignored. If this dispute does no more than catalyze careful review by the Park Service of those regulations and their underlying purposes, it will have served a useful function.[22]

Finally, at the most general level this dispute teaches two lessons about the core purposes of the national parks. First, policymakers need a firmer grasp on the key functions of the park system in order to respond to novel developments like bioprospecting. Second, those key functions, as several commentators have forcefully argued, encompass far more than the physical resources of the parks.[23] The symbolism of the national parks is nearly as important to the nation as the natural resources they harbor. The fundamental purpose of the national parks is not merely to preserve nature. They should also inspire the populace with the wonder, awe and fascination of nature, express the nation's respect for its natural wonders, and make those wonders available to all on an equal basis.

This dispute, more than other park management controversies, brings the importance of the parks' intangible inspirational resources into sharp focus. As the Park Service has concluded, Diversa's bioprospecting activities probably will

21. After years of calls for an explicit mandate for scientific research in the parks, Congress has recently enacted one. *See* National Parks Omnibus Management Act, Pub. L. No. 105-391, tit. II, 112 Stat. 3497 (1998) (to be codified at 16 U.S.C. § 5932). The Park Service is presently considering revision of its regulations governing scientific research and collections in the parks, although it has not issued any formal proposal to revise those regulations.

22. The Park Service probably also should reconsider its broad delegation of decisions regarding extramural research to individual parks. *See infra* text accompanying note 423.

23. *See infra* notes 233-35.

not have any lasting impact on the physical or biotic resources of Yellowstone National Park. But that does not necessarily mean that bioprospecting will have no effect on the park. Allowing biotechnology companies to extract natural resources from the parks for profit may affect the ability of the parks to serve their inspirational and expressive functions. In deciding to enter into the Diversa agreement, the Park Service has framed the question as whether bioprospecting companies should pay for the right to seek their fortunes in the national parks.[24] The real question, however, is whether they should have that right at all. That question can only be answered in light of *all* the purposes of the parks, including their inspirational and expressive purposes.

This Article argues that companies like Diversa should not be permitted to bioprospect in the national parks, because commercial bioprospecting is inconsistent with the inspirational purposes of the parks. That conclusion is surely open to debate; reasonable persons might well disagree. But whatever the ultimate answer on this particular issue, recognition that the right question encompasses far more than the physical resources of the parks should help policymakers more effectively address other controversial issues of park management, including the commercial use of national park images.[25]

I
BACKGROUND

A. The Diversa Bioprospecting Agreement

The agreement that has sparked the bioprospecting dispute is styled as a Cooperative Research and Development Agreement between Diversa Corporation, Yellowstone National Park and the National Park Service.[26] It calls for Diversa, working with park employees, to identify and assess the microbial diversity of the park's unique microbial habitats. The company will then, over a period of five years, systematically sample those habitats in

24. *See* Smith, *supra* note 12, at A1. Commentators who have supported the idea of bioprospecting agreements in the parks have accepted this framing of the agreement. *See generally* Adair, *supra* note 15.

25. *See, e.g.*, Charles Pope, *National Parks, Private Funds: Trouble in Paradise?*, CONG. Q. WKLY., Oct. 31, 1998, at 2938 (stating that park officials have approved a national parks version of the popular board game Monopoly, but declined to allow a park ranger Barbie doll).

26. Cooperative Research and Development Agreement for a Project Between Yellowstone National Park/National Park Service and Diversa Corporation, May 1, 1998 (copy on file with author) [hereinafter Diversa Agreement].

order to assemble a representative collection of organisms.[27]

The agreement imposes some limits on the company's sampling efforts. It requires that all collecting be done out of public view, that restricted areas of the park not be entered without separate authorization, and that a Park Service liaison be present during all sample collection.[28] It also purports to restrict sampling methods, but those restrictions turn out to be weak. The agreement mandates compliance with the most current "Yellowstone National Park Thermophilic Microorganism Collection Guidelines,"[29] but no such guidelines exist.[30] The agreement also calls for the use of techniques that will "ensure that there is no significant impact to park resources or to other appropriate park uses,"[31] but does not specify what techniques might meet that requirement or how their use will be assured. Nonetheless, it does appear that the physical impacts of Diversa's sampling will be minimal. According to media accounts, Diversa collects samples by dragging small specimen cups attached to long poles across the bottom of thermal pools.[32] It seems plausible, as both Diversa and the Park Service contend, that the pools and their biota will suffer no lasting physical impact from this technique.[33]

Following sampling, Diversa employees will isolate nucleic acids (DNA and RNA) from the organisms collected and use those nucleic acids to create gene libraries,[34] collections of cloned DNA and RNA fragments containing all the genetic information of the sampled organisms.[35] Diversa will search the gene libraries for

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27. *See id.* Statement of Work at 2.

28. *See id.* App. A (Research Authorization/Collection Permit).

29. *See id.* Statement of Work at 4.

30. Interview by Keith Wagner with John Varley, Yellowstone Center for Resources (Aug. 5, 1998).

31. Diversa Agreement, *supra* note 26, Statement of Work at 2.

32. *See* Laura Vandendorpe, *Abundant Life at Yellowstone Bears Investigation*, RES. & DEV., Feb. 1998, at 19.

33. *See* Elizabeth Pennisi, *Lawsuit Targets Yellowstone Bug Deal*, 279 SCI. 1624 (1998); Bob Lindstrom, *Biodiversity, Ecology, and Evolution of Hot Water Organisms in Yellowstone National Park: Symposium and Issues Overview*, PARK SCI., Winter 1996, at 12, 13 ("Since the small samples (a few milliliters) needed to start tissue culture collections are usually gathered with tweezers, and since the high growth rates of thermophiles revegetate disturbances quickly, no long-term harm to the resource is apparent.").

34. *See* Diversa Agreement, *supra* note 26, Statement of Work at 3.

35. *See* THE LANGUAGE OF BIOTECHNOLOGY: A DICTIONARY OF TERMS 124 (John M. Walker & Michael Cox eds., 1995); Larry L. Deaven, *Chromosome-Specific Human Gene Libraries*, *in* 2 ENCYCLOPEDIA OF HUMAN BIOLOGY 455 (Renato Dulbecco ed., 1991). In a somewhat ironic twist, the PCR amplification technique, the profitability of which seems to have motivated the Park to enter the deal, will be used to generate

commercially valuable compounds and proteins.[36] Diversa does not expect to produce a revolutionary breakthrough or medical miracle as a result of this research. It does hope that it can find genes or enzymes that will prove valuable as incremental improvements to processes such as industrial bleaching.[37] Nothing in the agreement confers any exclusive sampling rights on Diversa, and indeed, several other companies reportedly are negotiating similar bioprospecting agreements.[38]

Yellowstone National Park expects to gain both revenue and scientific information from this agreement. Diversa will pay a flat fee of $20,000 per year;[39] it will also pay as royalties a percentage of net revenues from any products based on Yellowstone samples. The details of the royalty arrangement have not been publicly released, but royalties reportedly will range from 0.5 to 10%.[40] At those royalty levels, a new Taq polymerase could generate hundreds of thousands of dollars per year for the park.[41]

Expected revenues, however, must be examined in light of the costs the agreement imposes on the park. Oversight of sample collection will require the assignment of park employees who could be engaged in other activities. Yellowstone may also provide logistical support, such as transportation, communications, and technical assistance, as it typically does for scientific researchers.[42] The resulting costs to the park will

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the gene libraries. *See* Diversa Agreement, *supra* note 26, Statement of Work at 3.

36. *See* Diversa Agreement, *supra* note 26, Statement of Work at 3.

37. *See* Cynthia G. Wagner, *Biotech Goes to Extremes*, THE FUTURIST, Oct. 1, 1998, at 11 (reporting that Diversa is working on a bleaching enzyme obtained from Yellowstone microbes). To date, Yellowstone microbes have also proved useful in perfume production and brewing. *See supra* note 9.

38. *See* Smith, *supra* note 12, at A1.

39. *See* Diversa Agreement, *supra* note 26, App. B (Payments) at 1.

40. *See* Smith, *supra* note 12, at A1; *see also* Edmonds Inst. v. Babbitt, 42 F. Supp. 2d 1, 5 (D.D.C. 1999). Those values lie in the range expected for a bioprospecting agreement. *See* Sarah A. Laird, *Contracts for Biodiversity Prospecting*, *in* REID, *supra* note 15, at 99, 111-12 (citing 1 to 5% as typical royalty rates for bioprospecting, with lower rates appropriate if the collector must isolate microbes from soil, higher if pre-existing ethnobotanical data suggest a market). As required by federal law, Diversa has agreed in advance to allow the federal government to license, at no cost, any patented inventions Diversa may develop from this work. *See* Diversa Agreement, *supra* note 26, § 7.2.

41. The market for Taq polymerase has been estimated at $80 to $85 million per year. *See supra* note 9. That number presumably represents gross revenue. If the net revenue were 5% of that gross, the potential royalties would be approximately $20,000 to $400,000 annually.

42. *See* 1995 ANNUAL REPORT, *supra* note 12, at 73 ("YCR provides logistical support to approved research projects . . . ."); YELLOWSTONE CENTER FOR RESOURCES, INVESTIGATORS' ANNUAL REPORTS FOR 1996 at 2 (1997) [hereinafter INVESTIGATORS'

depend upon the extent of both Diversa's collecting activities and park assistance, neither of which is quantified in the agreement. Beyond these indirect costs, Yellowstone reportedly will pay $200,000 to a nonprofit foundation for assistance in negotiating this and similar deals.[43] That cost is double the minimum cash return to the park. Unless this or other bioprospecting agreements yields significant royalties, therefore, the park will not see any notable improvement in its budget situation.

Yellowstone also stands to gain some scientific information through this agreement. Diversa will use its genetic libraries to prepare phylogenetic trees illustrating the likely evolutionary relationships among Yellowstone's microbes.[44] Diversa will also contribute equipment and scientific training, with an estimated value of $75,000 annually, toward environmental research at Yellowstone.[45] In addition, the company will provide written reports of its research activities to the Park Service,[46] which will have the right to use the data for any governmental purpose.[47] Diversa may, however, prevent disclosure of proprietary information.[48]

ANNUAL REPORTS FOR 1996] ("Scientists who wish to conduct research in the park are required to obtain a no-fee permit.").

43. Some of that money apparently came from private donations. *See* Smith, *supra* note 12, at A1. The foundation concerned is the World Foundation for Environment and Development, a non-profit organization which describes its major focus as international environmental conflict resolution. The Foundation has been closely involved in the development of international bioprospecting arrangements in Costa Rica. *See* World Foundation for Environment and Development, *WFED: The First 5 Years* (visited June 17, 1998) <http://www.wfed.org/Fiveyear.html>.

44. *See* Diversa Agreement, *supra* note 26, at Statement of Work 3-4. Diversa will generate comparisons of ribosomal RNA sequences using its genetic libraries. Divergence in ribosomal RNA can be used to measure the evolutionary distance between organisms. *See* Norman R. Pace, *A Molecular View of Microbial Diversity and the Biosphere*, 276 SCI. 734, 734 (1997).

45. Newspaper accounts indicate that Diversa will undertake genetic fingerprinting of Yellowstone's wolf population. *See* Jim Robbins, *Useful Microorganisms in Yellowstone's Hot Pools*, PITTSBURGH POST-GAZETTE, Oct. 20, 1997, at A8. The agreement itself does not explicitly so provide, but there may be an understanding between the company and the park that some of the equipment and training donated will be devoted to DNA fingerprinting. DNA fingerprinting has already proven useful to Yellowstone managers in several respects. *See* Varley, *supra* note 8, at 14. Yellowstone now has a PCR laboratory. *See* INVESTIGATORS' ANNUAL REPORTS FOR 1996, *supra* note 42, at 88. Diversa surely has the expertise to help Yellowstone make more efficient use of the research effort it puts into these areas.

46. *See* Diversa Agreement, *supra* note 26, § 4.1.

47. *See id.* § 10.1.

48. *See id.* §§ 10.1-10.4.

B. The Lawsuit

In March 1998, a coalition of plaintiffs including the Edmonds Institute, the Alliance for the Wild Rockies (AWR), and the International Center for Technology Assessment (ICTA) filed a lawsuit challenging the Diversa agreement.[49] Plaintiffs object both to the process by which the agreement was developed and to its substance. Procedurally, plaintiffs allege that the National Environmental Policy Act (NEPA)[50] required the Park Service to prepare an Environmental Impact Statement before entering into the Diversa bioprospecting agreement.[51] Despite the Park Service's categorical exclusion for "non-destructive data collection, inventory . . . , study, research and monitoring,"[52] the District Court recently agreed with plaintiffs that the Park Service must undertake some environmental analysis.[53] The Park Service has decided to prepare an environmental assessment rather than appeal the decision.[54] While the plaintiffs' NEPA victory will delay implementation of the agreement, it cannot ultimately prevent this or other bioprospecting agreements.[55]

For purposes of this Article, plaintiffs' substantive claim that the Park Service does not have the authority to enter into a bioprospecting agreement, with Diversa or anyone else,[56] is more

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49. *See* Complaint, Edmonds Inst. v. Babbitt, 42 F. Supp. 2d 1 (D.D.C. 1999) (No. Civ. A. 98-561(RCL)) (on file with author).

