INTRODUCING THE COMPLETE SYSTEM FOR DIRECT SEQUENCING OF PCR PRODUCTS.

The new AmpliTaq® Cycle Sequencing Kit comes with optimized protocols for direct sequencing of PCR products with your GeneAmp® PCR Instrument System. This means rapid results with fewer cycles, increased resolution, greater specificity and consistency only recombinant AmpliTaq® DNA Polymerase can provide. The AmpliTaq Cycle Sequencing Kit.

Based on recombinant AmpliTaq DNA Polymerase. Optimized for your GeneAmp PCR Instrument System. And backed by our PCR Performance Guarantee. In the U.S., call PE XPRESS at 1-800-762-4002 to order. Or call 1-800-762-4001 for technical information. Outside the U.S., contact your local Perkin-Elmer representative.
For CYTOKINE Research

The Broadest Spectrum of Premium Quality Cytokines

The cytokine laboratories of R&D Systems provide the most extensive line of both natural and recombinant cytokines. Each protein carries the following assurances:

**Superior Quality**
Each cytokine is produced and extensively tested in the laboratories of R&D Systems, ensuring extremely high and consistent quality.

**Full Biological Activity**
The biological activity of each cytokine is determined by bioassay. A description of the appropriate bioassay and the typical ED<sub>50</sub> range is included in each package insert.

**Highest Purity**
All are greater than 97% pure, as determined by N-terminus analysis as well as SDS-PAGE visualized by silver stain.

**Additional Reagents**
R&D Systems produces over 250 cytokine related reagents (e.g. neutralizing and detection antibodies, genes, probes, and cytokine ELISA assay kits) to provide investigators with a solid foundation on which to do cytokine research.

To obtain a catalog, detailed product information or to place an order call 1-800-343-7475.

In Europe contact:
British Bio-Technology, Ltd.
4-10 The Quadrant, Barton Lane
Abingdon, Oxon OX14 3YS
Telephone: +44 (0)235 781045
In Japan contact:
Funakoshi Co., Ltd.
9-7, Hongo 2-Chome
Bunkyo-ku, Tokyo 113
Telephone: +81 (0)3 56641622
Fax: +81 (0)3 56641633
R&D Systems
614 McKinley Place N.E.
Minneapolis, MN 55413
Telephone: 800-343-7475
Fax: (612) 379-6580

1-800-343-7475
Circle No. 2 on Readers' Service Card
GETTING TO YOUR RESEARCH GOAL QUICKLY IS OFTEN A MATTER OF HAVING A DIFFERENT PERSPECTIVE.

You may have a clear view of your research goal. But how you’re going to get there may not always be so clear. What that requires is looking at data in new ways — ways nobody ever expected.

To find those ways, consider looking into Digital’s Scientific Computing Environment.

You will see how our powerful open PCs and workstations support the most popular scientific and desktop applications. And how our robust software development environment and visualization tools enable you to quickly create specialized applications.

To expand your computing power, you will see that our massively parallel systems and supercomputers are capable of crunching huge amounts of data and reducing the time it takes...
to execute complex simulations.

To expand your reach, our multi-vendor computing solutions easily integrate systems from IBM®, Sun®, Apple®, Cray® and many others. That way, instead of reinvesting in equipment, you can invest in your staff. And our networking capabili-

**DIGITAL'S TECHNOLOGIES SPEED YOUR TIME TO DISCOVERY.**

- Capabilities make it easier for you to collaborate with colleagues around the world.
- In the future, we'll continue to help you to further broaden your horizons, thanks to Alpha — our innovative, high performance 64-bit RISC-based architecture.

If you'd like to see how Digital can give you a different perspective, call 1-800-DEC-INFO, ext. 27 in the U.S., fax us in Europe at 32-2-729-82-03, or contact your local Digital representative.

**OPEN ADVANTAGE.**
A study of habitat fragmentation in a successional field at the University of Kansas’s Nelson Environmental Study Area has monitored population, community, and ecosystem responses to fragmentation since 1984. The different sizes of the patches in the field were used to investigate the effect of different levels of fragmentation. See page 524. Negligible ecosystem and aggregate community responses may mask profound effects of fragmentation at the population level. [Aerial infrared photo: James E. Busse]
QIAEX for Gel Extraction... Your DNA will love it!

QIAEX matrix is a uniform, 3 μm silica gel suspension which selectively binds DNA in the presence of high salt. Pure DNA can be recovered from agarose gels - in just 20 μl of TE.

