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| 3W | Multiparameter Stat | 4S | Receptor |
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Proper connections
Carbon nanotubes, like graphite, are electrically conducting, but accurately measuring their conductivity can be difficult—very small probes are necessary, and the resistance of the contacts to the tube itself can dominate the measurement. Dai et al. (p. 523) used lithographic methods to expose parts of nanotubes while holding the rest of the nanotube under a conducting layer of gold. A conducting probe tip was then used to contact the exposed nanotubes and also map out their structure. Conductivity measurements were made at several points, and thus contact resistance could be factored out. Kinks in the nanotubes greatly increase their resistivity.

Moving molten iron
Formation of iron cores in Earth and other planets would have involved early segregation of iron-rich melts from silicate-rich mantles. Minarik et al. (p. 530) provide experimental evidence suggesting that large degrees of melting of the planets would have been required for the iron melts to segregate. These authors found large wetting angles for iron-rich melts in olivine up to pressures of 11 gigapascals, which suggests that small volumes of melt could not form an interconnected network through solid olivine.

Homeobox connection
Homeobox-containing (Hox) genes regulate pattern formation during development. No human mutations, however, have been linked to a Hox gene to date. Muragaki et al. (p. 548) found that synpolydactyly, an inherited abnormality of the hands and feet, is caused by a mutation in HOXD13. The phenotype is the result of an insertion of a polyalanine stretch in the protein in a region outside of the homeodomain.

An edge-on view of Saturn’s rings
About every 15 years, Earth, the sun, and Saturn are positioned such that Saturn’s rings appear edge-on. The Hubble Space Telescope has been used to take advantage of this rare set of reference frames in 1995 (see cover and the Perspective by Murray, p. 507). Bosh and Rivkin (p. 518) identified the F ring inner satellite, Prometheus, lagging behind its predicted position by about 20 degrees and the A ring outer satellite, Atlas, ahead of its predicted orbit by about 25 degrees, during the first Earth ring-plane crossing in May. During the second Earth ring-plane crossing in August and the solar crossing in November, Nicholson et al. (p. 509) confirmed Prometheus’ lag, which suggests that this satellite may not have collided with the F ring as predicted but may have encountered a co-orbital satellite instead. They also studied the structure of the fainter F, E, and G rings. Hall et al. (p. 516) used the faint object spectrograph on Hubble just before the August crossing to more clearly define a tenuous OH gas cloud enveloping the rings that may be derived from meteoric impacts.

Sense in the cerebellum
Because the cerebellum is activated by body movements and damage to it causes a loss of motor control, it has been regarded as a motor organ. Gao et al. (p. 545; see the news story by Barinaga, p. 482) obtained magnetic resonance images of the lateral cerebellum (the dentate nucleus, which sends out signals) of human subjects as they performed motor tasks which did or did not require sensory input, as well as sensory comparison tasks. Only the tasks that required sensory input activated the cerebellum. The cerebellum may not be specialized for motor control, as commonly thought, but only for certain motor tasks that are used to make sensory discriminations.

Visual cortex development
Covering one eye in a mammal’s early life can permanently impair the response of the visual cortex in the brain to that eye—the brain will learn to respond only to the open eye (ocular dominance plasticity). How this phenomenon occurs has been debated, and a role for one of the neurotransmitter receptors—the metabotropic glutamate receptor—has been postulated. Hensch and Stryker (p. 554) show that in vivo activation of the receptor is not required for the ocular dominance plasticity. However, they also demonstrate that in vitro long-term depression, which had been thought to occur through a similar mechanism, does require receptor activation.

Damage control
DNA damage induced by ultraviolet light or exposure to carcinogens can be repaired by nucleotide excision. Transcription-coupled repair (TCR) couples nucleotide excision repair to transcription; in Escherichia coli, mutations in genes for mismatch repair also lead to defects in TCR. Mellon et al. (p. 557) have identified mutations in human homologs of genes required for mismatch repair in E. coli in cell lines from patients with hereditary non-polyposis colorectal cancer, a cancer predisposition syndrome. These cell lines are also defective for TCR, suggesting that in addition to mismatch defects, environmentally induced defects also avoid repair in these cells and may lead to increases in sporadic tumors.