50. 42 U.S.C. §§ 4321-4370d (1994 & Supp. 1996).

51. *See* Complaint, *supra* note 49, at 27. Plaintiffs also object to the lack of public involvement in the process by which the Diversa deal was negotiated. *See, e.g.*, Smith & Siegel, *supra* note 14, at A1 (quoting attorney Joseph Mendelson of ICTA as saying that "[t]he Park Service cut a backroom deal"). In a separate lawsuit under the Freedom of Information Act, 5 U.S.C. § 552 (1994 & Supp. 1996), the plaintiffs obtained the release of some documents concerning the agreement. *See generally* Smith & Siegel, *supra* note 14, at A1.

52. *See* National Park Service, U.S. Dep't of the Interior, National Environmental Policy Act Guidelines 42 (last modified Aug. 18, 1998) <http://www.nps.gov/htdocs2/planning/nepa/index.htm>; National Environmental Policy Act; Revised Implementing Procedures, 49 Fed. Reg. 21,437, 21,438 (1984). Categorical exclusions are classes of actions that an agency has determined do not individually or cumulatively have a significant effect on the human environment. *See* 40 C.F.R. § 1508.4 (1998). Because those actions do not have a significant effect on the environment, they do not require environmental review.

53. *See* Edmonds Inst. v. Babbitt, 42 F. Supp. 2d 1 (D.D.C. 1999).

54. *See* Andrew Pollack, *Judge Halts Yellowstone Royalty Agreement with Biotechnology Company*, N.Y. TIMES, Mar. 26, 1999, at A18.

55. *See, e.g.*, Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 350 (1989) (stating NEPA does not allow courts to review the substance of decisions).

56. Plaintiffs argue that agreements permitting bioprospecting in the national parks are not authorized by either the Federal Technology Transfer Act (FTTA), 15 U.S.C. §§ 3710a-3710d (1994), or the National Park Service Organic Act (Organic

intriguing. Although these plaintiffs are vulnerable to charges of extremism,[57] the substantive issues they raise deserve deeper reflection.[58] The District Court has not yet ruled on those substantive issues, although it has signaled some skepticism of the Park Service's claim that current law authorizes the Diversa agreement.[59] The Park Service should view this lawsuit not as a roadblock in the way of a clever deal to gain the parks needed revenue, but as an opportunity for reflection on the appropriate role of bioprospecting and other commercial scientific ventures in the national parks.

II

CURRENT LAW AND THE DIVERSA DEAL

The Diversa agreement cites both federal technology transfer law and the law governing national parks as authorizing this deal.[60] Either could be read to permit this agreement, but neither plainly does so. In fact, current Park Service regulations appear to prohibit it. The fit between existing law and this bioprospecting agreement is sufficiently uncomfortable, and sufficiently open to judicial disapproval, that it should spark closer examination of the deal in light of the purposes of technology transfer and, ultimately, of the national parks.

A. Technology Transfer Law

After World War II, the federal government assumed an increasing share of the burden of funding the nation's scientific research and development efforts, both directly through federal laboratories and indirectly through grants to academic

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Act), 16 U.S.C. §§ 1-4 (1994). *See infra* Part III.A (FTTA) and Part III.B (Organic Act).

57. None of the plaintiffs is a large or "mainstream" group. The Edmonds Institute and ICTA appear radically anti-biotechnology. *See infra* note 259.

58. Like the implausible assertion that patenting human genes amounts to enslavement of persons, the rather extreme statements of these plaintiffs can be seen as indications of a more subtle but deep-rooted discomfort. *Cf.* Alain Pottage, *The Inscription of Life in Law: Genes, Patents, and Bio-politics*, 61 MOD. L. REV. 740, 744 (1998) (arguing that "extravagant" objections to gene patenting nonetheless "have identified a structural failing" in current law). Others not easily dismissed as cranks have echoed plaintiffs' concerns. Representatives Jim Hansen of Utah and Ralph Regula of Ohio, for example, have sought details of the Diversa deal and an explanation of its basis from the Park Service. *See* Smith, *supra* note 17, at A6; Christopher Smith, *Hansen Still Seeks Details of Yellowstone Bio-Tech Deal*, SALT LAKE TRIB., Mar. 24, 1998, at D2.

59. *See* Edmonds Inst. v. Babbitt, 42 F. Supp. 2d 1, 14-15 (D.D.C. 1999) (questioning whether FTTA applies and whether Park Service regulations permit this agreement).

60. *See* Diversa Agreement, *supra* note 26, § 1.1.

researchers.[61] These expenditures were, and continue to be, justified not only on the basis of their contribution to the missions of individual federal laboratories and agencies, but also by claims that a strong basic research program would help ensure economic growth and national prosperity.[62]

Through the 1970s, the government usually insisted on retaining intellectual property rights to inventions resulting from research it either conducted or funded.[63] From the outset, though, this policy was subject to considerable debate.[64] Critics charged that it inhibited full realization of the economic benefits of government research, pointing out that only a small proportion of government-owned patents had been commercialized.[65]

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61. *See* Kenneth Sutherlin Dueker, *Biobusiness on Campus: Commercialization of University-Developed Biomedical Technologies*, 52 FOOD & DRUG L.J. 453, 460 (1997) (arguing that growth in federal funding for research after World War II was accompanied by policy establishing the presumption that government held title to any resulting inventions).

62. Vannever Bush was one of the first to make this claim, noting in his influential postwar report:

> The Government should accept new responsibilities for promoting the flow of new scientific knowledge and the development of scientific talent in our youth. These responsibilities are the proper concern of the Government, for they vitally affect our health, our jobs and our national security.

VANNEVER BUSH, SCIENCE: THE ENDLESS FRONTIER 4 (1945). Economists soon chimed in, pointing out that because knowledge is a public good, private firms may not produce it despite the potential for high social return. *See, e.g.*, Lewis M. Branscomb & Richard Florida, *Challenges to Technology Policy in a Changing World Economy*, *in* INVESTING IN INNOVATION: CREATING A RESEARCH AND INNOVATION POLICY THAT WORKS 3, 30 (Lewis M. Branscomb & James H. Keller eds., 1998). By now, it is taken as an article of faith that science stimulates economic growth. *See* Paula E. Stephan, *The Economics of Science*, 34 J. ECON. LITERATURE 1199, 1199 (1996) ("[T]he economic impact of science is indisputable."). That assumption still underlies federal research and development spending. *See, e.g.*, S. REP. NO. 99-283, at 2 (1986) ("The ultimate purpose of Federal support for R&D is to develop the science and technology base needed for a strong national defense, for the health and well-being of U.S. citizens, and for a healthy U.S. economy."), *reprinted in* 1986 U.S.C.C.A.N. 3442, 3443.

63. *See* Rebecca S. Eisenberg, *Public Research and Private Development: Patents and Technology Transfer in Government-Sponsored Research*, 82 VA. L. REV. 1663, 1671-89 (1996) (describing the history of government vacillation over title to research results).

64. *See id.*; James V. Lacy et al., *Technology Transfer Laws Governing Federally Funded Research and Development*, 19 PEPP. L. REV. 1, 3-8 (1991).

65. *See* Dueker, *supra* note 61, at 461 (stating that the government spent over $30 billion in 1978 to develop 28,000 patents but licensed only five percent of them). The critics' explanation for this shortfall was that "no company was willing to invest in a product that they would have to share with their competitors." Barbara A. Duncombe, *Federal Technology Transfer: A Look at the Benefits and Pitfalls of One of the Country's Best Kept Secrets*, 37 FED. B. NEWS & J. 608, 608 (1990). There are alternative explanations, however, such as that the technologies developed in pursuit of federal laboratory missions simply did not lend themselves to broad commercial

In the 1980s, intent on encouraging industry to develop commercial products from government-generated knowledge,[66] Congress embarked on a policy of promoting "technology transfer," which it defined as the transformation of research into processes, products, and services.[67] The Stevenson-Wydler Technology Innovation Act[68] established a continuing federal duty "to ensure the full use of the Nation's Federal investment in research and development" through technology transfer to state and local governments and the private sector.[69] The Act also made technology transfer a mission of all federal agencies engaged in research and development.[70] To achieve that mission, the Stevenson-Wydler Act, as amended in 1986 by the Federal Technology Transfer Act (FTTA),[71] authorized cooperative research and development agreements (CRADAs) between federal "laboratories" and public or private entities.[72] It defined a "laboratory" as "a facility or group of facilities owned, leased, or otherwise used by a Federal agency, a substantial purpose of which is the performance of research, development, or engineering by employees of the Federal Government."[73]

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markets. *See* Eisenberg, *supra* note 63, at 1680-81.

66. *See, e.g.*, 15 U.S.C. § 3701(3) (1994) ("Many new discoveries and advances in science occur in universities and Federal laboratories, while the application of this new knowledge to commercial and useful public purposes depends largely upon actions by business and labor."); S. REP. NO. 96-480, at 19 (1979) ("It has been well demonstrated over a number of years that Federal agencies are not as successful in delivering new products and inventions to the marketplace as the private sector."), *quoted in* Dueker, *supra* note 61, at 461.

67. *See* H.R. REP. No. 96-1199, at 32 (1980), *reprinted in* 1980 U.S.C.C.A.N. 4892, 4921. Although some observers have criticized both the premises and the results of technology transfer policy, *see, e.g.*, Eisenberg, *supra* note 63, at 1726-27, national politicians have shown no inclination to retreat from that policy. *See, e.g.*, Wendy H. Schacht, Congressional Research Service Issue Brief, *Technology Transfer: Use of Federally Funded Research and Development* (last modified Aug. 28, 1997) <http://www.cnie.org/nle/st-9.html> ("The Clinton Administration has made expanded use of the federal laboratories and industry-government cooperation integral parts of its articulated technology policy.").

68. Pub. L. No. 96-480, 94 Stat. 2311, 2311-2320 (codified as amended at 15 U.S.C. §§ 3701-3714 (1994)). The other cornerstone of technology transfer policy was the Bayh-Dole Patent Act, Pub. L. No. 96-517, 94 Stat. 3015 (codified as amended in scattered sections of 35 U.S.C.), which allowed universities and small businesses to obtain title to inventions made with government financial support.

69. 15 U.S.C. § 3710 (1994 & Supp. 1996).

70. *See* 15 U.S.C. § 3710(a) (1994); H.R. REP. No. 96-1199, at 32 (1980), *reprinted in* 1980 U.S.C.C.A.N. 4892, 4921.

71. Pub. L. No. 99-502, 100 Stat. 1785 (1986) (codified as amended at 15 U.S.C. §§ 3710a-3710d (1994)).

72. 15 U.S.C. § 3710a(a)(1) (1994).

73. 15 U.S.C. § 3710a(d)(2)(A) (1994). Government-owned, contractor-operated facilities may also qualify as federal laboratories. *See id.* § 3710a(d)(2)(A), (B). Since the national parks are operated by the government, those provisions are irrelevant to

Park officials have framed the Diversa agreement as a CRADA authorized by the FTTA[74] because that structure offers significant financial advantages. The FTTA allows federal laboratories to keep payments received pursuant to CRADAs.[75] Using that authority, Yellowstone National Park will keep both the small annual payment and the potentially much larger royalties provided for by the Diversa agreement. Yellowstone's managers make no secret of their urgent need for additional funding.[76] The park has few other opportunities to increase its available funds. By law, national parks must remit all revenues they collect to the United States Treasury; only a small portion of those revenues is returned to the park system or the individual park without further legislative action.[77]

1. *The Statutory Text: Are Parks "Laboratories"?*

Plaintiffs challenge the ability of Yellowstone National Park to enter into a CRADA with Diversa. They assert that the FTTA

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this dispute.

74. *See* Diversa Agreement, *supra* note 26, §§ 1.1, 2.3.

75. *See* 15 U.S.C. § 3710c(a) (1994 & Supp. 1996). Laboratories can keep all of the CRADA payments they receive up to a ceiling of 5% of the agency's total laboratory budget for the year. Above that ceiling, they can keep 25%. *See id.* CRADA revenues must be devoted to specific enumerated purposes, including expenses incurred in licensing inventions, rewards to scientific personnel, personnel exchanges between laboratories, education and training consistent with the laboratory mission, and other technology transfer activities. *See* 15 U.S.C. § 3710c(a)(1) (1994 & Supp. 1996). That list, though, is broad enough to please any creative laboratory (or park) manager.

76. *See supra* notes 11-12. The national park system faces an overall budget shortfall estimated at $5 to $8 billion. *See Vision 2020 National Parks Restoration Act: Hearings on S. 624, S. 1614, and S. 1693 Before the Subcomm. on National Parks, Historic Preservation, and Recreation of the Senate Comm. on Energy and Natural Resources*, 105th Cong. pt. 1, at 1 (1998) [hereinafter *Vision 2020 Hearings*] (statement of Sen. Craig Thomas).