QIAEX means:
- Efficient purification from 50 bp to 50 kb
- Extraction in 15 minutes
- No enzymatic inhibition
- No need for low-melt agarose
- > 80% recovery
- No shearing of large DNA fragments

QIAEX isn't powdered glass like other gel extraction products. DNA purified using the QIAEX Gel Extraction Kit is free from fines or small particles of powdered glass.

Scanning electron micrograph of powdered glass.

<table>
<thead>
<tr>
<th>DNA size</th>
<th>Amount DNA (μg)</th>
<th>Recovery (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ds DNA</td>
<td>1.20 μg</td>
<td>75</td>
</tr>
<tr>
<td>23.5 kb</td>
<td>1.30 μg</td>
<td>90</td>
</tr>
<tr>
<td>6.6 kb</td>
<td>0.80 μg</td>
<td>92</td>
</tr>
<tr>
<td>1440 bp</td>
<td>0.90 μg</td>
<td>94</td>
</tr>
<tr>
<td>517 bp</td>
<td>0.14 μg</td>
<td>83</td>
</tr>
<tr>
<td>396 bp</td>
<td>0.06 μg</td>
<td>84</td>
</tr>
<tr>
<td>75 bp</td>
<td>0.13 μg</td>
<td>75</td>
</tr>
<tr>
<td>44 bp</td>
<td>0.02 μg</td>
<td>72</td>
</tr>
</tbody>
</table>

DNA size, DNA amount vs. recovery with QIAEX. Recoveries of αP end-labeled DNA fragments purified with QIAEX Gel Extraction Kit determined by scintillation counting.

QIAEX Gel Extraction Kit
150 Preparations
500 Preparations

Call now to place your order or for more information.

DIAGEN GmbH, Germany, Orders: (0)2103-892-230, Fax: (0)2103-892-222, Technical Service: (0)2103-892-240
QIAGEN Inc., USA, Orders: 800-426-8157, Fax: 818-718-2056, Technical Service: 800-DNA-PREP (800-362-7737)

Distributors: AUSTRALIA: PHOENIX Scientific Industries Ltd. (03) 544 8022, AUSTRIA: BIO-TRADE (222) 889 18 19, BELGIUM: Westburg B.V. (Nl-33) 95 00 94, DENMARK: KEBO Lab A/S (44) 68 24 97, FINLAND: KEBO OY (90) 435 420 03, FRANCE: Coager (1) 45 32 30 17, GREECE: Bio+Analytica (01) 64 42 748, HONG KONG/CHINA: Diagnotech Co., Ltd. (852) 542 0566, ISRAEL: BIO-LAB Ltd. (02) 524 447, ITALY: Genenco (M-Medical srl) (055) 300 1871, JAPAN: Funakoshi Co., Ltd. (3) 568-1622, KOREA: LRS Laboratories, Inc. 934 8697, MALAYSIA: Filtronic Company (03) 735 8892, NORWAY: KEBO (lab AS (02) 30 17 18, PORTUGAL: Izasa Portugal (01) 738 07 40, RSA: Whitehead Scientific Supplies (021) 981-1-560, SINGAPORE: TIBS TRADING PTE Ltd. 339 1691, SPAIN: Izasa S. A. (93) 401 01 01, SWEDEN: KEBO Lab AB (08) 621 34 00, SWITZERLAND: KONTRON Instruments AG (01) 733-5-733, TAIWAN: Formo Industrial Co., Ltd. (02) 736 7125, UK: Hybaid Ltd. (081) 977 3266

Circle No. 3 on Readers' Service Card
INTRODUCING CAYMAN'S NEW EIA KIT FORMAT
FOR EICOSANOID, CYTOKINE, AND OTHER AUTOCOID MEASUREMENT
FEATURING:
*Precoated, Dry Plates
*All Buffers & Reagents Included
*Fast, One Step Incubation
*Clear, Concise Instructions

Plates are shipped precoated and blocked, READY TO USE!

1 ONE STEP INCUBATION
Tracer (acetylcholinesterase linked analyte), sample or standard, and primary antiserum are added and allowed to incubate.

Work Time: 30 minutes
Incubation: overnight

2 WASHING AND DEVELOPMENT
Plate is washed to remove all unbound reagents. Ellman's Reagent (substrate for acetylcholinesterase) is added and allowed to develop for approximately one hour.