Fashioning an image
Two brain imaging techniques, positron emission tomography and functional magnetic resonance imaging, rely on changes in blood flow and oxygenation that result from neuronal activity. The temporal and spatial connection between neuronal activity and these changes has been an unresolved issue. Malonek and Grinvald (p. 551) optically imaged the cat visual cortex during presentation of oriented gratings that are known to yield well-defined cortical responses. They suggest that aerobic metabolism in localized neurons first creates a highly localized increase in deoxyhemoglobin. This effect triggers an increase in the blood flow that maintains oxyhemoglobin in the immediate vicinity and is then followed by a large regional increase in blood flow that only slowly returns to prestimulus levels.
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Gene Therapy in New Zealand

I would like to respond to the News & Comment article "New Zealand's leap into gene therapy" by Eliot Marshall (15 Mar., p. 1499).

I was not a visiting professor at Yale University, as Marshall states, but a full-time associate professor of surgery and medicine and director of a gene therapy laboratory for 8 years. I accepted a position to return to New Zealand in April 1995, at about the same time I agreed to take on the Canavan project.

Canavan disease did not figure in the movie Lorenzo's Oil, which was a story about adrenoleukodystrophy. Although both are genetic diseases that affect the brain's white matter, they differ in terms of their inheritance (autosomal versus X-linked), the gene involved (aspartoacylase in Canavan disease), and in the rate of progression, with Canavan disease untreatable and fatal within the first decade of life.

In my press release, I stated, "The best we can hope for is that the procedure is safe; anything over and above that will be a bonus." I specifically avoided stating that this study would save the children's lives or alter the disease process.

It is not correct that I did not notify regulatory agencies either in New Zealand or the United States. The first individual I suggested that Roger Karlin (the father of one of the children with Canavan disease) speak to in March 1995 was Nelson Wivel, director of the U.S. Recombinant DNA Advisory Committee (RAC), to discuss regulatory issues. Yale was well aware of my research from an early stage, as the families together with the Yale Development Office had a major public campaign to generate research support; I submitted the protocol to the Yale Human Investigation Committee (HIC) in November 1995, as soon as we had amassed sufficient preclinical gene expression and safety data. Moreover, at the time of my accepting the position in New Zealand, I had asked New Zealand authorities to establish a gene therapy advisory committee in time to review a protocol that I had hoped to submit by December 1995.

The Yale HIC chairman, Robert Levine, was made aware of the Canavan project in June, not October, 1995; the project had only gotten under way in April 1995. I had always intended to submit the project to the Yale HIC and moreover had openly discussed the project with several members of the RAC, including the director. In my discussions with Wivel, he endorsed my decision to bypass the RAC, as long as an analogous committee would review the proposal in New Zealand.

It is true that I did try to expedite the review process. I believed that, although the study was ultimately presented as a Phase I safety study, any possible therapeutic effect would only be possible if the procedure was not delayed. The children were becoming increasingly and rapidly moribund, and delay would also mask the primary outcome measures of toxicity and evidence of gene transfer.

I am happy to state that both children appear well, and we plan to assess indirect measures of gene transfer within the next few weeks.

Matthew During
Department of Molecular Medicine,
Faculty of Medicine and Health Science,
University of Auckland,
Auckland, New Zealand

Eye Evolution

1788) (1, 2) certainly merited publication in Science, but we would not have chosen it to epitomize the standards for aspiring contributors (Editorial, 12 Jan., p. 127). Among the criteria given in the editorial are "results [that] ... justify conclusions" and "interpretive excellence." The interpretation of the eyeless gene goes well beyond known facts in at least two respects, and the resulting confusion has been amplified in many secondary reports (3) (M. Barinaga, Research News, 24 Mar. 1995, p. 1766), including Science's "runner up" nomination for "Molecule of the Year" (22 Dec., p. 1903).