77. *See* 16 U.S.C. § 452 (1994) (providing that all revenues of the national parks shall be deposited into the national treasury). Park entrance fees are strictly limited under 16 U.S.C. § 460*l*-6a (1994 & Supp. 1996). Under that section, entrance fees are deposited into a special account for the National Park Service and then allocated to various units of the parks on the basis of need, operating costs, and collection. *See id.* § 460*l*-6a(i), (j). A temporary program instituted in 1996 allows the Park Service to increase entrance fees at selected units and keep up to 80% of that increase for use in the collecting unit; that program will expire at the end of fiscal year 1999. *See* Pub. L. No. 104-134, § 315, 110 Stat. 1321, 1321-200 to 1321-202 (1996). An attempt to extend the program failed to make its way into the National Parks Omnibus Management Act of 1998. *Compare* S. 1693, 105th Cong. § 501(a) (1998), *reprinted in* S. REP. NO. 105-202, at 12-13 (1998), *with* Pub. L. No. 105-391, §§ 501-502, 112 Stat. 3497, 3518 (1998). That Act does increase park revenues, however, by making franchise fees collected under concessions contracts available to the National Park Service without further appropriation. *See id.* § 407(c), (d).

does not authorize this agreement because the park is not a federal laboratory.[78] This claim has considerable common-sense appeal. The term "laboratory" evokes the image of a drab, institutional building lined with fume hoods, peopled by figures in white coats measuring chemical reagents into test tubes. Yellowstone, with its spectacular scenery, rustic buildings and olive-uniformed park rangers, does not fit that image.[79]

Furthermore, the Department of the Interior seems not to have thought of the national parks as laboratories for technology transfer purposes until it learned that Diversa would pay for access to the park's microbial resources. Interior did have a substantial number of CRADAs before this agreement, but virtually all were executed by the United States Geological Survey (USGS), Interior's research bureau.[80] The Park Service has never entered into a CRADA before this one, nor has it publicly expressed any desire to do so.[81] Neither the Park Service nor Yellowstone has established an Office of Research and Technology Applications, as the Stevenson-Wydler Act directs each federal laboratory to do.[82]

Nonetheless, a plausible argument can be made that the

78. *See* Complaint, *supra* note 49, at 24-25. Plaintiffs also assert that a CRADA "cannot limit or diminish existing statutory authority of any agency." *Id.* at 24. It is not entirely clear what plaintiffs mean by this claim, but it may rest on a misreading of the statute, which provides that "[n]othing in this section is intended to limit or diminish existing authorities of any agency." 15 U.S.C. § 3710a(f) (1994). That does not mean agencies cannot make CRADAs that in any respect limit the rights they would otherwise have. After all, CRADAs routinely confer intellectual property rights that would otherwise rest with the government agency on a nonfederal partner. Perhaps plaintiffs mean to refer to the requirement that CRADAs be consistent with the agency mission. *See infra* note 121 and accompanying text.

79. *See* Edmonds Inst. v. Babbitt, 42 F. Supp. 2d 1, 14 (D.D.C. 1999) ("[I]t seems absurd that an entire two-million-acre national park should be considered a 'laboratory' under the FTTA.").

80. The USGS describes its mission as providing "the Nation with reliable, impartial information to describe and understand the Earth." *See* United States Geological Survey, *U.S. Geological Survey Mission* (visited July 29, 1998) <http://www.usgs.gov/bio/USGS/mission.html>. A quick computer search turned up more than 40 notices published by USGS in the Federal Register since 1986 declaring its intention to enter into one or more CRADAs.

81. Unlike the USGS, for example, the Park Service does not devote any space in its pages on the world wide web to technology transfer. *See* United States Geological Survey, *U.S. Geological Survey Technology Transfer Information: What Is a CRADA?* (visited July 16, 1998) <http://www.usgs.gov/tech-transfer/what-crada.html>.

82. 15 U.S.C. § 3710(b) (1994). The Stevenson-Wydler Act contains its own definition of the term "federal laboratory," which seems broader than the definition used in the FTTA. *See* 15 U.S.C. § 3703(6) (1994) (defining a "Federal laboratory" as "any laboratory, any federally funded research and development center" or any Cooperative Research Center or National Science Foundation Cooperative Research Center).

national parks in general and Yellowstone in particular fit the FTTA's definition of "laboratories." The statutory definition is intended to be broad, encompassing "the widest possible range of research institutions operated by the Federal Government."[83] Although the national parks do not look much like the layman's vision of a laboratory, their unique potential for scientific research has long been recognized. The national parks have been described since their inception as natural laboratories.[84] Yellowstone is one of the most commonly cited examples. Because it is home to some two-thirds of the world's geysers and nearly 10,000 geothermal features,[85] Yellowstone National Park offers scientific opportunities not duplicated anywhere else.[86]

Until recently, there was no explicit legislative mandate for scientific research in the national parks. The National Park Service Organic Act ("Organic Act")[87] does not mention research. Scientific study is listed as a purpose in the enabling legislation of only a few national park system units.[88]

Nonetheless, scientific research has long been an important aspect of the parks' mission. Since the 1930s, it has been official Park Service policy to base natural resource management

83. *See* S. REP. NO. 99-283, at 11 (1986), *reprinted in* 1986 U.S.C.C.A.N. 3442, 3453.

84. John Muir may have been the first to describe Yellowstone as a collection of natural laboratories. *See* JOHN MUIR, OUR NATIONAL PARKS 44 (1901). Park Service Director Stephen Mather repeated that assessment in 1920. *See* U.S. DEP'T OF THE INTERIOR, ANNUAL REPORT OF THE DIRECTOR OF THE NATIONAL PARK SERVICE 66 (1920), *quoted in* ALFRED RUNTE, NATIONAL PARKS: THE AMERICAN EXPERIENCE 111 (3d ed. 1997). Mather's successor as Director gave the natural laboratories description wide circulation in a popular scientific journal in 1933. *See* Horace M. Albright, *Research in the National Parks*, 36 THE SCIENTIFIC MONTHLY 483 (1933), *reprinted in* AMERICA'S NATIONAL PARK SYSTEM: THE CRITICAL DOCUMENTS 122 (Lary M. Dilsaver ed., 1994) [hereinafter CRITICAL DOCUMENTS] (noting that national parks are "equipped by nature with the most complete and magnificent laboratories imaginable"). The phrase continues to be widely used in official Park Service documents. *See, e.g.*, National Park Service, U.S. Dep't of the Interior, *Science and Research in the National Parks* (visited June 2, 1998) <http://www.nps.gov/pub_aff/issues/scires.html>; National Park Service, U.S. Dep't of the Interior, *Management Policies* (visited Mar. 29, 1998) <http://www.nps.gov/planning/mngmtplc> [hereinafter *Management Policies*].

85. *See* T. SCOTT BRYAN, THE GEYSERS OF YELLOWSTONE 13, 196 (1979).

86. Moreover, unlike most of the world's other extensive geyser fields, Yellowstone's have not been heavily disrupted by development of energy resources. *See* PAUL SCHULLERY, SEARCHING FOR YELLOWSTONE: ECOLOGY AND WONDER IN THE LAST WILDERNESS 218 (1997).

87. Act of Aug. 25, 1916, ch. 408, 39 Stat. 535 (codified as amended at 16 U.S.C. §§ 1-4 (1994)).

88. *See, e.g.*, 16 U.S.C. § 79a (1994) (Redwood National Park); *id.* § 410tt-3 (1994) (Salt River Bay National Historical Park and Ecological Preserve); *id.* § 460y-1 (1994) (King Range National Conservation Area).

decisions on scientific research.[89] While the Park Service has never done enough science to satisfy critics,[90] it has acknowledged that "[a] sound, professional science program is essential to the successful achievement" of its mission.[91] In the National Parks Omnibus Management Act of 1998 ("Omnibus Management Act"), Congress explicitly recognized the critical need for research in the parks. The Act directs the Secretary of the Interior "to assure that management of units of the National Park System is enhanced by the availability and utilization of a broad program of the highest quality science and information."[92]

If any national park has a substantial research purpose it would be Yellowstone, which hosts roughly 200 research projects each year. Government agencies, academics, and private companies study geology, ecology, archaeology, and other topics in the park.[93] Even if Yellowstone National Park is not itself a federal research institution, it may encompass one. The Yellowstone Center for Resources, the park's scientific arm, clearly counts among its primary purposes the carrying out and

89. *See* RICHARD WEST SELLARS, PRESERVING NATURE IN THE NATIONAL PARKS: A HISTORY 97-99 (1997). Today, that commitment is embodied in the Park Service's formal management policies: "A program of natural and social science research will be conducted to support NPS staff in carrying out the mission of the National Park Service by providing an accurate scientific basis for planning, development, and management decisions." *Management Policies*, *supra* note 84.

90. *See, e.g.*, FREDERIC H. WAGNER ET AL., WILDLIFE POLICIES IN THE U.S. NATIONAL PARKS 198-99 (1995); NATIONAL RESEARCH COUNCIL, SCIENCE AND THE NATIONAL PARKS 2-4 (1992); NATIONAL PARKS AND CONSERVATION ASSOCIATION, NATIONAL PARKS: FROM VIGNETTES TO A GLOBAL VIEW 8 (1989); A.S. Leopold et al., *Wildlife Management in the National Parks*, *in* TRANSACTIONS OF THE TWENTY-EIGHTH NORTH AMERICAN WILDLIFE AND NATURAL RESOURCES CONFERENCE 29, 31, 43 (James B. Trefethen ed., 1963) [hereinafter Leopold Report], *reprinted in* CRITICAL DOCUMENTS, *supra* note 84, at 237, 239, 250.

91. NATIONAL PARK SERVICE, U.S. DEP'T OF THE INTERIOR, SCIENCE AND THE NATIONAL PARKS II: ADAPTING TO CHANGE vii (1993) [hereinafter SCIENCE AND THE NATIONAL PARKS II]; *see also* NATIONAL PARK SERVICE, U.S. DEP'T OF THE INTERIOR, NATIONAL PARKS FOR THE 21ST CENTURY: THE VAIL AGENDA 4 (1992) [hereinafter VAIL AGENDA] (emphasizing the need for a more sustained program of scientific research to support management decisions).

92. Pub. L. No. 105-391, § 202, 112 Stat. 3497, 3499 (1998) (to be codified at 16 U.S.C. § 5932). The Act requires that Interior undertake at a minimum baseline inventory and monitoring of park resources. *See id.* § 204. It also explicitly permits the Secretary of the Interior to authorize the use of the parks for outside scientific research. *See id.* § 205.

93. *See* Chester, *supra* note 3, at 13. In 1991 there were more than 300 research projects in Yellowstone, more than half undertaken by outside investigators funded by sources other than the Park Service. *See* YELLOWSTONE CENTER FOR RESOURCES, BRIEFING (unpaginated) (Feb. 12, 1997) (on file with author). Some 286 research projects were accounted for in 1995, *see* 1995 ANNUAL REPORT, *supra* note 12, at 73, and 152 were reported in 1996, *see* INVESTIGATORS' ANNUAL REPORTS FOR 1996, *supra* note 42, at 2.

overseeing of scientific research within Yellowstone National Park.[94]

Nonetheless, neither the parks in general nor Yellowstone in particular seem to be what Congress had in mind when it suggested that federal laboratories collaborate with private industry. Congress intended to enhance the value of the research federal laboratories were established to conduct. Yellowstone and the other national parks are undoubtedly valuable research sites, but they do not exist in order to perform or facilitate scientific research. Neither the Organic Act nor the Omnibus Management Act mandates that the Park Service carry out scientific research.[95] Although research is needed to fulfill the mission of the parks, research itself is not their mission.

2. *Looking Deeper: The Diversa Agreement is not Technology Transfer*

Because the statutory definition of "laboratory" is broad enough that it could encompass Yellowstone National Park but does not unambiguously do so, that term alone does not resolve the question of whether the Park has the authority to enter into a CRADA. The obvious next source, the legislative history of the Stevenson-Wydler Act and FTTA, is similarly unhelpful. Most of the discussion during consideration of the Stevenson-Wydler Act focused on the need to establish links between generators of knowledge (universities and federal laboratories) and users of knowledge (industry).[96] The major issue was the appropriate treatment of intellectual property rights in federal inventions.[97] Not surprisingly, the legislative history of both acts is virtually barren of any mention of the national parks.[98]

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94. The Center describes itself as "the division assigned primary responsibility for the science and management of natural and cultural resources in the park." 1995 ANNUAL REPORT, *supra* note 12, at iv.

95. During consideration of the bill, the Department of the Interior objected to a provision that would have mandated that the National Park Service itself establish a scientific research program. The agency argued that its research efforts were appropriately centralized in the USGS, aided by the nation's academic institutions. *See Vision 2020 Hearings*, *supra* note 76, Pt. 2, at 9 (statement of Denis Galvin, Deputy Director, National Park Service). As a result, the Act requires that the Secretary of the Interior, not the National Park Service specifically, implement a research program.

96. *See* H.R. REP. No. 96-1199, at 6-8, 18 (1980), *reprinted in* 1980 U.S.C.C.A.N. 4892, 4896-97, 4907-08.

97. *See, e.g.*, S. REP. NO. 99-283, at 1-2 (1986), *reprinted in* 1986 U.S.C.C.A.N. 3442, 3442-44.