Work Time: 30 minutes
Incubation: 45-70 minutes

3 DATA COLLECTION
Absorbance is measured at 412nm, and the standard curve is used to determine concentration of unknown samples.

Call us for information on our high quality, automated, Kmin™ microplate photometer. $5700.00, software included.

Circle No. 16 on Readers' Service Card
Adding Charisma to Science

Science: Dr. Noitall, you are the world’s greatest promoter, the man who was able to convert Barnum and Bailey into extroverts, the man who can make corporate annual returns into best sellers, and the man who wrote William Jennings Bryan’s speeches.

Dr. Noitall: A vast understatement of my true abilities.

Science: We need your help because scientists are generally neglected and downcast over the lack of attention to their views these days.

Noitall: It is their own fault because they are such drab creatures, always sticking to the facts, and thus very uninteresting to anybody.

Science: But how could they change their image and their lives?

Noitall: I doubt they have much chance of changing their image unless they are willing to get involved in sex scandals, bankruptcies, political action committees, or testifying before Congress that cars can make 55 miles per gallon running on water.

Science: Well, could they make their lives more interesting in other ways?

Noitall: They certainly could, if they would just incorporate some theatrical devices into their work. For example, at concerts, audiences that applaud enthusiastically are often rewarded with encores. Scientists could enliven their presentations in a similar way. If the audience bursts into spontaneous applause at a particularly good slide or experiment the speaker should be allowed to give an encore, even a couple of times.

Science: But some people say scientists give too many speeches anyway.

Noitall: Well, of course, they are idiots to give speeches for what is usually called “a modest honorarium.” That is entirely because scientists, unlike sensible people, handle their own appointment calendars. If Scientist X is invited to give a speech at University Y, he or she should immediately say, “I’m sorry, Professor Z handles all my appointments.” When Professor Z is called, he or she should say, “Oh, no, the size of the honorarium you mention is much too low. He or she usually gets an honorarium five times that big, expects a motorcycle escort from the airport, and would like to be greeted by a drum roll while entering the auditorium.”

Science: But even meetings of that sort could have rather boring speeches.

Noitall: That’s true, but here again, scientists could borrow from sports and bullfighting examples. A panel of judges could be selected who, like Olympic diving judges, would hold up numbers evaluating the quality of a speech. Below 7, the speaker would forfeit his or her honorarium. Above an 8 he or she would get a top graduate student and the ears and tail of a dean.

Science: But I don’t see how it’s possible to reward professors with graduate students.

Noitall: That’s another matter, and it would increase the efficacy of science. There are too many graduate students trying to make up their minds at a tender age. Hence, it is time to formalize the system of serfdom. If graduate students indentured themselves like baseball players, they might sooner or later work themselves up to baseball player salaries. A graduate student working for a certain professor would sign a contract that would allow the professor to exchange him or her at another university for a couple of other graduate students, a cloud chamber or amino acid analyzer, or whatever seemed worthwhile at the time. Of course, there would be thousands of protests, arguments about restrictive clauses, Supreme Court cases dealing with involuntary servitude, and so forth, and scientists would be in the headlines all the time, establishing themselves as celebrities and individuals to be reckoned with in society.

Science: Don’t you think celebrity style is inimical to the whole role of science in society?

Noitall: What nonsense! It is not necessary to have a white lab coat to achieve great results. Lab coats could be designed by great centers of fashion, could be colored, restyled for length and cut, and could make going to the office and coming home a real excitement. Laboratories could get funding based on style as well as productivity.

Science: Don’t you think there’s something to be said for just keeping the old stodgy ways, in view of the great success of science in turning out new products and technology?

Noitall: That is of course the ultimate error of scientists. If they simply go about their business from one success to another, it is irresistibly attractive for others to step in and explain how science really could be done much better. The critics then advocate minuscule changes costing large amounts of money that allow the critics to take credit for “rescuing science,” but they really want to attach themselves to its success. Only by becoming celebrities themselves can scientists repel phony reformers.

Daniel E. Koshland, Jr.
Few things are easier to use than the new SORVALL ULTRA PRO™ 80.

Simply put, the new SORVALL® Ultra Pro® 80 is the quickest, easiest ultracentrifuge available today. That's because it was designed with the help of ultracentrifuge users such as yourself. Thanks to QUIKset® user interface, all you need to do for most runs is simply set speed, time, and temperature, then press start. And with our built-in memory, you can save 30 programs and easily recall them when needed. What's more, the Ultra Pro 80 offers a built-in three-step run. Audible run status system. Imbalance detector. SOFTspin™ rotor control. Auto re-start. RCF and \( \omega^2dt \) integrator modes. And it even accepts Beckman Ultra rotors.

