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- Dimer formation to perform partial digest for rapid gene mapping (4).
- Confirming recA+ versus recA- genotypes in E.coli strains through UV sensitivity testing (5).

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* patents pending ** The polymerase chain reaction (PCR) process is covered by patents issued to Cetus Corporation.
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1. Khandjian, E.W., Biotechnology 5 February 1987
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• Purify Mini-prep DNA  
• Clean Up Restriction Digests

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Remove Polymerase Activity after PCR with StrataClean Resin

StrataClean™ resin has proven to be a safe, fast, and efficient method for the removal of polymerase activity from PCR reaction mixtures. Using StrataClean resin, it is also possible to eliminate an ethanol precipitation step before cloning PCR amplified DNA.

Figure 1. Comparison of StrataClean resin and phenol/chloroform extraction methods for removal of polymerase activity following amplification reactions. Four identical 100µl amplification reactions were treated as follows: no extraction; two extractions with StrataClean resin; two extractions with phenol/chloroform; and a single precipitation with ethanol. The samples were then assayed for polymerase activity at 72°C using a modified activated calf thymus/gap filling assay, essentially as described by Maki, et al. (2). Background activity was measured by assaying an amplification reaction without any added polymerase.

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Figure 2. Sequence derived from DNA purified using StrataClean resin with both the standard rapid boiling mini-prep procedure and the alkaline lysis mini-prep procedure. Panel A: StrataClean resin rapid boiling mini-prep; Panel B: phenol/chloroform alkaline lysis mini-prep; Panel C: StrataClean resin alkaline lysis mini-prep.

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1. U.S. Patent Serial No. 4,923,978  2. Strategies Vol. 3 Number 4

Figure 3. Ethidium stained agarose gel. Lane 1: control uncut plasmid DNA; Lane 2: the same DNA after standard StrataClean resin extraction; Lane 3: plasmid DNA digested with 4 units PvuII; Lane 4: plasmid DNA after standard StrataClean resin extraction then digested with PvuII; Lane 5: 24 units PvuII extracted with StrataClean resin from 20 microliters of 1X Universal buffer, plasmid DNA then added and incubated at 37°C for 18 hours.

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EDITORIAL

Individual-Initiated Public Policy

In this issue of Science, we initiate an experiment in the development of public policy. It is notable in the history of mankind that science continues from generation to generation to be innovative, whereas the governments of institutions and countries have had trouble sustaining creativity. It is perhaps worthwhile to examine the differences between scientific processes and government consensus building to arrive at suggestions for improvements in government policy-making.

In the field of public policy, individuals frequently have innovative ideas. In the process of consensus building, however, each new idea becomes modified to satisfy the needs of various constituencies. It is rare that the final concept that is tested resembles the initial innovative proposal. The larger the constituency affected, the more difficult it becomes to find the imagination within the final legislation.

In the field of scientific research, both ancient and modern research has been investigator-initiated. An individual scientist with a brilliant idea would, in the good old days when things were cheap, simply go to a back-room laboratory and carry out experiments on his or her own. As research has become more complex, grant applications must be made, but still no one needs a consensus of ten or twelve learned individuals to be allowed to originate an idea or submit a grant. To get grant approval, scientists do depend on committees, but these committees are prejudiced in favor of rewarding innovation and have a tradition against simply maintaining the status quo. The concepts and ramifications of the initial idea are published and subjected to criticism and appraisal by fellow workers to generate progress. In most cases this process results in a finely honed successful theory or experimental procedure. Therefore, it seems appropriate to try to apply the process of scientific discovery to public policy by inviting individuals to publish suggestions on public policy. The publications could then be commented on by others, further refined, and perhaps ultimately adopted by committees that might not have done so without such exposure and refinement.

This process had a chance to be tested when Dr. Bernadine Healy, the director of the National Institutes of Health (NIH), announced her decision to develop a strategic plan for NIH and instituted a number of regional meetings to encourage ideas from scientists. In this issue we print the essence of the speech she gave to those national meetings, and we invite individuals* to send suggestions with regard to NIH on any aspect of policy, whether in areas of research emphasis, organization of review panels, relative values of program-oriented versus investigator-oriented ideas, or the many areas suggested by Dr. Healy’s speech. Science will publish a selection of those responses that seem to be the most innovative, and, thereby, foster an exchange of ideas. We will forward all correspondence to Dr. Healy unless the writer specifically asks us not to. That way an individual will know that his or her ideas have been heard whether or not they appear in print. Science will have to select letters because of space limitations but will do so on the basis of originality of the ideas and the cogency with which they are presented. Selection will be made to avoid redundancy and provide diversity. Science is mindful of the meeting of the Golden Gate Bridge directors, at which a citizen in the back of the room, on hearing about budget problems, suggested a salary savings by charging tolls only in one direction. Everyone laughed at first, but a few said, “Maybe it will work.” The idea has now been implemented, not only in California, but also in other parts of the world. Truly original ideas may provoke laughter at first, but they are frequently the best in the long run.