98. There is only one mention of the National Park Service or the national parks in the entire legislative history of either act. The National Park Service is included in

The ambiguity of the language and the silence of the legislative history could leave room for a court to determine that Yellowstone does have the authority to enter into CRADAs. Such a decision, however, is hardly inevitable, and would scarcely be beyond question. In light of the motivating purposes of federal technology transfer law, the Diversa agreement cannot comfortably be described as a technology transfer instrument. The primary purpose of the Stevenson-Wydler Act is to ensure full use of the federal investment in research and development through transfer of the products of that investment to the private sector.[99] The paradigmatic CRADA serves this purpose, increasing the social return on federal research dollars by giving industry access to ideas or inventions developed during the course of mission-oriented federal research.[100] For example, the Department of Energy's Oak Ridge National Laboratory spent more than $1 million developing a remote-controlled robot to carry out maintenance tasks in radioactively contaminated areas of nuclear fuel reprocessing plants.[101] When no plans materialized to build such plants in the United States, it appeared those funds would be wasted. But the laboratory found a partner company interested in developing a commercial version of the robot. In return for the right to profit from its modified robot, the company built one for the laboratory's use.[102] Oak Ridge, the public and the company all benefitted from the exchange.

The Diversa bioprospecting agreement, unlike the Oak Ridge example, will not leverage added benefits from federal research. Instead, it will wrest a private economic benefit from the government's longstanding efforts to preserve Yellowstone's

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a chart submitted for the record by Richard E. Eckfield, representing the U.S. Conference of Mayors, with his testimony in a 1979 hearing on technology transfer. *See The Role of the Federal Laboratories in Domestic Technology Transfer: Hearings Before the Subcomm. on Science, Research and Technology of the House Comm. on Science and Technology*, 96th Cong. 390 (1979). The chart, for which no source is given, lists federal agencies, their technology transfer objectives, and implementation. The entry for the National Park Service states: "Where possible, it is NPS policy to have results of research presented in such form that they are also transmitted to other agencies, the scientific community, and the general public." *Id.*

99. *See* 15 U.S.C. § 3710(a)(1) (1994). The Bayh-Dole Act similarly states the policy of "promot[ing] the utilization of inventions arising from federally supported research or development." *See* 35 U.S.C. § 200 (1994).

100. *See* S. REP. NO. 99-283, at 1-2 (1986), *reprinted in* 1986 U.S.C.C.A.N. 3442, 3442-44.

101. *See* Daniel Charles, *Labs Struggle to Promote Spin-Offs*, 240 SCI. 874, 875 (1988).

102. *See id.*

unique thermal habitats. The agreement itself acknowledges that the government's primary contribution is preservation of the site, not research or technical know-how.[103] Although it makes an effort to include knowledge in the park's contribution to the project, the agreement is not able to articulate what unique knowledge park employees will provide.[104] Information about the thermal and chemical characteristics of Yellowstone's waters will be useful, but Diversa could readily acquire that information directly. Similarly, information about the legends of Yellowstone's hot springs, such as the tale that handkerchiefs thrown into certain pools would come up clean,[105] is available from published sources. Nor is that information necessary for the Diversa project, which involves exhaustive sampling of park microbes rather than a targeted search of limited locations for organisms with particular properties.

Moreover, because the key to this agreement is the transfer of naturally occurring biological organisms, it cannot accurately be characterized as "technology" transfer. The Stevenson-Wydler Act does not define the word "technology." The ordinary dictionary meaning implies knowledge or the products of knowledge.[106] Legislators seem to have intended that ordinary meaning,[107] and government agencies and analysts have

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103. Under the heading "Recognition of Contribution from Yellowstone National Park," the agreement provides: "Collaborator [Diversa] recognizes that the priceless nature of the research specimens at [Yellowstone National Park] and the efforts and expertise that [the National Park Service] has invested in the preservation, conservation, and protection of the research specimens will contribute significantly" to the potential for invention and development of products. Diversa Agreement, *supra* note 26, § 6.6; *see also id.* ("Collaborator agrees that efforts by the NPS to protect the physical, hydrological, and ecological integrity of YNP's thermal features, hot springs, and geysers, all of which contain globally unique microbial ecosystems, contributes significantly to the research and development of useful discoveries . . . .").

104. *See id.* Statement of Work at 4 ("YNP's capabilities that enable the park to oversee, manage, and collaborate in the research program outlined herein include fundamental knowledge regarding the ecological, geophysical, geochemical and historical elements that concern the park's unique hot spring, geyser and fumarole habitats and other novel habitats in the landscape. These capabilities, unique to YNP staff, enable the best use of selection criteria for cooperative research sampling.").

105. *See* Smith, *supra* note 12, at A1 (citing an 1888 description of the Yellowstone thermal feature now known as the Devil's Laundromat).

106. Technology includes processes, inventions, and means of applying knowledge to a practical end. *See* RANDOM HOUSE WEBSTER'S COLLEGE DICTIONARY 1371 (1995) (giving as first three definitions of technology: "the branch of knowledge that deals with applied science, engineering, the industrial arts, etc."; "the application of knowledge for practical ends"; and "a technological process, invention, or method").

107. *See supra* note 67 and accompanying text; *see also* H.R. REP. No. 96-1199, at 3 (1980), *reprinted in* 1980 U.S.C.C.A.N. 4892, 4893 (describing the primary purpose of the Stevenson-Wydler Act as the establishment of "links between generators of

proceeded on the assumption that it applied.[108] But nature, rather than knowledge, is the backbone of the Diversa deal. The company is not entering into this agreement to get access to the knowledge or skills of park employees or the results of earlier park research. What Diversa wants is access to the park's microorganisms. All the important know-how in this agreement comes from Diversa; the park provides only the raw materials.

The curious financial terms of this agreement confirm that the park is transferring natural resources rather than knowledge. As is typical of CRADAs, the Diversa agreement allows both Diversa and the Park Service to patent any inventions made solely by their employees in the course of the cooperative research and provides for joint ownership of joint inventions.[109] The Diversa agreement also contains a typical boilerplate provision allowing Diversa to obtain an exclusive license, on terms to be negotiated, to any government or joint inventions created under the agreement.[110]

At this point the Diversa agreement diverges from the typical

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knowledge (universities and Federal laboratories) and users of knowledge (industry and State and local governments)").

108. *See, e.g.*, David H. Guston, *Technology Transfer and the Use of CRADAs at the National Institutes of Health*, *in* INVESTING IN INNOVATION, *supra* note 62, at 221, 221 ("Technology transfer is the process by which expertise and its embodiment in people, processes and artifacts move from one organization, sector, or country to another."); OFFICE OF TECHNOLOGY ASSESSMENT, FEDERAL TECHNOLOGY ASSESSMENT AND THE HUMAN GENOME PROJECT iii (1995) ("Technology transfer involves converting scientific knowledge into commercially useful products."); FEDERAL LABORATORY CONSORTIUM FOR TECHNOLOGY TRANSFER, COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENT HANDBOOK 4 (1994) [hereinafter CRADA HANDBOOK] (explaining that the FTTA provides a mechanism for transferring not inventions per se, but the human skills and know-how that are essential to successfully practicing a patented invention); U.S. Geological Survey, *U.S. Geological Survey Technology Transfer Information: What Is Technology Transfer ?* (visited July 17, 1998) <http://www.usgs.gov/tech-transfer/what-tt.html> ("Technology Transfer is a process through which technical information and products developed by the Federal government are provided to potential users in a manner that encourages and accelerates their evaluation and/or use.").

109. *See* Diversa Agreement, *supra* note 26, §§ 7.2-7.3. Several model CRADAs published by other agencies contain similar terms. *See* EPA Model CRADA, Sept. 20, 1993, §§ 5.3 to 5.4 (visited Sept. 8, 1998) <http://www.epa.gov/appcdwww/crb/aptb/samplecrda.html>; *see also* Public Health Service Model CRADA, Art. 4, Jan. 22, 1998 (visited July 22, 1998) <http://www.nih.gov/od/ott/crada198.htm>; CRADA HANDBOOK, *supra* note 108, at 8 ("As a general rule, any inventions made solely by a collaborating party will be owned by the collaborating party; any inventions made solely by the federal laboratory employees will be owned solely by the government . . . and any jointly made inventions will be owned jointly by the collaborating party and the government.").

110. *See* Diversa Agreement, *supra* note 26, § 7.6; EPA Model CRADA, *supra* note 109, § 5.10.2; Public Health Service Model CRADA, *supra* note 109, at Art. 5-6.

CRADA. Generating revenue for the government is not usually an important purpose of technology transfer agreements.[111] Any revenue the government does realize from such agreements comes indirectly through subsequent licensing of government- or jointly-owned inventions. Accordingly, CRADAs usually do not include royalty provisions; royalty arrangements are worked out later in separate agreements.[112] By the same token, the private partner to a CRADA ordinarily would not expect to pay for the right to use or license others to use inventions created solely by its employees.[113]

The Diversa agreement, though, imposes just such a requirement. It gives Diversa full intellectual property rights to inventions made by company employees based on work under the CRADA. At the same time, it calls for the company to pay the Park Service a share of any profit it makes from those inventions.[114] Those payments cannot be intended to

111. *See* OFFICE OF TECHNOLOGY ASSESSMENT, *supra* note 108, at 2-3 (noting that CRADAs are useful for sharing resources but provide negligible income to the federal agencies involved); *cf.* Rebecca S. Eisenberg, *Technology Transfer and the Genome Project: Problems with Patenting Research Tools*, 5 RISK 163, 165 (1994) (noting that government revenue generation is not a viable justification for patenting the results of government-sponsored research because any savings to the public as taxpayers would come through burdening the public as consumers with higher prices).

112. *See* EPA Model CRADA, *supra* note 109, § 5.10.2; Public Health Service Model CRADA, *supra* note 109, at 5.

113. Typical CRADAs (and the Yellowstone-Diversa agreement) expressly give those partners exclusive rights to their own inventions, forestalling the need for any such payment. *See supra* note 109 and accompanying text. The Stevenson-Wydler Act also makes it clear that royalties are anticipated only from inventions made at least in part by federal employees. The Act directs federal agencies to pay the first $2,000 and 15% of all additional royalties "to the inventor or coinventors." 15 U.S.C. § 3710c(a)(1)(A)(i) (1994 & Supp. 1996). That provision was intended to provide federal employees with an incentive to create and report their inventions. *See* S. REP. NO. 99-283, at 12 (1986), *reprinted in* 1986 U.S.C.C.A.N. 3442, 3454. Obviously, Congress anticipated that any inventions for which the government received royalties would have been invented by federal employees. The legislature had no intention of sharing government royalties with industry inventors. *See id.* at 13 (stating that the legislation is not intended to set a precedent mandating royalty sharing for private inventors).

114. The details of the royalty provisions have been withheld from public release. The agreement's provision calling for royalties, however, illustrates the oddities of this deal. Article 9 of the agreement, titled "Copyright Royalties," calls for Diversa to "compensate NPS [as detailed in the redacted appendix] from royalties produced from the sale or use of copyrighted materials." Diversa Agreement, *supra* note 26, § 9.1. But the products of the Diversa agreement, enzymes and other natural products useful in industrial processes, would be expected to be protected by patents rather than copyright. The copyright term was probably obtained from a model CRADA intended to produce computer software or other copyrightable material. Such CRADAs may call for payments by the collaborating party on income from the sale or use of copyrighted works because the government generally cannot hold a copyright

compensate the Park Service for its research contributions. Because they lack Diversa's expertise, Park Service employees are quite unlikely to play any role in commercialization of Yellowstone microbes. If Service employees did play such a role, the Service would hold joint patent rights to the results and could demand licensing fees on that basis.[115] The only possible role of the royalties called for by this agreement is to compensate the Park Service for granting access to Yellowstone's microbial resources. That makes the FTTA's CRADA provisions an odd, if not outright impermissible, basis for this agreement.[116]

On the other hand, this agreement is not wholly inconsistent with the broad purposes of the federal technology transfer statutes. In addition to making the most of federal research dollars, those laws are intended to enhance the economic competitiveness of domestic technology-dependent industries.[117] The biotechnology industry, regarded by many as crucial to the nation's economic success,[118] will surely benefit from access to park resources. Providing that benefit at minimal cost might be

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on works created solely or jointly by federal employees. Consequently, the government cannot realize revenue by licensing a jointly held copyright for works produced under a CRADA. *See* CRADA HANDBOOK, *supra* note 108, at 9.

115. The Agreement leaves for the future the negotiation of licenses for any government inventions under the CRADA, so the royalty provisions are not a pre-negotiated licensing deal. *See* Diversa Agreement, *supra* note 26, §§ 7.3-.4, .6.

116. According to the Office of Technology Assessment, "the U.S. government insists that the federal investigator make an intellectual contribution to the joint work as part of the CRADA" in order to ensure that federal laboratories focus on basic scientific research. OFFICE OF TECHNOLOGY ASSESSMENT, *supra* note 108, at 14. No authority is cited for that claim, and the basis for it is not clear. Although the Federal Grant and Cooperative Agreements Act directs agencies to use cooperative agreements only when there will be "substantial involvement" by both the federal agency and the nonfederal entity in "carrying out the activity contemplated in the agreement," 31 U.S.C. § 6305(2) (1994), that Act does not apply to CRADAs. 15 U.S.C. § 3710a (1994 & Supp. 1996).