For more information on the new SORVALL Ultra Pro 80, call 1-800-551-2121. And get a hold of the easiest ultracentrifuge around.

SORVALL...a better choice.
Kemp's Ridley Sea Turtles

Gary Taubes' article about Kemp's ridley sea turtle conservation (Research News, 1 May, p. 614) addresses a controversial issue which exemplifies scientific and political problems associated with endangered species conservation. Unfortunately, the article seems to emphasize criticisms of the Kemp's ridley project and to downplay defending arguments.

The article indicates that a primary problem with the headstart project is the lack of a control group. However, the natural population is the control group. The number of natural hatchlings entering the water from the nesting beach and the number of hatchlings in the headstart project are known for each year. All "headstarted" turtles currently receive flipper tags and a permanent "passive integrated transponder" or "pit" tag which is inserted under the skin. Headstarted turtles can thus be differentiated from wild ridleys on the nesting beach, and their reproductive output can be compared to that of wild ridleys.

The article suggests that after their release into the wild, headstarted turtles do not act like natural turtles. To substantiate this, the article indicates that "many" headstarted turtles are captured by hand after they "meekly" approach swimmers. Of the total number of headstarted recaptures, the actual percentage of ridleys that are captured or observed while swimming is 68%. Further, most of these recaptures occur from the same methods by which wild ridleys are captured (shrimp trawls and hook and line) and from similar locations, suggesting that the majority of headstarted turtles are behaving like wild turtles.

The article presents several anecdotes that negatively characterize the performance of the headstart project. However, these anecdotes are inaccurate. Scientific and political problems associated with the headstart project, it omits or poorly addresses the primary obstacles it faces. Initially, only flipper tags were used to mark turtles, and tag return data indicated that there was a high probability that the tags may fall off before adulthood. Thus, if headstarted turtles nested, they could not be identified. During the mid-1980s the project began experimenting with a variety of permanent tags, and every headstarted yearling now receives a permanent pit tag in addition to a flipper tag. The initial lack of permanent tags has also prevented an accurate assessment of age to sexual maturity, so it is at present impossible to estimate how many (if any) headstarted turtles have reached adulthood. The use of permanent tags will now provide the first conclusive data on age to sexual maturity in the wild.

In addition to tagging problems, there has been a wide variety of logistical problems involved with rearing and releasing 1000 to 2000 sea turtles per year (as would be expected in an experimental research program of this magnitude). However, these problems have for the most part been overcome, and the project has become unparalleled in its ability to efficiently rear sea turtles for an 11-month period. The major problem facing the project (and the recovery of Kemp's ridley species in general) became clear by the mid- to late 1980s. Mortality of Kemps' ridleys in the wild (both headstarted and wild turtles) was extremely high, so high that it was likely that few if any headstarted turtles were surviving to adulthood. But this was also the case in the natural population. During the 1980s the nesting population hovered at approximately 500 or fewer females per season (even though turtles on the nesting beach have been protected since the 1960s and 20,000 to 50,000 hatchlings enter the water at the nesting beach each year). Fortunately, the mortality of ridleys in the wild should significantly decrease during the 1990s because turtle exclusion devices have become mandatory on shrimping vessels in U.S. waters and are now being implemented in Mexican waters.

The headstart project is now efficiently producing yearling turtles complete with permanent tags, and mortality in the wild is decreasing. From a scientific viewpoint it is ironic that political pressure may terminate the project just as it begins to generate data that would answer the question, Is headstarting a viable conservation tool?

Thane Wibbels
Department of Zoology
University of Texas, Austin, TX 78712

Taubes' article "A dubious battle to save the Kemp's ridley sea turtle" contains some statements regarding National Park Service activities that are ambiguous, misleading, or incorrect. The distinctions between imprinting and headstarting activities and the agencies conducting these two separate programs were unclear in the article. A portion of the multiagency project to help save the critically endangered Kemp's ridley sea turtle from ex-
tinction was an experimental attempt to establish a secondary breeding colony of this species at Padre Island National Seashore (PAIS), a unit of the National Park Service (NPS). Each year, from 1978 through 1988, approximately 2000 eggs were collected in Rancho Nuevo, Mexico, for this program. The NPS was responsible for “imprinting” activities, which included incubation of the eggs at PAIS and exposure of the hatchlings to the local beach and surf. The National Marine Fisheries Service (NMFS) conducted the “headstarting” portion of the project, which involved rearing the imprinted turtles for 10 to 12 months at their laboratory in Galveston, Texas.