The evolutionary interpretation advanced in the original articles and elaborated in many commentaries does not consider convergence (analogy) as an alternative to conservation (homology) in attempting to account for the strikingly similar roles, in eye development, of eyeless in Drosophila and its homologs in vertebrates. To rule out convergence requires much more than pairwise comparisons of sequences and functions. When regulatory genes and their products evolve new functions, homologous molecules may appear in nonhomologous structures (4). Thus the fact that two structures are similar in many respects (including reliance on homologous genes) does not necessarily indicate that the structures themselves are homologous. Convergences of this kind, in which homologous gene products are recruited to analogous functions, may be more common than most biologists would imagine. Consider the function of hedgehog homologs in wing development of flies and birds (5). The parallels are as striking as those involving eyeless homologs, but no one suggests that bird and insect wings are homologous structures. Even if the proposed eyeless homologies should stand up to more rigorous analysis, the ancestral structure would undoubtedly turn out to have been a simple photoreceptor, not an image-forming eye. Homology at such a level has long been implied (although not proved) by the homologies of photoreceptor molecules. Because the proposed eyeless homologies add little to this picture, it is hard to see how they challenge "traditional" models of eye evolution (6).

The assertion that eyeless represents a new class of "master control gene" seems overstated. Like other homeotic genes, its function depends on context, consistent with combinatorial models that have been current for at least two decades (7). Eyeless is normally expressed (and required) in cells that do not contribute to the eye, and global expression under control of a heat-shock promoter does not convert the entire embryo into eye structures. We agree that "eyeless" function is [probably] universal among metazoa" (2), but we take this to imply that it originally served some basic developmental process other than eye induction.

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References

Response: It was to be expected that our two papers (1, 2) about the homology of eyeless, Small eye, and Aniridia and the induction of ectopic eyes would stir up a debate about

Patrik never fails to get a reaction

Patrik Samuelson

Patrik Samuelson is a molecular biologist at the Royal Institute of Technology in Stockholm, Sweden. Patrik uses Ready-To-Go beads to convert his RNA samples into cDNA templates for PCR.*

* PCR is a patented process of Hoffmann-La Roche, Inc.
evolution, as they go against the dogma of eye evolution that can be found in most textbooks. We not only presented sequence comparisons, but also found the conservation of splice sites that argue strongly in favor of the hypothesis that eyeless in Drosophila, Small eyes in the mouse, and Aniridia in humans are true homologs. We can now extend this list to the Pax-6 genes of squid, ascidians, nemertines, nematodes, and platelhelmints. However, the much stronger argument for true functional homology comes from the fact that we can induce ectopic eyes with the mouse gene in Drosophila. Meanwhile, we have shown the same for the squid and ascidian genes. Evidence of this kind is not easy to obtain and is entirely new. Already, on the basis of our first paper, Stephen J. Gould has proposed (3) that our finding challenges the traditional model of eye evolution, which assumed that primitive eyes evolved separately in more than 40 different phyla (4) and that the prototypic eye might have evolved only once in evolution. We were holding back on this interpretation until we had carried out the crucial experiment, which was to induce ectopic eyes with both the Drosophila and the mouse gene. On the basis of these experiments, we are proposing now that the prototypic eye arose only once in evolution and that subsequent convergent evolution gave rise to the image-forming eyes of vertebrates and cephalopods, whereas the compound eyes of insects resulted from divergent evolution. The main difference from the "traditional" view is the assumption of a single, rather than more than 40, prototypic eyes. Our hypothesis is much more compatible with Darwin's theory, because the prototypic eye evolved before the time when selection was effective as a driving force, as stated by Darwin himself. We have not implied that eyeless only functions in eye morphogenesis. To the contrary, we stated clearly (2, p. 1791)

In addition to eye morphogenesis, ey controls other functions in the developing nervous system, because null mutations are lethal, and the loss of eye structures alone is not the cause of lethality. The reason for proposing a new type of master control gene comes from the observation that the loss-of-function mutation leads to a loss of eye structures rather than a switch in cell determination, as in the previously described homeotic mutations. We do not think that we have overstated the conclusions drawn from our experimental data. Of course, it is difficult to prove an evolutionary hypothesis, but we continue to accumulate evidence in favor of our admittedly revolutionary idea.