117. *See* H.R. REP. NO. 96-1199, at 3 (1980), *reprinted in* 1980 U.S.C.C.A.N. 4892, 4893 ("Overarching thrusts of the bill [that became the Stevenson-Wydler Act] are . . . to build into the Federal Government a positive concern for the welfare of industry."); *id.* at 6-7, *reprinted in* 1980 U.S.C.C.A.N. 4892, 4896-97 (noting the need for technological innovation to create increased productivity and a favorable balance of trade).

118. *See generally* Dan L. Burk & Barbara A. Boczar, *Biotechnology and Tort Liability: A Strategic Industry at Risk*, 55 U. PITT. L. REV. 791, 796-803 (1994) (describing biotechnology as a strategic industry critical to U.S. economic development). On the importance of technology-dependent industries generally to the national economy, see, for example, Michael Borrus & Jay Stowsky, *Technology Policy and Economic Growth*, *in* INVESTING IN INNOVATION, *supra* note 62, at 40, 47-48; CONGRESSIONAL RESEARCH SERVICE, TRANSFER OF TECHNOLOGY FROM PUBLICLY FUNDED RESEARCH INSTITUTIONS TO THE PRIVATE SECTOR 3 (1991) ("It has been estimated that technology-based sectors generate approximately one half of the U.S. gross national product . . . .").

just the kind of private leveraging of federal expenditures the technology transfer laws promote.[119] If the FTTA were interpreted broadly to achieve the purpose of using pre-existing government expenditures (of whatever stripe) to promote key technology-dependent industries, this agreement might fit within its scope.

It is possible, then, to read the technology transfer laws either to permit or to forbid this agreement. In either case, the inquiry cannot stop there. If the technology transfer laws do not expressly authorize this deal, they do not explicitly forbid it either.[120] Even if the technology transfer laws encompass this agreement, they are not sufficient to validate it. CRADAs must be "consistent with the missions of the laboratory."[121]

B. The Law Governing National Parks

No matter how one reads the FTTA, evaluating the legality of the Diversa contract requires some consideration of the law governing national parks in general and Yellowstone National Park in particular. The Park Service does not need the FTTA to justify this agreement if it is a permissible exercise of the Park Service's general authority. Conversely, the FTTA will not validate the agreement if it is inconsistent with the Service's underlying obligations.

Like the technology transfer statutes, the law governing parks does not directly address bioprospecting. Although the recent Omnibus Management Act contains a provision that may

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119. One criticism of federal technology transfer efforts is that federal research expenditures simply displace private dollars that would otherwise perform the same function. *See, e.g.*, COMMITTEE ON CRITERIA FOR FEDERAL SUPPORT OF RESEARCH AND DEVELOPMENT, NATIONAL ACADEMY OF SCIENCES, ALLOCATING FEDERAL FUNDS FOR SCIENCE AND TECHNOLOGY 23 (1995). That criticism does not apply to this deal. No biotechnology company could or would take over the job of protecting Yellowstone's thermal features.

120. *See* 15 U.S.C. § 3710a(f) (1994 & Supp. 1996) (stating that FTTA does not limit existing statutory authority); *see also* H.R. CONF. REP. NO. 99-953, at 15 (1986), *reprinted in* 1986 U.S.C.C.A.N. 3442, 3458 ("This authority [to enter into CRADAs] is optional . . . and is not intended to affect previously existing cooperative agreement authority.").

121. 15 U.S.C. § 3710a(d)(1) (1994 & Supp. 1996); *see also* 15 U.S.C. § 3710a(g)(1) (1994 & Supp. 1996) (stating that agencies are to implement the CRADA provision in such a way as to "advance program missions at the laboratory"); S. REP. NO. 99-283, at 11, *reprinted in* 1986 U.S.C.C.A.N. 3442, 3453 ("[C]ooperative research and development arrangements must be consistent with the missions of the laboratories . . . ."). Because the statute requires each federal agency to determine the missions of its laboratories, judicial review on this point would have to be deferential. *See* 15 U.S.C. § 3710a(e) (1994 & Supp. 1996).

have been intended to validate this agreement, it does not clearly do so. It is possible to read the applicable statutes as permitting the Diversa bioprospecting agreement, but that reading conflicts with Park Service regulations and interpretive policies.

1. The Organic Act and Yellowstone Act Provide Broad Discretion

Management of the parks generally is governed by the Organic Act, which applies to all units of the national park system except as otherwise provided by the enabling legislation of individual units.[122] The Organic Act directs the Park Service to "promote and regulate" the use of park lands in accordance with their fundamental purpose, which is "to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."[123] Park Service and Department of the Interior officials, as well as commentators, have long described this fundamental mandate as ambiguous at best, paradoxical at worst.[124] Because the mandate is so vague and flexible, it has been interpreted to afford the Park Service considerable discretion in determining the appropriate uses of the parks.[125]

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122. *See* 16 U.S.C. § 1c(b) (1994) ("Each area of the national park system shall be administered in accordance with the provisions of any statute made specifically applicable to that area. In addition, the provisions of [various general laws, including the Organic Act] shall, to the extent such provisions are not in conflict with any such specific provision, be applicable to all areas within the national park system . . . .").

123. 16 U.S.C. § 1 (1994 & Supp. 1996).

124. *See, e.g.*, Mausolf v. Babbitt, 85 F.3d 1295, 1303 (8th Cir. 1996) (acknowledging that recreational and conservationist purposes of the parks "will sometimes, unavoidably, conflict"); RONALD A. FORESTA, AMERICA'S NATIONAL PARKS AND THEIR KEEPERS 100 (1984); SELLARS, *supra* note 89, at 45 ("The act did not resolve the central ambiguity in national park management–the conflict between use and preservation . . . ."); Federico Cheever, *The United States Forest Service and National Park Service: Paradoxical Mandates, Powerful Founders, and the Rise and Fall of Agency Discretion*, 74 DENV. U. L. REV. 625, 628-29 (1997); Robert L. Fischman, *The Problem of Statutory Detail in National Park Establishment Legislation and Its Relationship to Pollution Control Law*, 74 DENV. U. L. REV. 779, 800 (1997) ("It may well be that the tension between providing for enjoyment (recreation) and leaving units unimpaired (preservation) creates an impossible paradox for the NPS to solve."); T.H. Watkins, *National Parks, National Paradox*, AUDUBON, July 17, 1997, at 40, 42; Tom Kenworthy, *Babbitt Vows to Protect National Parks*, WASH. POST, May 24, 1994, at A5 (citing Interior Secretary Bruce Babbitt as asserting that Organic Act contains an inherent conflict). *But see* Robin W. Winks, *The National Park Service Act of 1916: "A Contradictory Mandate"?*, 74 DENV. U. L. REV. 575, 612-14 (1997) (arguing that there is no contradiction because preservationist purpose is paramount).

125. *See, e.g.*, Bicycle Trails Council v. Babbitt, 82 F.3d 1445, 1454 (9th Cir. 1996) (noting that Park Service has discretion to determine what uses of park

The Yellowstone Park Act,[126] Yellowstone's enabling legislation, is similarly open to interpretation. It designates Yellowstone "as a public park or pleasuring ground for the benefit and enjoyment of the people."[127] The Secretary of the Interior is directed to make such regulations as may be necessary for the management and care of the park and "for the protection of the property therein, especially for the preservation from injury or spoliation of all . . . natural curiosities, or wonderful objects" within the park, and the maintenance of those resources "in their natural condition."[128] Like the Organic Act, the Yellowstone Act has been interpreted to give park officials broad management discretion.[129]

The Diversa bioprospecting agreement could fall within the scope of the Service's broad discretion under these acts. The Service could argue that the microorganisms Diversa intends to take are not protected park resources. The Organic Act declares that the purpose of the parks is to conserve "the scenery and the wild life therein" and provide for their enjoyment.[130] The Yellowstone Act adds "curiosities" and "wonderful objects" as resources to be protected.[131] Microorganisms, invisible to the naked eye, can hardly be considered "scenery." Yet they are natural and alive, which would seem to bring them within a common sense reading of both "natural objects" and "wild life." They also could easily be considered curious and wonderful. Nonetheless, thermophilic microorganisms undoubtedly were not among the wonders Congress intended to protect in 1872, when it created Yellowstone, or in 1916, when it enacted the Organic Act.[132] If the Park Service were to carefully consider the issue

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resources are proper); Daingerfield Island Protective Soc'y v. Babbitt, 40 F.3d 442, 446 (D.C. Cir. 1994) (noting that Organic Act gives Park Service broad but not unlimited discretion); Greater Yellowstone Coalition v. Babbitt, 952 F. Supp. 1435, 1441 (D. Mont. 1996) ("[T]he statutory purpose language obviously gives park managers broad discretion in determining how best to conserve wildlife and to leave them unimpaired for future generations."); National Wildlife Fed'n v. National Park Serv., 669 F. Supp. 384, 391 (D. Wyo. 1987) ("[T]he Park Service is empowered with the authority to determine what uses of park resources are proper and what proportion of the park's resources are available for such use.").

126. Act of Mar. 1, 1872, ch. 24, § 1, 17 Stat. 32, 32.

127. 16 U.S.C. § 21 (1994).

128. 16 U.S.C. § 26 (1994).

129. *See* Frost v. Garrison, 201 F. Supp. 389, 390 (D. Wyo. 1962); Greater Yellowstone Coalition v. Babbitt, 952 F. Supp. 1435, 1443 (D. Mont. 1996). The mandates of the Organic Act and the Yellowstone Act have been described as essentially synonymous. *See* SELLARS, *supra* note 89, at 22.

130. 16 U.S.C. § 1 (1994 & Supp. 1996).

131. *Id.* § 26.

132. Scientists did not learn that microbes could live at the high temperatures of

and conclude that these resources are not among those it must protect, a reviewing court might be hard pressed to overturn that determination. Without that consideration, however, a court might well hold the Park Service to a broad interpretation, requiring protection of these resources. Even so, the Park Service could make a strong case that Yellowstone's microflora will not be "impaired," "injured," or "spoiled" by the removal of a few small samples, as population levels will undoubtedly recover quickly.[133]

In light of the broad discretion the Park Service exercises in implementing the Organic and Yellowstone Acts, the inconspicuous nature of microbial resources, and the probability that they will suffer no lasting physical harm, a considered Park Service decision that bioprospecting will not impair protected park resources would likely survive review. So far, however, the Park Service has not made such a considered decision. Furthermore, its own regulations stand in the way of that interpretation.

2. *The National Parks Omnibus Management Act of 1998*

On November 13, 1998, President Clinton signed the Omnibus Management Act,[134] dealing in part with the place of science in the national parks. Title II of the Act, "National Park System Resource Inventory and Management," states as its purposes both to provide "clear authority and direction for the conduct of scientific study in the National Park System" and to "encourage others to use the National Park System for study to the benefit of park management as well as broader scientific value, where such study is consistent with" the Organic Act.[135] In order to achieve those goals, the Act explicitly directs the

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Yellowstone's hot springs until the 1960s. *See* Brock, *supra* note 12, at 10-13. It is quite unlikely that Congress was interested in any microbes at the time of the Yellowstone and Organic Acts. Not until the 1880s did scientists begin to recognize the ecological role of soil microorganisms. *See, e.g.*, PAUL J. VANDEMARK & BARRY L. BATZING, THE MICROBES 25 (1987); MICHAEL J. PELCZAR, JR. ET AL., MICROBIOLOGY (5th ed. 1986). Their potential value as antibiotics first became apparent in the 1940s. *See* JACQUELYN G. BLACK, MICROBIOLOGY 18 (3d ed. 1996).

133. *See supra* note 33. Clearly not every removal of park resources is prohibited. The Yellowstone Act, for example, specifically allows recreational fishing in the park. *See* 16 U.S.C. § 26 (1994) ("[The Secretary of the Interior] shall make rules and regulations governing the taking of fish from the streams or lakes in the park."). It seems unlikely that a Congress willing to allow removal of fish would automatically balk at the removal of small numbers of microorganisms.

134. Pub. L. No. 105-391, 112 Stat. 3497, 3499 (1998) (to be codified at 16 U.S.C. § 5932).

135. *Id.* § 201.