The article states that the “yearly budget for imprinting and headstarting at Galveston would be between $250,000 to $500,000.” However, funding requirements for the two activities should be considered separately. NPS expenditures for imprinting (approximately $15,000 a year) were significantly smaller than headstarting (NMFS) costs. Additionally, transfer of eggs to PAIS for incubation and imprinting ceased after 1988, whereas headstarting activities continue. Hatchlings are now transported directly from Rancho Nuevo, Mexico, to Galveston, Texas, for headstarting.

It was stated in the article that “the Park Service on Padre Island calculated that 31 degrees Celsius was the pivotal temperature.” However, the NPS estimate of the pivotal temperature was 30.2 degrees Celsius (1, 2). Although this may seem a trivial point, this slight difference has profound implications on sex ratio.

Regarding the gender of hatchlings born before 1985, although no hatchlings could be killed to determine gender, a number of methods were used to determine the sex of dead embryos, dead hatchlings, and captive turtles (gonadal histology, laparoscopy, serum testosterone assay, and necropsy). It was found that some females were produced during the early project years (2, 3). Estimates of the overall percentage of females within the 1978 to 1984 year-classes range from 33 to 48%, depending on the method of calculation used. About three-fourths of these hatchlings had either entered or completed their middle third of development, thought to be the critical sex-determining period, before shipment to PAIS.

The statement that “[a] 1983 shipment of 2000 eggs to Padre Island . . . was left in an air-conditioned room; only one in eight hatched” should also be clarified. No incubating sea turtle eggs were placed in an air-conditioned room at PAIS. Although only 12% of the eggs within the 1983 year-class hatched, most embryos ceased development before their arrival at PAIS, and fungal infection or excessive sand moisture, or both, contributed to their death (1, 4). Despite the high embryonic mortality in the 1983 year-class, the overall hatching rate for the 22,507 eggs incubated at PAIS from 1978 through 1988 was 77.1%.

Undoubtedly, public awareness about the plight of sea turtles has increased as a result of NPS efforts. Some of the biological information collected by the NPS was the first of its kind for the species and has been used to assist with efforts in Rancho Nuevo, Mexico. Although none of the headstarted turtles have been observed returning to nest at any beach, several factors may have influenced their return or detection: (i) mortality at sea; (ii) predominance of males in some early project years; (iii) tag loss; and (iv) limited efforts to detect returning females. At least 11 to 12 years may be required for females of this species to attain the minimum nesting size (5).

The NPS is now focusing conservation efforts for this species on attempts to locate and protect nesting females (wild and headstarted) and stranded hatchlings. Staff at PAIS are conducting extensive beach patrol and public education efforts, both of which have been given high priority in the recently completed Kemp’s Ridley Sea Turtle Recovery Plan. As directed by the recovery plan, NPS mandates, and the Endangered Species Act, these efforts will continue for the foreseeable future.

D. J. Shaver
National Park Service,
Padre Island National Seashore,
Corpus Christi, TX 78418
M. R. Fletcher
National Park Service,
Cooperative Park Studies Unit,
University of New Mexico,
Albuquerque, NM 87131

REFERENCES


Response: Wollbels makes several debatable points. That 6% of the turtles are captured by hand (45 out of 7160 tag recaptures) does not

Here’s why it’s so popular:
- Accepts any biological sample, including viscous liquids, tissue specimens and cell suspensions with no need to alter the physical state of the specimen.
- Accepts sample volumes as small as 2 microliters.
- Avoids measurement artifacts that often accompany freezing point measurements.
- Electronic accuracy and reliability without mechanical complexity.

If you are working with living cells or have other applications for accurate concentration measurements, investigate the Wescor VPO. It’s the ideal osmometer.

Contact Wescor, Inc. 459 South Main Street, Logan, UT 84321 USA. (801) 752-6011 or (800) 453-2725. FAX (801) 752-4127

Wescor® Innovative instrumentation since 1970.

Circle No. 13 on Readers’ Service Card

The ideal way to measure osmolality.