In the present case, Dr. Healy’s announcement that she wanted a new strategic plan for NIH and this editor’s desire to test the idea of the “individual-initiated public policy” created a perfect symbiosis in which the idea and its usefulness could be evaluated. In a sense we are undertaking a social experiment to see whether a new tool can be helpful to public policy-makers in widely diverse areas.

The true innovator is reluctant to expend time because of fear that the bureaucracy will make his or her efforts futile. Bureaucrats hesitate to support innovators until they are certain their proposals are economically practical, not just superficially attractive. Perhaps the new social experiment will provide a device to allow the originality of the innovator and the practicality of the implementer to work together. Let us begin.

Daniel E. Koshland, Jr.
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Women in Mathematics

It was difficult to recognize our profession from the 13 March special section of "Women in Science." Are there serious problems in mathematics for women? Yes, and the 18 signers* of this letter have spent a serious amount of time addressing them. But there are serious problems for any woman who aspires to excellence in our society, and even professions with large numbers of women (think of the arts) set up serious obstacles for women who attempt to play more than a supporting role.

Furthermore, the emphasis within the article on the role of sexual innuendo seemed quite misleading, distracting from the real issue, which is society's belief that (i) women can't do mathematics and (ii) if they do, it's by definition not too good. Sexual innuendo is just one (and a fairly minor one in the mathematics community) manifestation of these beliefs, and it is these beliefs that are the major issue.

In spite of all the hassles, women continue to do good mathematics and enjoy it too! The persistence and existence of women mathematicians witness this fact. Do they get sufficient recognition for their achievements? Probably not, but they get more recognition now than they did 15 to 20 years ago. Is mathematics worse than chemistry or biology? We just don't know, and the articles in Science have not helped us find out.

A reader seeking a more balanced report on the status of women mathematicians might want to begin with the September 1991 issue of the Notices of the American Mathematical Society (vol. 38, no. 7), which was a special issue on women in mathematics. The articles on women in the profession from this issue of Notices are available in bound-together reprint form and can be obtained from the society's office at Post Office Box 6249, Providence, Rhode Island 02940-6248.

*Card Wood, President, Association for Women in Mathematics, Wellesley College, Wellesley, MA; Susan Montgomery, University of Southern California, Los Angeles; Cathleen Synge Morawetz, Applied Mathematics Section, National Academy of Sciences, and Courant Institute of Mathematical Sciences, New York University; Judith Rolfman, former President, Association for Women in Mathematics, University of Kansas, Lawrence, KS; Mary Beth Rusak, University of Massachusetts, Lowell, MA; Alice T. Schaller, Chair, Section A, AAAS, and former President, Association for Women in Mathematics, Marymount University, Arlington, VA; Judith S. Sunley, Washington, DC; Mary Wheeler, Rice University, Houston, TX.

Paul Selvin's article of 28 June 1991, "Does the Harrison case reveal sexism in math?" (News & Comment, p. 1781), contains a table listing by gender the numbers of tenured and untenured faculty in mathematics at ten academic institutions in 1990–1991. The table is becoming a standard reference in the discussion of women in mathematics. It is referred to at least twice in the 1991 Special Issue on Women in Mathematics of Notices of the American Mathematical Society (1). It is therefore important to point out that its information is not altogether correct.

The table reports 35 tenured members of the mathematics department at Princeton, when the actual number was 24 plus six joint appointments with other departments, for a highest possible total of 30. As the table correctly reports, none of the tenured members was a woman. But the table incorrectly reports no untenured women when Princeton had four—one assistant professor and three instructors—in positions that could lead to tenure.

I have contacted the other academic institutions listed in the table and have been informed that there were additional errors. The table reports 13 untenured positions with no women at Harvard, when 3 of the 13 were women, who held the position of preceptor. Yale had nine untenured people in its department, even though the table reports it had none; one of the nine was a woman. In addition to the one tenure-track woman reported at Michigan, there were five more women at the assistant professor level that might lead to tenure. There were four women (not the zero reported) at Massachusetts Institute of Technology; they were instructors. Finally, the table reports one tenure-track assistant professor at California Institute of Technology when there were two, one a woman. Altogether, only one woman is reported when there were 19. Eight of the 19 were assistant professors, 8 were instructors, and 3 were preceptors.

Even correctly counted, the number of
women in relation to men is not good. But it is a real disservice to present the situation as worse than it actually is. The table and the erroneous reference in its title to a "shoutout" create an illusion of insuperable odds for women interested in mathematics that is not supported by the facts.