Department of the Interior to ensure that "a broad program of the highest quality science and information" supports park management,[136] and to inventory and monitor park resources.[137] It also directs the Department to enter into agreements with universities to create cooperative study units to conduct research on park resources[138] and authorizes the Secretary of the Interior to consider requests from "public or private agencies, organizations, individuals, or other entities" to conduct scientific studies in the parks.[139] Such requests are to be approved only if the proposed studies are "consistent with applicable laws and management policies" and will "pose no threat to park resources or public enjoyment derived from those resources."[140] The Secretary is further authorized to "enter into negotiations with the research community and private industry for equitable, efficient benefit-sharing arrangements."[141]

Very little formal legislative history underlies these provisions. They were not discussed on the floor of either the House or the Senate, nor do the House or Senate reports elaborate on them.[142] A 1992 Park Service report, popularly known as the Vail Agenda,[143] provided the impetus for these sections and others in the Omnibus Act.[144] That report emphasized the importance of scientific information for park management, but said little about the specific conditions under which scientific research should be permitted in the parks. The scientific research provisions were discussed at a hearing of the Subcommittee on Parks, Historic Preservation, and Recreation of the Senate Energy and Natural Resources Committee, but that discussion sheds little light on the specific provisions ultimately adopted.[145] Nonetheless, it seems clear that the Act was not intended to relax the conditions under which extramural scientific research could be conducted in the parks. As

136. *Id.* § 202.
137. *See id.* § 204.
138. *See id.*
139. *See id.* § 205(a).
140. *Id.* § 205(b).
141. *Id.* § 205(d).
142. *See* S. REP. NO. 105-202, at 18 (1998) (stating simply that Title II "directs the Park Service to implement a broad scientific research mandate to ensure that park managers have the highest quality science and information available when making resource management decisions"); H.R. REP. NO. 105-767, at 20 (1998).
143. VAIL AGENDA, *supra* note 91.
144. *See* S. REP. NO. 105-202, at 17 (1998).
145. The witnesses concentrated on the need for scientific information to support effective park management and on the appropriate administrative structure for a research program. *See generally Vision 2020 Hearings*, *supra* note 76, at 1-33.

originally drafted, the bill would have allowed use of the national parks for scientific study if that study would pose "no significant threat to or broad impairment of national park resources and public enjoyment."[146] Representatives of the Park Service, National Parks and Conservation Association, and Natural Resources Defense Council argued against this language, claiming it was inconsistent with the general requirement of the Organic Act that park resources be protected against any impairment.[147] The bill was changed in accordance with these comments, so that the enacted legislation requires that scientific research in the parks pose no threat to park resources.[148] The Omnibus Act, therefore, does not radically change the terms under which scientific research may be permitted in the national parks. Rather, it is a legislative endorsement of, and explicit mandate for, science in the national parks.

Although section 205(d), providing that the Secretary of the Interior "may enter into negotiations with the research community and private industry for equitable, efficient benefits-sharing arrangements,"[149] seems to have been directed at the Diversa situation, it does not change the background law governing what research may be done in the parks and under what conditions. This provision did not appear in the bill originally considered and passed by the Senate. It was added by the House Resources Committee, without public explanation,[150] after the Diversa lawsuit had been filed. The provision appears to be intended to shore up Park Service authority to accept money from Diversa, allowing the Park Service to share the benefits of the Diversa arrangement, in light of the substantial doubt that the technology transfer statutes provide that authority.[151] It does not, however, address the issue of whether Diversa or other researchers may be allowed to conduct any particular research in the parks. Nor does it undermine or question existing Park Service regulations governing research in the parks. Rather, this provision of the Omnibus Management

146. *See id.* at 10 (quoting language from the bill).

147. *See id.* at 10 (statement of Denis Galvin, Deputy Director, National Park Service), 20, 23 (statement of William J. Chandler, Vice President, Conservation Policy, National Parks and Conservation Association), 32 (statement of Charles M. Clusen, Senior Policy Analyst, Natural Resources Defense Council).

148. *See supra* text accompanying note 140.

149. Pub. L. No. 105-391, § 205(d), 112 Stat. 3497, 3499 (1998) (to be codified at 16 U.S.C. § 5932).

150. *Compare* S. REP. NO. 105-202, at 3 (1998), *with* H.R. REP. NO. 105-767, at 4 (1998).

151. *See supra* text accompanying notes 78-121.

Act simply gives the Park Service greater discretion to distribute the benefits of research that is carried out in the parks. It could be cited to support an argument that the Park Service enjoys the discretion to permit bioprospecting, but it does not, of its own force, validate the Diversa agreement.

3. *Current Regulations are Inconsistent with the Diversa Deal*

Although it would be possible to read the relevant legislation in such a way as to permit this agreement, the Park Service has established a different interpretation. The Park Service's regulations adopt a broad view of the scope of park resources subject to protection and characterize any commercial use of those resources as an unacceptable impairment.

The Park Service's regulations generally prohibit the removal from their "natural state" of wildlife, fish, plants, cultural or archaeological resources, and mineral resources or their parts.[152] The regulations also bar the gathering, possession, and unauthorized removal from the park of "natural products."[153] Thermophilic bacteria might not be wildlife, fish, plants, or mineral resources within the meaning of these regulations,[154] but they do seem to be "natural products." The Diversa agreement itself uses that term to refer to the specimens the company will collect,[155] and certainly bacteria are natural. Although the Park Service has never formally defined the term "natural product," the history of the bar on removing objects from the park suggests a broad interpretation. The earliest formal park regulations prohibited disturbance or removal of "any tree, flower, vegetation, rock, mineral, formation, stalactite, stalagmite, phenomenon of crystallization, incrustation in any

152. *See* 36 C.F.R. § 2.1(a)(1) (1998).

153. *See id.* § 2.1(c)(3)(i).

154. "Wildlife" and "fish" are defined terms. The former means "any member of the animal kingdom . . . except fish" and the latter is limited to "any member of the subclasses Agnatha, Chondrichthyes, or Osteichthyes, or any mollusk or crustacean found in salt water." 36 C.F.R. § 1.4 (1998). Although not defined by the regulations, the term "plants" in ordinary usage is limited to organisms that use photosynthesis to convert sunlight to chemical energy and in common usage is often further limited to multicellular organisms. The Yellowstone thermophilic bacteria do not fit either of those criteria. "Minerals" is also not a defined term, but its ordinary usage would not encompass living organisms like the Yellowstone thermophiles.

155. Diversa Agreement, *supra* note 26, § 2.11 (defining "natural product" as "any naturally occurring Research Specimen located in or taken from" the park). Other portions of the Diversa agreement make it clear that the Park Service believes a permit is required to remove these specimens. *Id.* Statement of Work at 4 (describing the permit requirement as a constraint on the research activity contemplated); *see also id.* App. A (Yellowstone National Park Research Authorization/Collection Permit).

lava tube, cave, steam vent, or cone, or of any animal, bird, or other wildlife, or of any ruins or relics, or of any other public property of any kind."[156] Although the current regulations are differently phrased, there is no reason to think they are intended to have any narrower coverage. Whatever their biological category, Yellowstone's hot spring microbes, which spend all their life on federal land or in federal waters, would seem to be "public property" of some kind.[157]

Although it agrees that thermophilic microorganisms are natural products, the Park Service believes it may authorize their removal from the park. Park Service regulations provide several exceptions to the general prohibition on removal of natural products. One such exception allows park superintendents to issue permits for the collection of research specimens.[158] Research collection permits are limited to government agencies and representatives of "reputable scientific or educational institutions."[159] The park superintendent must find that collection is necessary to the stated scientific and resource management goals of the applicant and will not damage park resources.[160] No permit may be issued "if the specimen is readily available outside of the park area."[161] Specimens and data derived from consumed specimens must be made available to the public, and copies of reports and publications must be filed with the park superintendent.[162] The Park Service is disposed to

156. Department of the Interior, National Park Service, Rules and Regulations, 1 Fed. Reg. 672, 673 (1936).

157. There is very little law on the ownership of naturally occurring microbes. In general, the common law considered plants, which are sessile, to be the property of the person who owned the land upon which they grew. *See* Linda McMahan, Comment, *Legal Protection for Rare Plants*, 29 AM. U. L. REV. 515, 526-28 (1980). Animals, which are freely mobile, were not owned by anyone until captured. *See, e.g.*, MICHAEL J. BEAN, THE EVOLUTION OF NATIONAL WILDLIFE LAW 8 (3d ed. 1997). States, however, have a property-like interest in the animals within their jurisdiction, and the federal government has a similar interest in the animals that inhabit federal lands. *See id.* at 14-15, 19-22; Kleppe v. New Mexico, 426 U.S. 529, 537 (1976). The logic of the common law differentiation between animals and plants suggests that micro-organisms, because they are not mobile, should be considered the property of the landowner. By that logic, Yellowstone's thermophiles are surely federal property.

158. *See* 36 C.F.R. § 2.5(b) (1998). Permits have been formally required for scientific collection in the parks at least since the 1930s. *See* Department of the Interior, National Park Service, 1 Fed. Reg. at 673 (1936) ("Collections for scientific or educational purposes shall be permitted only in accordance with written permits first had and obtained from the superintendent.").

159. 36 C.F.R. § 2.5(b) (1998).

160. *See id.*

161. *Id.*

162. *See* 36 C.F.R. § 2.5(g)(2) (1998). In a policy statement obviously adopted with the Diversa agreement, and perhaps Taq polymerase, in mind, the Park Service

approve requests for research permits so long as they will not threaten park values.[163] Park Service policies, however, state that manipulative or destructive research will not be permitted unless "the impacts will be short-lived, the park is the only area where such research can be conducted, the value of the research is greater than the resource impacts, or the research is essential to provide information for resource management."[164]

Prior to the Diversa agreement, Yellowstone and other national parks had relied on this authority to allow bioprospecting.[165] The Diversa agreement continues that reliance; it is accompanied by a scientific research collection permit.[166] But close examination shows that the authority to issue scientific collection permits does not cover this agreement.

The first problem is that other Park Service regulations flatly forbid the sale or commercial use of natural products.[167] Research specimen permits do not provide an exception to that prohibition. In fact, Park Service policies forbid the use of research specimens for commercial profit.[168] Park Service officials argue that the Diversa agreement will commercialize only the end products developed by the company, not the

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asserts that it has a right to any royalties "that may accrue from present and yet to be discovered applications from the collected specimen." National Park Service, U.S. Dep't of the Interior, *Special Park Use Guidelines*, A9-2 (Release No. 2, Sept. 1997) (visited Mar. 30, 1998) <http://www.nps.gov/refdesk> [hereinafter *Special Park Use Guidelines*].

163. *See* General Regulations for Areas Administered by the National Park Service, 48 Fed. Reg. 30,252, 30,266 (1983) (to be codified at 36 C.F.R. pts. 1-7, 12) ("[C]ollection for scientific purposes should be allowed unless prohibited by the enabling legislation for a park area and when such collection will not result in derogation of park values, and has the potential of conserving and perpetuating such biota."); *Management Policies*, *supra* note 84 ("In recognition of the scientific value of parks as natural laboratories, investigators will be encouraged to use the parks for scientific studies when such use is consistent with NPS policies.").

164. *Management Policies*, *supra* note 84.

165. *See supra* note 14 and accompanying text.

166. *See* Diversa Agreement, *supra* note 26, at app. A.

167. *See* 36 C.F.R. § 2.1(c)(3)(v) (1998) ("The following are prohibited: . . . Sale or commercial use of natural products.").

168. *See Special Use Guidelines*, *supra* note 162, Ex. 3, at A18-10 ("Collected specimens may be used for scientific or educational purposes only, shall be dedicated to public benefit, and shall not be used for commercial profit."). These guidelines, which have not been formally promulgated as regulations in accordance with the requirements of the Administrative Procedure Act, probably are not directly judicially enforceable against the Park Service. *See, e.g.*, Western Radio Servs. Co. v. Espy, 79 F.3d 896, 901 (1996); Chrysler Corp. v. Brown, 441 U.S. 281, 315-16 (1979). Nonetheless, they reinforce the most natural reading of the Park Service's regulations, that research specimens are not exempt from the general prohibition on commercial use.

microbial resources removed from Yellowstone,[169] but this contention is not persuasive. Although it does not plan to sell Yellowstone specimens, Diversa is using those specimens to produce products it will sell for profit, a commercial purpose. Moreover, the financial terms of the Diversa agreement strongly suggest that the park is selling microbial samples to Diversa.[170]

But that is not the only shortcoming of this agreement. The Diversa permit also may be inconsistent with the regulation limiting collection permits to reputable scientific or educational institutions. The Park Service has never directly explained the purpose of this limitation. The provision's history, though, suggests that it is intended at a minimum to assure that specimen collection in the parks benefits the public, rather than the collector alone. When it was added in 1941, this limitation was coupled with a prohibition on collection for personal, as opposed to public, use.[171] Limiting permits to institutions effectively excludes individual collectors, whose collections are more likely to serve their personal aesthetic and financial interests than to add to the public knowledge base.[172]

The regulation's drafters undoubtedly were thinking of universities and research institutions like the Smithsonian as the kinds of "reputable" institutions whose scientists should be encouraged to carry out research projects in the park. The regulatory language does not explicitly rule out collection by a commercial entity, probably because the Park Service simply had not envisioned the possibility that research in the parks could be commercially valuable. The regulation suggests, however, that

169. *See* Smith, *supra* note 12, at A1; *see also* 1995 ANNUAL REPORT, *supra* note 12, at 9 ("These tiny research specimens represent not a biological commodity, but a piece of 'intellectual property' in the form of a genetic code that the park has protected.").

170. *See supra* notes 109-16 and accompanying text.

171. The 1941 regulation forbade permits for collecting for personal use, and required that specimens collected from the parks "be made permanently available to the public." National Park Service, General Rules and Regulations, 6 Fed. Reg. 1626, 1629 (1941).