The biotechnology explosion has expanded the need for measuring the osmolality of solutions. Such measurements are critical in many areas of research. The most current and accurate means of measuring osmolality is the Wescor Vapor Pressure Osmometer. More than 5,500 laboratories now use the Wescor VPO routinely.
sound like "many," except when compared with the number of wild Kemp's ridleys found meekly approaching swimmers, which is effectively none. One must also add that of the 716 tags recaptured, according to Charles Caillouet, a chief scientist for the headstarting program at Galveston, 313 (43%) were from turtles found stranded on the beach; and in 103 cases no method of recovery was reported.

As for Wibbs' criticism of the anecdotes used to illustrate the problems encountered by the laboratory, the primary source for the numbers used in these accounts was Caillouet, who should know. It is true that these were isolated incidents from the early to mid-1980s. However, my article did not mention a 1987 incident, in which the Galveston laboratory aborted "research" plans to place 48 freshwater turtles near underwater explosions to determine the "lethal range" of the blasts and then to place 50 legally threatened loggerhead sea turtles outside the lethal range to establish the level of injuries that would be suffered. The decision to abort the project was made by Ed Klima, director of the laboratory, only after the lay press reported the research plans and sparked a vehement public outcry.

As Klima told me, "I must have had 1000 letters addressed to me saying, 'Why didn't they put me in the water and blow me up? It was unbelievable. We had the money' [to do the research] and we returned it. Even though we were not going to intentionally kill any sea turtles, we were going to use a surrogate species. Dumb on my part! Yes." My article also omitted a 1991 incident in which 100 adult ridleys were trucked in midsummer to Panama City, Florida, for Turtle Exclusion Device (TED) testing, resulting in the death of 30 of these turtles. Thus it is still questionable whether the current performance of the project has been "enhanced."

As for the key question of continuing the headstart experiment, Wibbs told me in a 31 January phone interview that his blue-ribbon panel was specifically directed to evaluate only the headstart program and that they were not told to consider sea turtle conservation as a whole. "If I was in the position where I was in control of all conservation sea turtle money in the United States," Wibbs said, "it would be a really tough decision whether I would put it in the nesting beach or put it in the Galveston project." Wibbs also admitted that headstarting is an experiment and not a conservation tool. Considering, as he says, that the full implementation of TEDs in the Gulf of Mexico also means "the mortality of ridley's in the wild should significantly decrease," it makes the relative importance of another decade of headstart experimentation in a world of limited funding highly questionable.---Gary Taubes
33P nucleotides. Safety, sensitivity and resolution all in one.

An unpurified 20-mer oligonucleotide was 5'-end labeled using [γ-33P] ATP (Cat. No. NEG-302H) and subsequently used as a primer in a cycle sequencing reaction with λgt11 DNA clones. Film exposure: 12h. Sequencing gel courtesy of T. Iwata, LMOD, National Eye Institute, Bethesda, MD.

New 33P nucleotides have β-emissions that are five-fold weaker than 32P, so they can be handled routinely with no elaborate shielding. And with higher emission energies than 35S, they require shorter exposure times. You get faster sequencing autoradiographs and maintain equivalent band resolution. 33P nucleotides are ideal for emerging technologies such as DNA cycle sequencing, single-stranded conformational polymorphism and in situ hybridization.

And like all NEN® nucleotides, new 33P nucleotides offer consistent results. Thanks to two Du Pont advances – our patented radiochemical stabilizer, Tricine, and our MicroSpec specific activity analysis. In fact, Du Pont is the only manufacturer to accurately measure the specific activity of its nucleotides using microbore HPLC.

Du Pont offers a choice of radiolabeled nucleotides as well as nonradiometric fluorescent and biotin-based labels, so you can choose the nucleotide best suited to your needs.

For additional information by fax, 24 hours a day, 7 days a week, call Du Pont FaxBack® at 1-800-666-6527 (or 302-892-0616) and request document #2002.
Pure Half Megabase DNA, Even From A Drop of Blood...

Without Any Sweat or Tears!

Pure DNA, in as little as 30 minutes, for PCR, Southerns or RFLP when you use TurboGen™ and Micro-TurboGen™ isolation kits. TurboGen allows direct isolation of genomic DNA from 10⁶ to 5x10⁷ cells, 50-500 mg of tissue or 2 ml of blood and Micro-TurboGen from 5x10⁵ cells, up to 50 mg of tissue and 5µl to 100µl of whole blood.