Jacquelyn Savani
Press Officer, Princeton University, Princeton, NJ 08544-5264

REFERENCES AND NOTES


Response: Science applauds Savani in her effort to find out what the status of women in mathematics is at some of the most distinguished universities in the United States. Her letter, however, is directed at a different issue from what the table accompanying Selvin’s article was attempting to address. The table was intended to specifically list those in tenure-track positions. Savani’s remarks are directed to the total number of untenured faculty—including both those in tenure-track jobs and those in nontenure-track positions. Under any classification, women are underrepresented, but a carefully revised and updated version of the table for the academic year 1991–1992, which appears on page 323 of this issue, shows that the situation is particularly depressing for tenured and tenure-track positions: the number of women there remains very low.—Eds.

Miscarriage Study

Joseph Palca’s article “Banking for transplantation research” (News & Comment, 29 May, p. 1274) conveys a misleading impression regarding data on miscarriages for fetal tissue transplant research that I supplied to Congress. Palca states that I “made no attempt to determine whether viral or bacterial infection might make tissue that [I] classified as acceptable unsuitable for transplantation.”

The study referred to [J. Byrne et al., Teratology 32, 297 (1985)] is the largest and most comprehensive to date on the pathology of miscarriages. From January 1977 to August 1981 I was the leader of a team that evaluated more than 3500 miscarriage specimens for evidence of gross disorganization and dysmorphology. The overall study goals concerned the genetic and environmental causes of miscarriage. Detecting infection was not an objective. I suspected then (and still do) that infection might be a causal factor in miscarriages, but attempts to obtain funding for a study were unsuccessful. Transplantation research was also not part of our study. We supplied different kinds of tissue to local investigators. They found this tissue suitable for their purposes which, 10 years ago, probably did not include transplantation.

The information given to Congress referred only to well-preserved specimens and did not include data on fetuses that had died some time before delivery. The data indicate that occasional miscarriage tissue could be obtained for tissue banks (Byrne et al.). How much, and under what conditions, would be a probable subject of study by the new tissue bank program.

Julianne Byrne
Executive Director, Boyne Research Foundation, Washington, DC 20010

Cold Fusion: Not Nuclear

In his News & Comment article “A Japanese claim generates new heat” (24 April, p. 438), David H. Freedman reports, “Peter Hagelstein . . . asserts in a paper to be published in the Journal of Fusion Technology that neutrons are emitted in cold-fusion reactions—but are promptly absorbed by the palladium lattice.” Prompt absorption of neutrons by the palladium lattice can only mean that they are absorbed by palladium nuclei. This would lead to several radioactive palladium isotopes, emitting β- and γ-rays, and the intense γ-rays should have been noticed by those researchers who looked for γ-rays from cold fusion. Thus, since neither such a radioactivity nor tritium, helium, or neutrons have been found, all proposed nuclear explanations of the heat generated in D2O-palladium cells have been excluded.

Maurice Goldhaber
Department of Physics, Brookhaven National Laboratory, Upton, NY 11973

Corrections and Clarifications

In the letter of 19 June 1992 (p. 1613) by Ellen C. Weaver and Stephanie J. Bird of the Association for Women in Science (AWIS), an incorrect phone number was given for the AWIS mentoring program. The correct number is 800-886-AWIS.
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References


Endotoxin removal from protein solutions by a 12 hour exposure to END-X BEADS.

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<th>Final Endotoxin ng/ml</th>
<th>Percent Endotoxin Removed</th>
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<tr>
<td>Human Serum Albumin in PBS 10mg/ml*</td>
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<td>Bovine fetal Serum 0.5 mg/ml</td>
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<td>Recombinant Hemoglobin 250 mg/ml</td>
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<td>Vaccine (Chicken) 2.5 mg/ml</td>
<td>1000 ng/ml</td>
<td>90.0 ng/ml</td>
<td>91.0**</td>
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<td>Monoclonal Mouse 0.1 mg/ml</td>
<td>0.1 ng/ml</td>
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*Human serum and hemoglobin spiked with purified E. coli O113 endotoxin.
**Bead capacity exceeded - further reduction possible with additional beads.

Endotoxin Removal From Fetal Serum Protein Hydrolysate

Endotoxin Level (%)

Sample A | Sample B | Sample C

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An Article Reprinted from Science (1 September 1989)

ETHAN A. NADELMANN
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"Drug legalization" increasingly merits serious consideration as both an analytical model and a policy option for addressing the "drug problem." Criminal justice approaches to the drug problem have proven limited in their capacity to curtail drug abuse. They also have proven increasingly costly and counterproductive. Drug legalization policies that are wisely implemented can minimize the risks of legalization, dramatically reduce the costs of current policies, and directly address the problems of drug abuse. Twelve pages.