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References

NIH Regional Primate Centers

Of particular interest in Jon Cohen's News & Comment articles about changes in AIDS research control at the National Institutes of Health (NIH) (2 Feb., p. 590; 15 Mar., p. 1491) were statements relating to AIDS research at the seven NIH Regional Primate Research Centers (RPRCs).

As the former director of the RPRC program I addressed two subgroups of Office of AIDS Research Director William Paul's advisory committee on the subject of usage of the RPRCs by AIDS researchers. At that
time (a year ago), not a single "outside" scientist had been refused animals and expertise at the centers for a peer-reviewed, funded project. I believe that is still true today. Some in the audience objected, stating they knew this had occurred, but none could provide a specific example of such a refusal. My impression was that some investigators, lacking peer-reviewed project support, believed the RPRCs should provide animals and expertise "gratis." The perception among these investigators appears to be that there is not "equal access to nonhuman primate models." Such is not, and has not been, the case.

It is ironic that, with this increased interest in nonhuman primate models relative to AIDS, the RPRCs have been reported to have received less than a cost-of-living budgetary allowance during the current year. One would hope that if greater research were needed, it would be reflected in a more positive increase in support funds to these valuable research resources.

There would, however, be great value in a review of the total RPRC program, as the committee suggests. Each RPRC is reviewed extensively every 5 years, but a total review of the entire program has not been conducted for more than 15 years and is overdue. Two years ago, the plans for such a review were initiated, and NIH received an outstanding planning report by a blue-ribbon committee (which included AIDS researchers). Unfortunately, this report did not receive the approval of an NIH committee. One hopes that the research efforts relating to AIDS will not only build on the work that the RPRCs have done but, through appropriate review and evaluation, will further strengthen future research on this dread disease.

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Going to Sea

I strongly disagree with the suggestion, quoted by Jeffrey Mervis ("A fleet too good to afford?", News & Comment, 15 Mar., p. 1486), that academic research ought to be performed on ships provided lowest bids. This would be the worst of all possible outcomes. The great bulk of the nation's oceanographic research is done on ships of the University-National Oceanographic Laboratory System's (UNOLS's) fleet. The science operations conducted at sea represent the spectrum of the work done in our nation's premier scientific laboratories. This work may range from deploying large instruments such as remotely operated vehicles and deep-sea moorings, to probing the atmosphere with laser-based instruments, to studying trace elements under clean room conditions. The ships and their crew play a critical, and constantly changing, role in this work by properly handling and deploying instruments, station-keeping, and providing ship services that range from highly regulated electrical power for sensitive instrumentation to safe areas for research with radioactive isotopes. This type of experience is not developed elsewhere in the commercial shipping industry, and the crews of the ships in the UNOLS fleet represent a remarkable asset that has grown from within by long experience. Any ship that cannot excel at this spectrum of work will not remain competitive in the fleet. In an age where success rates for ocean science proposals are running as low as 5 to 10%, it would be a gross disservice to the science community to send researchers to sea on a vessel that could not be counted on.