These systems feature:
- no spooling
- no incubation with proteolytic enzymes or purification with ion exchange resins
- high yield of pure DNA at a molecular weight of 20-700 kb (400 kb average).

Each TurboGen kit provides everything needed for 25 reactions in as little as 60 minutes and Micro-TurboGen allows 50 reactions in as little as 30 minutes.

If you want Pure DNA from cells, tissue or a drop of blood and you don't want all the sweat and tears that other kits can bring, call Invitrogen...

1-800-955-6288

Invitrogen

3985 B Sorrento Valley Blvd., San Diego, CA 92121

Circle No. 11 on Readers' Service Card
Pure mRNA in Minutes...

...Directly from Small or Large Samples of Cells or Tissue.

FastTrack™ and MicroFastTrack™ set the industry standard in high quality mRNA isolation.

**MicroFastTrack™**: 20 Reactions
- Ideal for PCR, Northernns and cDNA synthesis
- Isolation from samples ranging in size from 10-3×10^6 cells or 10-250mg of tissue.
- Reproducible yields of high quality mRNA.

**FastTrack™**: 6 Reactions
- mRNA isolation for Northernns, cDNA, library construction, PCR, microinjection, RNA protection studies and *in vitro* translation.
- Isolation from samples ranging in size from 10^7-10^8 cells or 0.4-1.0 gram of tissue.
- Fast, efficient recovery of large amounts of polyA+ RNA from a variety of sources.

Both systems offer:
- High yields of intact mRNA with low ribosomal contamination.
- Eliminate the need for total RNA isolation or the use of toxic chemicals.
- The most cost effective means of generating high quality mRNA.
- Consistency, convenience and the fastest isolation time.

For the very best in direct mRNA isolation FastTrack™ and MicroFastTrack™ are the choice of thousands of research labs worldwide. When the quality of your mRNA is important, turn to the original source for purity, reliability and convenience; turn to Invitrogen.

**Toll Free 1-800-955-6288**

Invitrogen CORPORATION

3985 • B Sorrento Valley Blvd. • San Diego, CA 92121
(619) 597-6200 Phone • (619) 597-6201 Fax
rising budget that prevented NSF expansion from being a zero-sum game, a degree of skill at administrative politics within the agency, and the fact that, in the first decade or so, grantees committed no serious gaffes or egregious offenses to the conventional morality or established values of those who controlled authorization and budget.

I don’t think that the explanation put forth by Rieckenh and Larsen is wrong; rather it is ahistorical and thus needs to be placed in a context of change. Neither American society nor the social sciences stood still during these 50 years. The sweeping changes in American society are well known. Let me cite some of the “outside the Beltway” changes in the social sciences that certainly increased their prospects for legitimization:

1) The wartime experiences of hundreds of social scientists—in everything from assessment of the morale of soldiers and civilians to psychological warfare to price control—sent them to the universities as the best-trained generation of social scientists the country has ever had.

2) The enormous postwar expansion of university social science departments created a strong second generation of social scientists, which now dominates most of the disciplines.

3) The postwar flourishing of university-based social, psychological, and economic research institutes both trained students and made research results useful to a broader audience.

4) The postwar development of quantitative research methods and mathematical modeling greatly improved the scope and specificity of research results.

5) The postwar creation or development of disciplines that study the institutions of science—the history of science, the sociology of science, science policy analysis, ethical issues in science—commanded wide respect and created important bridges to the natural sciences.

6) The concepts and language of the social sciences entered popular discourse during this era. Larsen quotes from a 1986 Congressional Research Service report that lists a number of words and phrases that made this transition, including: acculturation, alienation, charisma, ethnocentrism, fiscal policy, GNP, identity crisis, juvenile delinquency, minority group, quality of life, reference group, self-fulfilling prophecy, sample, socialization, stagflation, standard of living, status, stereotype, the unconscious, and youth culture.

I cannot say whether or not the attitudes of natural scientists changed during this period. A suggestion that Larsen believes they have not is found in his pronouncement that “it would help if social scientists in the major research universities would take a physicist, chemist, biologist, or mathematician to lunch from time to time.”