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“Portable telescope mounted on a lawnmower chassis. Photo courtesy of Dr. Clyde Tombaugh. Note the curved secondary mirror holder which minimizes the apparent effects of the diffraction spikes.” [From Unusual Telescopes]

eyepiece extending inward through the open sunroof), to Sandia National Laboratories’ array of solar sensors, which occasion-ally have been pointed at night toward bright celestial sources. In degree of seriousness, Manly’s discussions range from an account of a telescope made from a beer can by David Levy (whose primary is a ladies’ compact mirror and whose sighting device is the pull tab from the can) to an extended evaluation of the designs of solar telescopes on the summits of Mt. Wilson near Los Angeles, Kitt Peak in Arizona, and Sacramento Peak in New Mexico. The apertures of the telescopes he describes vary from a 1-inch, Schmidt-type telescope by Wesley Lindsay (a telescope without an eyepiece that is used as a finder for larger instruments) to the largest professional telescopes in the world. In time and space his coverage is also extensive and includes telescopes operating throughout the United States and Europe as well as in more remote locations such as Indonesia and Kenya. He treats quite a few historical designs as well, including the Paris Refractor of 1900, which was made for public viewing during the Paris Exhibition and dismantled shortly thereafter, and classics such as the 72-inch Leviathan telescope of Lord Rosse, made in the 1840s.

An amateur astronomer with professional affiliations, background in small computers, and publications in various magazines, Manly communicates a strong sense of familiarity and a firsthand appreciation of the telescopes he discusses. The book is also enhanced greatly by the large number of illustrations, more than 150 in all, pictur-ing the majority of designs discussed. An index is included which, along with the list of illustrations, greatly assists in locating the information pertinent to a particular telescope. Manly has grouped the tele-
copes rather loosely, using a prominent unusual feature, rather than size or application, as the focal point. The most attention naturally is paid to the optics and the mount, topics discussed in the first two chapters of the book. Subsequent chapters point out the mount and optics designs in relation to other features, including the position of the eyepiece and the mobility of the telescope.

This is not the book from which to learn about the principal types of telescope opti-cal and mounting designs, however. Except in passing, or in rare exceptions (such as the schiefspiegler optical path and the Gregory-Maksutov double-field telescope), Manly does not detail or depict the specific principles that pertain to a particular mount or optical train. This is probably appropriate for an amateur audience, for which a knowledge of a Dobsonian mount may legiti-mately be presumed, but it does force the non–telescope-building audience to work a little harder. Largely beyond the scope of the book are aspects of telescope performance such as solid-state detectors, including CCDs, and the computerization of much astronomical data taking, data analysis, and scientific results, which are occasionally mentioned. While citations of the scientific astronomical literature are largely omitted, there are many references for further reading to the popular amateur journal Sky and Telescope, to several books describing the history of the telescope, and occasionally to engineering reports or publications.

With such a diversity of telescopes included, it is understandable that a few errors have crept into the text. For example, the Multiple Mirror Telescope at Mt. Hopkins, Arizona, which is operated jointly by the Smithsonian Institution and the University of Arizona, is mistakenly referred to and indexed as the Fred Lawrence Whipple Multiple Mirror Telescope. However, the author invites corrections, addi-tions, and suggestions and provides an ad-dress (but not a telephone number until after 1996, “when the youngest [teenager] will be away in school”).

All in all, Unusual Telescopes provides interesting and often amusing descriptions of what makes some telescopes stand out from the rest. With an informal style and a wide familiarity with telescopes, Manly has written a book with an appeal not only to the principal audience of amateur ob-servational astronomers but to a broader group of engineers and professional astron-omers with an interest in system design or telescope performance.

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- Ava I
- His•Tag™ C-terminus
- T7 terminator

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**Expanded Polylinker**

- Containing cloning sites in all three reading frames

**Choice of Expression Controls and Host Strains to Optimize Expression Levels**

- f1 origin of replication for mutagenesis and sequencing with single stranded templates

**Convenient Restriction Sites for Subcloning from Other Vectors**

- One-step purification of target proteins without antibodies

**Variety of System Configurations Plus Many Supporting Products:**

- Individual vector DNAs (over 30 available)
- T7•Tag™ Antibody Kit
- His•Bind™ Purification Resin and Buffer Kit
- Restriction Grade Thrombin
- Competent Cells of host strains
- Primers for sequencing and amplification
- λDE3 Lysogenization Kit
- λELEX™ cDNA Cloning System and PhageFinder™ Immunoscreening Kit
- Sequences on diskette