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After a 32-year Navy career and 5 1/2 years at the Woods Hole Oceanographic Institution (WHOI) that WHOI operates as part of UNOLS, it is my view that the Navy's oceanographic fleet was neither cheaper to operate nor better. Driven by bottom-line considerations, the contractor-operators appeared to feel little obligation to strive for excellence. Reviews by the Federal Oceanographic Fleet Coordinating Council, which I chaired, showed that UNOLS was well operated, well maintained, and well equipped. In 1995, the UNOLS deep submersible DSV Alvin made three times as many dives as the Navy's two deep submersibles (Sea Cliff and Turtle) at one-fifth the cost. The quality of science services provided by Alvin far exceeds that of Navy submersibles. The Navy's large oceanographic ships cost at least 50% more to operate than UNOLS's large ships. Similar comparisons with the National Oceanic and Atmospheric Administration's (NOAA's) fleet indicate that NOAA's costs are at least as high, possibly more.

Going to sea safely and effectively is never going to be cheap. UNOLS is well tailored to support the stated needs of our ocean science community thanks to a great deal of work by that community and the dedicated support of Congress and the funding agencies. We should continue to properly support it.

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Linac-Based Free Electron Lasers

I was surprised to discover from Alexander Helleman's article (News & Comment, 16 Feb., p. 902) that we had reached "consensus" on future x-ray generation at the International Committee on Future Accelerators Workshop on 4th Generation Light Sources, hosted by the European Synchrotron Radiation Facility in Grenoble, France. In fact, the group of more than 100 international scientists found it difficult even to agree on the definition of "4th Generation," let alone have a precise view of the future. While linear accelerator (linac)-based free electron lasers (FELs) did have their strong advocates, as Helleman describes, there was more to the meeting than that.

FELs have already demonstrated success as powerful infrared facilities in Europe, the United States, and elsewhere, mostly on the basis of relatively low-energy electron linacs. However, electron storage rings are likely to remain better value for the money in the higher energy range from 100 mega-electron volts to at least several giga-electron volts; such energies are needed for the next step of user facilities using very ultraviolet, extreme ultraviolet, and even soft x-ray output. Of course, if an accelerator has already been funded for other purposes [such as the TESLA linac at DESY (Germany's particle physics laboratory near Hamburg)], then it makes sense to exploit it for FEL development. In contrast to such unusual (and technologically demanding) linacs, there are already large numbers of storage rings in use or planned around the world, and it seems logical to explore the use of FELs on these as a favored option. Successful demonstrations have been conducted for more than 10 years, and one UV user facility now exists at the LURE center near Paris. It seems likely that the present Russian world record for FEL output wavelength [240 nanometers (nm)] will be broken later this year as the Duke University storage ring in the United States comes on stream. The workshop concluded that storage ring FEL technology should reach 50 nm within 2 years and 20 nm soon afterwards (the possibility of 4 nm was also discussed).

It is far too early to write an obituary for both the 3rd Generation Light Sources and the FELs they are likely to contain in the future. As usual, a number of complementary sources are going to emerge, and each will have its application.

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Corrections and Clarifications

The beginning of the last sentence of the cover caption for the issue of 5 April should have directed the reader to the article by E. C. Butcher and L. J. Picker on page 60 (not page 54).
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Insurance Bill to Protect Gene Data?
The campaign to prevent insurance companies from using genetic test results to deny people health coverage seems to be making some headway in Congress. In March, the House approved a medical insurance reform bill barring such discrimination. And the Senate this week passed an insurance bill containing some of the provisions.
The House's plan would ban health insurers from obtaining a person's genetic data without authorization, and it would prohibit companies from treating genetic information as evidence of a "pre-existing condition" and using this as a basis for denying coverage. And last week during a Senate debate, Senators Nancy Kassebaum (R-KS) and Edward Kennedy (D-MA) amended their insurance bill to bar employer-based plans from denying coverage based on genetic data—a change approved by the full Senate this week.
Wendy McGoodwin of the Council for Responsible Genetics in Boston calls the bills "a step in the right direction," although she notes they apply only to people changing jobs. A House-Senate panel must now decide which provisions to include in a final bill.

Fertility risk? Center might examine reproductive hazards of chemicals linked to Gulf War syndrome.