David L. Sills
P.O. Box 303, Rowayton, CT 06853, and Social Science Research Council, New York, NY 10158

A Vanishingly Small Case


“One watt input, four watts output!” was the electrifying claim that precipitated a storm of publicity and started a worldwide scientific race to verify the existence of nuclear fusion in a jar. Members of the scientific community and lay readers interested in the history of the cold fusion episode and its broader implications for the scientific process will find much to consider in John Huizenga’s thoughtful account of this astonishing chapter in the history of science. Huizenga, professor of chemistry and physics at the University of Rochester, co-chaired the Department of Energy ERAB (Energy Research Advisory Board) panel appointed to investigate the claims made in the memorable 1989 press conference by the two University of Utah electrochemists Martin Fleischmann and Stanley Pons. The most startling aspect of this report was the claim that nuclear reactions could be induced by loading deuterium atoms into a palladium metal lattice and that these reactions released macroscopic quantities of heat detectable by a simple calorimeter. Present nuclear theory predicts vanishingly small D + D reaction rates (~10^-64 per second) under the reported experimental conditions, but experiment, not theory, is the final authority in science, and it is argued persuasively in this book that the resolution of the cold fusion story came about through careful analysis of the experimental procedures and data.

Huizenga begins his narrative by tracing the history of cold fusion claims and counterclaims through press conferences, scientific meetings, and journal publications. The level of technical detail provided enables the reader to judge the science for himself or herself, and the chronicle of the subject is liberally documented with journal citations and illuminating techni-
pathogen have led to the concept of the modern subunit vaccine. For example, hibridoma technology can be utilized to pinpoint the immuno-critical epitopes of a pathogen, and genetic engineering or peptide technology can be used to create vaccine antigens that could not otherwise be acquired in sufficient quantity or purity. However, as all who work in vaccine development can attest, many vaccines that look promising in the laboratory fail the test of the clinical trial, reminding us of deficiencies in our knowledge. Nevertheless, the information garnered from vaccine "failures" may provide the inspiration for future successes. For instance, the shortcomings of the first subunit malaria sporozoite vaccines accelerated efforts to investigate the safety and efficacy of newer adjuvants in humans and focused interest on cellular immune mechanisms of protection against Plasmodia.

In Vaccines, the editor, Ronald W. Ellis, and contributors consider new technologies in molecular biology, biochemistry, and immunobiology as they apply to vaccine development. Fourteen of the 20 chapters focus on vaccines against human viral, bacterial, and parasitic infectious diseases, and another discusses antitumor vaccines. Later chapters review vaccinia- and adenosivirus-expression vectors, applications of anti-idiotypic antibodies as vaccines, the use of synthetic peptides in subunit vaccines, and passive immunophylaxis with monoclonal antibodies. There is an enthusiastic and thought-provoking contribution on adjuvants and their mode of action. Each chapter on a particular vaccine tells its own interesting story. For instance, the evolution of Haemophilus influenzae b (Hib) vaccines is reviewed from the first polysaccharide vaccine to the currently licensed conjugate vaccines, which effectively overcome the nonresponsiveness of the T-independent polysaccharide immunogen in young children. All the conjugate vaccines markedly increase the immunogenicity of the polysaccharide antigen and also alter the antibody subclass response to the polysaccharide. In addition, the choice of protein conjugate may affect the age at which a child is immunologically capable of responding, and monkey studies suggest that immunologic priming with the conjugate protein may affect the subsequent antibody response to the polysaccharide. The Hib conjugate vaccines are now licensed and available to protect infants and children from life-threatening invasive disease. Furthermore, the lessons learned about polysaccharide-protein conjugate vaccines can be applied to other pathogens, such as the pneumococcus and meningococcus. I found the chapter on hemophilus vaccines fascinating. In the cases of schistosomiasis and filariasis, our biotechnology has put us in the interesting position of knowing more about the protein and carbohydrate antigens that can be identified at various stages of the life cycles of these complex organisms than we do about the biology of the parasites. In particular, we are reminded that the lack of a suitable test animal is a major impediment to progress in vaccinology, and technological advances thus far have not found a way to replace the experimental model.

In the preface, the reader is informed that this volume is not intended to cover vaccinology in an exhaustive manner, but rather to illustrate the modern process for developing a vaccine through pertinent examples. The book clearly achieves this goal and can be recommended as a source of current information on a select number of vaccines in an area where rapid progress is being made. For those who desire a truly comprehensive work on vaccines, New Generation Vaccines, edited by Woodrow and Levine (Dekker, 1990), is an excellent resource.

Deidre Herrington
Division of Infectious Diseases,
Bowman Gray School of Medicine,
Winston-Salem, NC 27157