172. Some individual collectors may be amateurs dedicated to the promotion of science and quite capable of producing important scientific knowledge. *See, e.g.*, Arthur M. Shapiro, *The Morality of Collecting: Who Cares and Why?*, NEWS OF THE LEPIDOPTERISTS' SOC'Y, Mar./Apr. 1993, at 54, 54-55 ("[S]ome amateurs ('hobbyists') have made and continue to make superb contributions to science, and some professionals have made at best trivial, insignificant, redundant or grossly wrongheaded contributions."). Many individual collectors, however, will be more bent on advancing their collections for personal aesthetic or financial reasons. If the latter are numerous, and if institutional scientists will pick up much of the work of the former, excluding all individual collectors will be more cost-effective than trying to separate "good" individuals from "bad" ones.

commercial collecting is not permissible. The term "institution" usually connotes a public service organization, not a for-profit corporation like Diversa.[173] That connotation is consistent both with the preference for public rather than private benefits and with the prohibition on commercial use of park resources.

In addition, limiting permits to reputable scientific and educational institutions may help ensure, with minimal expenditure of Park Service resources, that the science carried out is worthwhile and the collecting done is necessary to accomplish that science. Serious scientists from reputable institutions are likely to know what science can usefully be done in the parks. With their own and their institutions' reputations at stake, they may generally be trusted to limit their collecting to the extent necessary. Given the reality of limited administrative resources for oversight of collection permits, the restriction to "reputable institutions" can help effectuate the additional requirement that collection be necessary to a scientific purpose.[174]

That requirement points out another problem with the Diversa agreement. Implicit in the mandate that collection serve stated scientific goals is the assumption that collecting will be done only for scientific purposes. But Diversa's purpose is not primarily "scientific." It is, instead, commercial. Science is the quest for knowledge about nature, and the process used to gather such knowledge.[175] Although Diversa undoubtedly will generate some new knowledge about nature pursuant to this agreement, that is not the purpose of its microbial sampling. The company's purpose is to find valuable enzymes that will increase its profits; it is not particularly interested in increasing the world's store of knowledge about thermophilic organisms.

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173. *See* RANDOM HOUSE WEBSTER'S COLLEGIATE DICTIONARY 698 (1995) (giving the first definition of institution as "an organization or establishment devoted to the promotion of a cause or program, esp. one of a public, educational, or charitable character"); THE AMERICAN HERITAGE DICTIONARY OF THE ENGLISH LANGUAGE 680 (New College ed. 1976) (listing as one definition of "institution" "an established organization; especially one dedicated to public service, as a university").

174. *See supra* note 160 and accompanying text. The parks, notoriously short of personnel with scientific expertise, *see* NATIONAL RESEARCH COUNCIL, *supra* note 90, at 73-76, are not likely to be very good at evaluating the extent to which collection is needed to achieve any particular scientific goal.

175. *See, e.g.*, Holly Doremus, *Listing Decisions Under the Endangered Species Act: Why Better Science Isn't Always Better Policy*, 75 WASH. U. L.Q. 1029, 1057 (1997) (describing science as a process for gathering knowledge about the world, and the body of knowledge produced by that process); RANDOM HOUSE WEBSTER'S COLLEGE DICTIONARY (1995) (defining "science" as among other things "systematic knowledge" or "knowledge gained by systematic study").

Furthermore, a distinctive feature of science is that the knowledge it generates is made widely available.[176] Diversa, like other industrial research operations, has little incentive to reveal what it learns from its Yellowstone work.[177] There is some science in this agreement, but it is incidental to the commercial purpose.[178]

In addition, the Diversa agreement does not comfortably square with the requirement that a permit be denied if the specimen sought is readily available outside the park.[179] That requirement presupposes that the collector knows what specimen it is seeking, but less than 1% of Yellowstone's microorganisms have been identified.[180] Thus, neither Diversa nor the park can know in advance what organisms will be collected or whether those organisms could be found elsewhere. Whether Diversa's work complies with this requirement, therefore, depends upon which side has the burden of proof. Because Yellowstone has a unique range of thermal habitats,[181] it might seem plausible that many specimens available in Yellowstone would not be available elsewhere. History, however, provides grounds to doubt that supposition. Yellowstone's most famous microbe, *Thermus aquaticus*, turned up in many thermal sites, including water heaters, following its discovery at Yellowstone.[182] Undoubtedly many of the microbes in Yellowstone's hot springs are also available elsewhere.

The Diversa agreement may also conflict with the regulatory

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176. *See, e.g.*, ROBIN DUNBAR, THE TROUBLE WITH SCIENCE 31 (1995) (stating that part of the process of science is putting ideas into the arena of public debate); JOHN ZIMAN, RELIABLE KNOWLEDGE: AN EXPLORATION OF THE GROUNDS FOR BELIEF IN SCIENCE 31 (1978) (noting that results must be made publicly available for testing and extension).

177. *See infra* text accompanying note 309.

178. Justice Mosk of the California Supreme Court drew a similar distinction in his dissent in *Moore v. Regents of the University of California*, 793 P.2d 479 (Cal. 1990). The statute in question allowed only the "scientific use" of excised human body parts. Justice Mosk agreed that "scientific use" would include examination of the tissue for the purposes of medical diagnosis and treatment as well as "purely scientific study by a disinterested researcher for the purpose of advancing medical knowledge." *Id.* at 508 (Mosk, J., dissenting). Because the researchers allegedly sought to promote their own economic, financial, and competitive interests by establishing a cell line from Moore's cells, however, Justice Mosk would have found that their use was commercial rather than "scientific." *Id.* at 508-09; *cf.* American Geophysical Union v. Texaco, Inc., 60 F.3d 913, 916, 920 (2d Cir. 1994) (distinguishing between commercial and noncommercial research for purposes of fair use analysis under copyright statute).

179. *See* 36 C.F.R. § 2.5(b) (1998).

180. *See* Smith, *supra* note 12, at A1.

181. *See supra* notes 85-86 and accompanying text.

182. *See* Brock, *supra* note 12, at 14.

requirement that collected specimens and the data derived from consumed specimens be made available to the public.[183] The agreement calls for Diversa to destroy all collected specimens in order to extract their DNA.[184] But Diversa will be culturing at least some samples,[185] and presumably could grow enough to make some specimens available to the public.[186] Some data, specifically the phylogeny constructed for the park, will be made available to the public. But the extent to which additional information generated under the agreement, such as descriptions of the genes or enzymes isolated from the samples, will be made publicly available is unclear. The agreement flatly forbids the public release of data Diversa designates as proprietary.[187] Furthermore, the major product of this research will not be *information* but rather *things*, genes or enzymes that can be produced in commercial quantities. Those are not likely to be made available to the public on the free-access terms contemplated by the regulation.

In sum, the Diversa bioprospecting agreement probably could be permitted under the legislation governing Yellowstone and other parks, but it is inconsistent in several respects with Park Service regulations designed to preclude commercial exploitation and to assure that any science performed in the parks yields public, rather than private, benefits. The obvious next question is which should be reconsidered, the agreement or the regulations with which it conflicts. Answering that question requires a clearer picture of the functions of the national parks.

III

THE IMPORTANCE OF NATIONAL PARKS AS SOURCES OF INSPIRATION

The Organic Act provides only the vaguest explanation of the fundamental purposes of national parks. It speaks of both use and conservation.[188] It tells the Park Service not to "administer the parks in derogation of the purposes for which they have been established."[189] More than three-quarters of a century after the establishment of the Park Service, the fundamental purposes of

183. *See* 36 C.F.R. § 2.5(g)(2) (1998).

184. *See* Diversa Agreement, *supra* note 26, Statement of Work at 2.

185. *See id.*

186. The American Type Culture Collection offers a mechanism for making specimens widely available. *See infra* note 340.

187. *See* Diversa Agreement, *supra* note 26, Statement of Work at 11.

188. *See* 16 U.S.C. § 1 (1994 & Supp. 1996).

189. 16 U.S.C. § 1a-1 (1994).

the national parks remain surprisingly unclear.[190] It is clear, however, that the parks are more than simply physical resources. Those who fought most strongly for establishment of the national parks saw them as places that could inspire and refresh the populace and express the nation's special respect for its unique national resources.[191] In today's world, the parks should be places where the populace can be inspired with the wonder of nature and the understanding that some things are too special to be sold.

A. *Historic Background*

1. *The Ideal of Parks as Inspirational and Symbolic Places*

The precise reason why the earliest national parks, beginning with Yosemite[192] and Yellowstone,[193] were set aside was not directly stated in their enabling legislation nor was it made clear in the political debates at the time.[194] Most observers

190. Park officials admit that they do not know quite why the parks exist. *See, e.g.*, VAIL AGENDA, *supra* note 91, at 13 ("Why would a nation want a system of national parks? If we can answer this question, it will help define the purpose of the National Park Service as it looks beyond its seventy-fifth anniversary into the next century."); WAGNER ET AL., *supra* note 90, at 159 (quoting a "veteran NPS biologist" as asking "what are we managing the parks for?"). Of course, the Park Service has some incentive not to clarify the precise purposes of the parks, as doing so might constrain their currently broad managerial freedom. *See* Cheever, *supra* note 124, at 638-39 ("Paradoxical mandates were a particularly useful form of legislative carte blanche. They appear to have substance because they speak of general values in mandatory terms. However, they do not significantly constrain agency action."). But outsiders also seem uncertain about the purposes of the parks. *See, e.g.*, Ted Williams, *Deregulating the Wild*, AUDUBON, July 17, 1997, at 56, 56-57 (stating that it is as true today as when Theodore Roosevelt said it that "we are not yet sure as a people just what we want [national parks] for").

191. *See infra* notes 197-217.

192. The United States conveyed Yosemite Valley and the surrounding peaks to the state of California in 1864 for "public use, resort and recreation." Act of June 30, 1864, ch. 184, 13 Stat. 325. The land was returned to the United States and designated a national park in 1906. *See* Act of June 11, 1906, ch. 27, § 1, 34 Stat. 831, 831.

193. Yellowstone was "set apart as a public park or pleasuring ground" in 1872. Act of March 1, 1872, ch. 24, § 1, 17 Stat. 32, 32.

194. *See* JOSEPH L. SAX, MOUNTAINS WITHOUT HANDRAILS: REFLECTIONS ON THE NATIONAL PARKS 5 (1980) ("What exactly was meant to be accomplished by these unprecedented reservations is a mystery that will never be fully solved."). Yosemite was set aside for "public use, resort and recreation." *See supra* note 192. Yellowstone's enabling act simply stated that the designated land "is reserved and withdrawn from settlement, occupancy, or sale under the laws of the United States, and dedicated and set apart as a public park or pleasuring ground for the benefit and enjoyment of the people." Act of March 1, 1872, ch. 24, § 1, 17 Stat. 32 (codified at 16 U.S.C. § 21 (1994)). Virtually the same language was repeated in the 1890 Act

have concluded that these areas were designated for preservation primarily on account of their spectacular natural scenery.[195] Government action was thought necessary to prevent the physical destruction of these scenic wonders because private caretakers, driven by the exigencies of the economic market, might be unable to resist the temptation to destroy them for short-term profit.[196]

But that was not the only basis for preferring public control. Park advocates believed these magnificent areas should be made available to all members of the public, which required that they be kept out of the hands of profiteers who would charge exorbitant access fees.[197] Moreover, there seems to have been a sense that the encroachments of vulgar commercialism were themselves a form of despoliation. The desire to avoid repeating the failures of Niagara Falls, the epitome of crass commercialization, proved an important motivating force for the national parks movement.[198]

Why was it so desirable to protect these special places not only against physical destruction but also against rampant commercialism and elitism? Because they offered the nation far more than mere scenery. In his seminal history of the national

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that created Sequoia National Park. Act of Sept. 25, 1890, ch. 926, § 1, 26 Stat. 478, 478 (codified at 16 U.S.C. § 41 (1994)).

195. *See* SELLARS, *supra* note 89, at 30; RUNTE, *supra* note 84, at 29. The earliest public statement of Park Service policy, a 1918 letter from Secretary of the Interior Franklin Lane to Park Service Director Stephen Mather emphasized the importance of scenery in park selection. *See Letter from Franklin Lane to Stephen Mather, May 13, 1918, in* CRITICAL DOCUMENTS, *supra* note 84, at 48, 51 [hereinafter *Lane Letter*] (urging that new parks be limited to "scenery of supreme and distinctive quality or some national feature so extraordinary or unique as to be of national interest and importance").

196. For example, Frederick Law Olmsted, a leading proponent of national parks, argued that the market would lead, rather than follow, public tastes, inducing private owners to convert these areas to more profitable uses than the contemplative reflection Olmsted preferred. *See* Joseph L. Sax, *America's National Parks*, 85 NAT. HIST. 57, 75 (1976).

197. The House Committee on the Public Lands explained the need for the legislation by reference to the danger that private claimants might "fence in these rare wonders so as to charge visitors a fee, as is now done at Niagara Falls, for the sight of that which ought to be as free as the air or water." H.R. REP. NO. 42-26, at 69 (1872). "By the 1860s not a single point remained in the United States from which the falls could be viewed without paying a landowner an entry fee." Joseph L. Sax, *supra* note 196, at 64. Such a fate simply could not be permitted for other spectacular areas. Park chronicler John Ise expressed this idea forcefully in 1961: "Private monopoly of such unique scenic wonders would be repugnant to all sense of justice and propriety." JOHN ISE, OUR NATIONAL PARK POLICY: A CRITICAL HISTORY 5 (1961).