New Center to Weigh Reproductive Risks
The tide of claims that synthetic chemicals may be harming our ability to reproduce is rising faster than the ability of scientists to assess them. So the National Institute of Environmental Health Sciences (NIEHS) has proposed a way to cut through the hype and give the country timely, accurate information on the risk of these chemicals to human reproduction.
The idea is to establish a center through the interagency National Toxicology Program (NTP) in Research Triangle Park, North Carolina to examine the myriad chemicals—from drugs to pesticides and pollutants such as dioxin—that can affect human fertility and development. The center would coordinate the work of expert panels that would review the data on individual hazards, judge their potential for harm, and identify gaps in existing research. The panels would follow a model for evaluating reproductive risks developed by a team led by the Institute for Evaluating Health Risks in Washington, D.C. Industry, government agencies, and international health groups would chip in to provide an annual budget of $400,000 to $1 million.

A "lot of misinformation has gone out about reproductive risks," says Michael Shelby of NIEHS, who's heading the proposal. "There needs to be some respected source to explain what we know and don't know."
NTP's board of scientific counselors responded "enthusiastically" to a presentation of the plan last week, Shelby says. The next step is to meet with industry groups. If all goes well, the center could get under way in 1997.

Behavioral Surveys In Distress?
After failing to get changes made in a bill that could hinder surveys of adolescent behavior, social scientists are taking a new tack: They are trying to persuade the Senate not to vote on the bill at all.
The Family Privacy Protection Act, which was passed by the House a year ago, would bar researchers from surveying minors about risky behaviors without first getting their parents' written permission (Science, 15 December 1995, p. 1747). Last week Senator John Glenn (D-OH) introduced an amendment in a committee for a less restrictive bill, but it was voted down.
The bill is expected to be debated on the Senate floor in a few weeks and could pass with the survey limitations unchanged, says the American Psychological Association's Pat Kobor. Research groups, she adds, are scrambling to impress on senators "why this could have unintended negative consequences" and are urging them to put off action.

Green Bill Reconciles Polar Opposites
The National Science Foundation (NSF) and environmental groups have reconciled their differences over protecting the Antarctic environment, ending a 3-year battle and paving the way toward passage of a bill that would implement a 1991 international treaty. The only remaining U.S. roadblock, say congressional sponsors, is a crowded legislative calendar.
"I know of no controversy on this bill," declared Representative Robert Walker (R-PA), chair of the House Science Committee, before a hearing last week on H.R. 3060, the Antarctic Environmental Protection Act he introduced last month. "I think we can move quickly through the House, but I could use some help lighting a fire under the Senate." A Senate staffer for one of two panels that must act on a companion bill, S. 1645, says that legislative activity is "possible" later in the year. Five other countries, including Russia and Japan, must also act before the treaty goes into effect.
The bill takes the middle ground on several knotty issues. One part recognizes that the National Environmental Protection Act applies to U.S. activities in Antarctica—a feature NSF had long opposed—but makes no provision for citizen suits, a demand by environmental groups. It also requires NSF to concur with the relevant federal agencies in regulating waste—halfway between NSF's preference to run the show and activists' wish to give other agencies the lead role. "It strikes a delicate balance," says one NSF official, adding "if Congress messes with this bill, the whole agreement could unravel."
The message seems to have gotten through. Ranking Representative George Brown (D-CA) startled members by declaring he had nothing to add to Walker's railing of the State Department's Eileen Claussen and NSF Director Neal Lane. In return, both Claussen and Lane said they could offer no changes to Walker's bill. "Just do it, please," said Claussen.

Alabama Challenges Fraud Award
A federal court could decide later this year whether to throw out a $1.6 million settlement given to a former graduate student in a suit against the University of Alabama, Birmingham (UAB), for plagiarism. Last week the university appealed a verdict handed down in May 1995 in which a federal district court ruled that UAB had defrauded the National Institutes of Health by taking credit in grant applications for work done by epidemiologist Pamela Berge for her doctorate at Cornell (Science, 26 May 1995, p. 1125). Berge's victory sent a shock wave through the academic community. The reason: Berge had bypassed the system that normally handles scientific misconduct charges and filed her allegations instead in a Baltimore federal court.
UAB, shaken by the decision, has filed an appeal to the U.S. 4th Circuit Court of Appeals in Richmond, Virginia. Six universities and several academic lobbies, including the Association of American Medical Colleges, have filed amicus curiae briefs supporting UAB.
The court should never have agreed to hear the case, argues the school's attorney, Washington, D.C., lawyer Barbara Mishkin, because the basis for Berge's suit—the federal False Claims Act—was not designed to arbitrate disputes over scientific credit. Mishkin notes that a different judge in the same court dismissed a similar case in 1995, writing that "the legal process is not suited to resolving scientific disputes. ..." Berge has 30 days to respond to the appeal, and oral arguments could be presented as early as August.
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The blissful act of categorizing may help explain why children are fascinated with dinosaurs. Given all the possible living and fossil animals available to the minds of eight-year-olds, why is there so much enthusiasm for a group of extinct reptiles? . . . Bigness is indeed exhilarating . . . but moose and elephants do not receive the same degree of devotion. . . . The answer is perhaps in the genesis of speech as nomenclature, the tasks of order making, names as conjuring images. . . . The great array of dinosaurs is somewhat like a garden of great riches, a kindergarden of the intellect. Minding them is a sugarplum pie in the naming process, which is ordinarily meat and potatoes, too easy among farm animals, too hard among beetles or birds, too limited among mammals.

—Paul Shepard, in The Others: How Animals Made Us Human (Island Press)

Control over the powerful and threatening external elements of life is not the only sort of power kids typically derive from their wealth of dino lore. They also gain something of an upper hand over their parents at the same time. Kids can tell you the true scientific name of Brontosaurus (it’s Apatosaurus—an arcane piece of information their parents are unlikely to know). There is power in knowing things.

—Niles Eldredge, in Dominion: Can Nature and Culture Co-exist? (Holt)
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Background specimen
Computer generated 3D visualization by raytracing of segmentation chromosome territories of a female human somatic cell nucleus. False colors represent: red (X-territory), yellow (X-territory), blue (chromosomes 7). Chromosomes were originally visualized by Fluorescence in situ hybridization.

Courtesy of R. Ehr, S. Dresel, E. Schrick, T. Cremer

Monitor specimen
Comparative genomic hybridization of DNA extracted from an invasive carcinoma of the cervix uteri. The arrows denote chromosome arm 3q, that is recurrently gained in invasive carcinoma. The gain of 3q occurs at the transition from severe dysplasia to invasive carcinomas and serves as a genetic marker of tumor progression.

Courtesy of E. Schrick and T. Cremer, National Center for Human Genome Research/NHLBI

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The aim of the Human Frontier Science Program (HFSP) is to promote, through international collaboration, basic research to elucidate the complex mechanisms of living organisms, including man. Applications are solicited for the support of research grants, fellowships and workshops in the areas set out below.

RESEARCH AREAS OF THE HFSP
Basic Research for the Elucidation of

(B) Brain Functions
1. Elementary Processes
2. Perception & Cognition
3. Movement & Behavior
4. Memory & Learning
5. Language & Thinking

(M) Biological Functions through Molecular Level Approaches
1. Expression of Genetic Information
2. Morphogenesis
3. Molecular Recognition & Responses
4. Energy Conversion

TYPES OF SUPPORT

The program will only support research that transcends national boundaries. Thus, research grants will be awarded for programs that involve collaboration between teams in different countries; fellowships are available to young post-doctoral scientists who wish to work in a different country; and support will be provided for international workshops.

RESEARCH GRANTS
Grants for basic research (up to 3 years) carried out jointly by research teams in different countries. The principal applicant must be from one of the eligible countries*.