198. *See* RUNTE, *supra* note 84, at 5-9 (describing European condemnation of the commercialization of Niagara Falls as an embarrassment to the nation).

parks, Alfred Runte attributes the national park movement of the 19th century to the search of a still-young nation, whose human works could not compare with those of Europe, for a national identity in which it could take pride.[199] Surely national pride is an important product of our national parks. But the mere existence of natural wonders like Yosemite and Yellowstone could not justify much pride, though it might inspire a feeling that the nation was blessed by fortune. What could justly fuel national pride was the preservation of such wonders. Americans, in addition to envying Europe its history and cultural achievements, had been stung by criticism of American materialism.[200] Preservation of the country's spectacular national wonders for public enjoyment allowed America to show the world that it recognized values other than money.[201] In this way, creation of the national parks allowed America to take pride in its national character.[202] The parks symbolized what was best in the nation, not just in its natural beauty but also in its human character.

The parks were not only intended to express the most noble

199. *See id.* Not everyone, however, is persuaded that the search for national pride was an important aspect of the national park movement. *See, e.g.*, SCHULLERY, *supra* note 86, at 62-63.

200. In his study of America, Alexis de Tocqueville noted that the Americans refused to condemn, and sometimes even praised, traits "that common sense and the universal conscience of mankind condemn," such as "the love of money." ALEXIS DE TOCQUEVILLE, DEMOCRACY IN AMERICA 621 (J.P. Mayer ed., Anchor Books 1969) (1835). Although de Tocqueville regarded the immoderate American desire for wealth as useful in the context of American society, *see id.* at 284, he condemned it in the abstract as ultimately degrading to humanity, *see, e.g., id.* at 543-44. Some Americans also criticized their compatriots' materialistic excesses. For example, a Californian protested the cutting of giant redwoods for exhibit in Europe and New York, protesting that in Europe the trees would have been protected by law "but in this money-making, go-ahead community," they were sold for cheap amusement. RUNTE, *supra* note 84, at 27.

201. During the battle over Hetch Hetchy, John Muir wrote: "Dam Hetch Hetchy! As well dam for water-tanks the people's cathedrals and churches, for no holier temple has ever been consecrated by the heart of man." John Muir, *Hetch Hetchy Valley, in* JOHN MUIR, NATURE WRITINGS 810, 817 (William Cronon ed., 1997). Muir also wrote that "Nothing dollarable is safe, however guarded." *San Francisco and the Hetch Hetchy Reservoir: Hearings on H.R.J. Res. 184 Before the House Comm. on the Pub. Lands*, 60th Cong. 32 (1909) (memorandum from John Muir, President, Sierra Club). Establishment of the national parks was a declaration that these areas, at least, were not and never would be "dollarable." Runte points out that the early parks appeared to have little economic value other than as tourist destinations. *See* RUNTE, *supra* note 84, at 48-64. That made it politically easier to make the initial declaration that their resources were not for sale, but it does not diminish the moral force of the declaration.

202. Runte sees this function in today's national parks, although he seems to miss it in their origins. *See* RUNTE, *supra* note 84, at xvi.

aspects of the national character, they were expected to play a role in creating and passing on that character. Although the parks were often referred to as playgrounds,[203] that term was not intended to connote cheap mass amusement.[204] The parks were supposed to offer recreation of a kind not available elsewhere, "healthful" recreation that could inspire, educate and improve those who engaged in it.[205] As Gifford Pinchot, the first director of the Forest Service, pointed out in opposition to the proposal to create a national park service distinct from the Forest Service, the national forests provided opportunities for ordinary outdoor recreation.[206] Parks, to justify their distinct status, had to provide special recreational opportunities.

Park advocates insisted that parks would offer a form of recreation that would make people better citizens. Stephen Mather, the first director of the Park Service, envisioned the parks as places where people could renew their spirits and become better citizens through clean living in the outdoors.[207] Frederick Law Olmsted, a leading advocate of the parks ideal in the late 19th century and one of the first commissioners of the Yosemite Valley,[208] believed that the parks should "draw people out of the routine of daily life, to create a total and encompassing experience, to change the entirety of their pace and permit the rhythm of the park to take over."[209] Olmsted was convinced that spectacular natural scenery would stimulate healthy contemplation and pure reflection, which in turn would regenerate spirits dulled by the constant labor of the ordinary

203. *See, e.g.*, SELLARS, *supra* note 89, at 58 (quoting Stephen Mather); *Letter from Secretary of the Interior Hubert Work to Park Service Director Mather, March 11, 1925, reprinted in* CRITICAL DOCUMENTS, *supra* note 84, at 62 [hereinafter *Work Letter*].

204. The term "the nation's playgrounds" signified places where the public might enjoy rest, solitude, and recreation. It was used in preference to "resort" because the latter was thought to have an undemocratic ring. *See* Winks, *supra* note 124, at 585.

205. *See Superintendents' Resolution on Overdevelopment, reprinted in* CRITICAL DOCUMENTS, *supra* note 84, at 57 [hereinafter *Superintendents' Resolution*] (describing parks' mission as "healthful recreation and education"). Nonetheless, a great many activities were apparently considered sufficiently healthful, or at least sufficiently compatible with self-improvement to be permitted. Director Mather "personally encouraged construction of golf courses in Yosemite and Yellowstone, believing that tourists would stay longer in the parks if they had more to entertain them." SELLARS, *supra* note 89, at 63.

206. *See* SELLARS, *supra* note 89, at 36 (describing Pinchot's opposition to the Organic Act proposal on grounds that national forests could provide needed recreation).

207. *See id.*

208. *See* RODERICK NASH, WILDERNESS AND THE AMERICAN MIND 106 (1st ed. 1967).

209. Sax, *supra* note 196, at 81.

citizen's life.[210] John Muir,[211] Robert Marshall,[212] and Horace McFarland[213] agreed that parks would help instill in citizens the vigor, patriotism, and productivity the nation needed.

An important aspect of this civilizing recreational experience was its availability to all, rich and poor alike. Olmsted, an advocate of urban parks as well as national parks, noted in the context of the former that the congregation of all classes in the outdoors could create a sense of community, helping to combat the isolation of increasingly urban life.[214] Introduction of visitors to the wonders of nature was a key element of this socializing function.[215] It was hoped that exposure to the spectacular wonders of the national parks would encourage people to notice the myriad smaller wonders that fill the natural world.[216] Recognizing that the messages parks conveyed to visitors, as well as their physical resources, deserved protection, the early Park Service included the "dignity" and "grandeur" of the parks in the list of attributes it vowed to protect.[217]

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210. *See* SAX, *supra* note 194, at 19-21.

211. *See, e.g.*, MUIR, *supra* note 84, at 1 ("Thousands of tired, nerve-shaken, over-civilized people are beginning to find out that . . . mountain parks and reservations are useful not only as fountains of timber and irrigating rivers, but as fountains of life.").

212. *See* RUNTE, *supra* note 84, at 95-96.

213. *See id.* at 88-89; *see also id.* at 96 (setting forth 1909 statement of the director of the USGS that parks could help maintain "industrial supremacy"); VAIL AGENDA, *supra* note 91, at 73 (citing the idea that wholesome recreation is necessary for worker productivity as one basis for creation of the national parks).

214. *See* Frederick Law Olmsted, *Public Parks and the Enlargement of Towns, in* CIVILIZING AMERICAN CITIES 75-77 (S.B. Sutton ed., 1979); Carol Rose, *The Comedy of the Commons: Custom, Commerce, and Inherently Public Property*, 53 U. CHI. L. REV. 711, 779 (1986). While inaccessibility to daily use prevented the national parks from substituting for community parks in this respect, they could reinforce the social cohesion developed in more local parks.

215. *See Superintendents' Resolution*, *supra* note 205, 58-59 ("A vital part of the education of every individual is to acquire at least a partial understanding and appreciation of nature and scenery. . . . The study of nature develops power of observation, quickens the senses, increases the usefulness of an individual in any line of work or occupation, and makes his life broader, deeper, happier. . . . [N]ot all of Nature's treasures are to be seen from the seat of an automobile; one does not receive at twenty miles an hour, the inspiration that results from a pilgrimage on foot . . . . The national parks should be a real factor in the building of a better, stronger race.").

216. *See* RUNTE, *supra* note 84, at 31 (citing John Muir's hope that the public, which would be drawn to the spectacular, would then learn to see smaller wonders).

217. *See, e.g.*, *Superintendents' Resolution*, *supra* note 205, at 57 (noting that parks preserve fine scenery for future generations, "that they may always know the quiet dignity of our forests and the rugged grandeur of our mountains"); *Lane Letter*, *supra* note 195, at 51 (noting that "[t]he national park system as now constituted should not be lowered in standard, dignity, and prestige by the inclusion" of less magnificent new areas); *Work Letter*, *supra* note 203, at 65 ("Our existing national

2. *The Reality of Parks as Cheap Amusement*

Nonetheless, from their very inception the national parks fell short of the goal of presenting nature's wonders in a way that would inspire visitors rather than simply amuse them. Even before Yosemite was formally designated as a national park, it gave way to what Runte calls "carnivalism."[218] James McCauley, the builder of a hotel at Glacier Point, began the tradition of the firefall, pushing smoldering embers over the cliff. As they fell, the embers glowed brightly, delighting observers with the illusion of a flowing river of fire.[219] "Tunnel trees" were invented in the same era; to attract publicity and attention, carriage roads were carved through living redwood trees.[220] There was even talk of "improving" Yosemite's signature waterfalls by building reservoirs to augment their flow in California's dry summers.[221] Yellowstone received similar undignified treatment, with colored spotlights highlighting the evening eruptions of Old Faithful geyser and "performances" in which bears were fed garbage in an amphitheater for the amusement of visitors.[222]

Some of the unnatural treatment of parks in this era can be attributed to a lack of understanding of nature's complexities. Early park managers freely manipulated nature to make the parks more aesthetically pleasing and appealing to recreational visitors.[223] They seem to have assumed that a pleasing appearance would reflect a healthy land.[224]

But the failure to achieve in practice the ideal of protecting the parks as symbols of the nation's respect for nature was also due to the undeniable fact that other, incompatible, goals were always part of the political mix. In order to win political support for their cause, advocates of the national park system early on moved away from strict reliance on the inspirational possibilities of parks. In order to win passage of the Organic Act, for example, they argued that a national park system would boost the nation's economic health by encouraging Americans to spend

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park system is unequaled for grandeur.").

218. RUNTE, *supra* note 84, at 163.

219. *See id.* at 164-65.

220. *See id.* at 165.

221. *See id.* at 166.

222. *See id.* at 168.

223. *See generally* SELLARS, *supra* note 89, at 22-90. Sellars calls this practice of preserving the scenic facade of nature without concern for the reality of naturalness "facade management." *Id.* at 70. For examples of this management philosophy, one need look no further than the *Lane Letter*, *supra* note 195, at 49, which endorsed such steps as tree removal to improve scenic vistas.

224. *See* SELLARS, *supra* note 89, at 88.

their tourist dollars at home.[225] The commitment to attracting tourists inevitably pulled the parks away from their founding principles, encouraging a proliferation not only of roads but also of tawdry amusements. Despite his calls for inspirational recreation, director Mather hired a publicity chief to promote the parks, inevitably degrading the experience offered by the parks to that demanded by the crowds.[226] By the mid-1930s, Bob Marshall observed that artificiality and luxurious development had thoroughly overtaken the primitive experience in the parks.[227] Inspiration, while touted in theory, was clearly taking a back seat in practice.

B. Inspiration and Today's National Parks

1. The Core Purpose of Parks in the Modern World

In the years since 1916, the national park system has greatly expanded and diversified. It now includes historic sites as well as spectacular natural areas.[228] Nonetheless, Congress continues to treat the park system as a collection of unique resources deserving special respect. In 1970, the legislature reaffirmed that the purposes of the 1916 Organic Act— allowing the use and enjoyment of parks while preserving them unimpaired for the enjoyment of future generations— remain the organizing principles for all units of the national park system.[229] At the same time, Congress expressly recognized both the importance of the parks' inspirational function, and their peculiarly public nature. The national park system, Congress declared, is to be "preserved and managed for the benefit and inspiration of all the people of the United States."[230]

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225. *See* RUNTE, *supra* note 84, at 82-105.

226. *See* MICHAEL FROME, REGREENING THE PARKS 48-49 (1992).

227. *See id.* at 9.

228. The system now includes units as far removed from Yellowstone as Wolf Trap Farm Park, a performing arts center in the suburbs of Washington, D.C., *see* 16 U.S.C. §§ 284-284j (1994), and Steamtown, a railroad museum in Scranton, Pennsylvania, *see* Steamtown National Historic Site Act of 1986, Pub. L. No. 99-500, tit. I, 100 Stat. 1783 (1986).

229. Congress explicitly reaffirmed the primacy of these purposes in 1970. *See* 16 U.S.C. § 1a-1 (1994) ("Congress . . . reaffirms, declares, and directs that the promotion and regulation of the various areas of the National Park System . . . shall be consistent with and founded in the purpose established by section 1 of this title, to the common benefit of all the people of the United States.").

230. *Id.* This same section further declares that "the promotion and regulation" of the units of the national park system shall be consistent with the purpose established by the Organic Act "to the common benefit of all the people of the United