FELLOWSHIPS
Long Term (1-2 years) and Short-Term (up to 3 months) Fellowships for researchers early in their careers and from the eligible countries* who wish to do post-doctoral research in foreign countries, or for young researchers from outside the eligible countries who wish to do research in one of the eligible countries*.

WORKSHOPS
Grants for international workshops organized by researchers from the eligible countries.

* Current eligible countries are Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Italy, Japan, Luxembourg, the Netherlands, Portugal, the Republic of Ireland, Spain, Sweden, Switzerland, the UK and the USA.

RESEARCH GRANTS AND LONG-TERM FELLOWSHIPS: APPLICATION DEADLINE IS 1 SEPTEMBER 1996
(awards to be announced in April 1997)

Applications for Short-Term Fellowships and Workshops can be submitted throughout the year.

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Sponsored by the American Association for the Advancement of Science and Goddard Space Flight Center

The Genetic Frontier: Ethics, Law, and Policy

Editors: Mark S. Frankel and Albert H. Teich
AAAS Directorate for Science and Policy Programs.

Written in a language accessible to the layperson, the book's 15 essays offer a stimulating, informative exploration of the controversial issues raised by advances in genetic testing, including:

- Family Relationships and Social Policy
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FELIX User Facility
FOM Institute for Plasma Physics
Nieuwegein, The Netherlands

DEADLINE: 1 June 1996

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An information package about FELIX and ancillary equipment, including guidelines for submitting a proposal, is available from Mrs Laura M.P. van Veenendaal, Secretary of Laser Physics Department, FOM Institute for Plasma Physics 'Rijnhuizen', Nieuwegein, The Netherlands.

Requests should preferably be made by fax: +31-30-60 31 204 or by e-mail: laurav@rijnh.nl.
The Women in Science special advertising section in this issue of SCIENCE profiles leading women scientists in the biotechnology and pharmaceutical industries. Full-page recruitment advertisements are featured in the special section beginning on PAGE 572.
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Microscopic Fluid Handler
The new model CellSelector is a remote-controlled precision microsyringe pump that handles microliter volumes and selects and isolates single cells or particles with absolute purity. The unique design eliminates flow fluctuations and allows the module to be directly mounted on the microscope stage. The CellSelector makes use of disposable micropipette tips; the tip is visible in the microscope's field of view so that cell and fluid manipulation can be readily observed. Applications are extremely broad and include rare cell isolation for cloning or genetic analysis, sorting of selected chromosome fragments, delivery of microdrops of stains or antibodies to obtain spatially limited chemical reactions, and collection and storage of cells or particles. Cell Robotics. Circle 140.

DNA and RNA Recovery from Agarose
With GELase Agarose Gel-Digesting Preparation, DNA and RNA can be recovered intact and in quantitative yields from agarose gels. Agarose digestion is complete in as little as 8 min. The simple procedure avoids organic extractions and the shearing, low recovery, and introduction of contaminants that often occur with other methods. Nucleic acids of any size can be recovered, from 100-base pair amplification products to multimegabase genomic DNA. Epicentre Technologies. Circle 141.

Monoclonal Antibodies
Monoclonal antibodies (mAbs) are available to CD103 (fluorescein-conjugated), CD79b (fluorescein-conjugated), and CD68 [fluorescein isothiocyanate (FITC)—conjugated] for use in flow cytometry. Dako. Circle 142.

This mAb has been shown to be an effective marker of apoptosis, correlating well with nick-end labeling methods and comparing favorably with expression of Fas antigen. The antibody does not react with cells undergoing necrosis or proliferation. It works on formalin-fixed, paraffin-embedded sections. Dako. Circle 143.

Clone BU1/75 (ICR 1) is an FITC-conjugated mAb for the identification of cells in the S phase of the cell cycle that have been labeled with bromodeoxyuridine. The mAb has a wide range of applications for the in vitro analysis of human and other mammalian cells, including estimating cell proliferation. It can be used in flow cytometry with simultaneous analysis of cell surface markers, in immunohistochemistry, on para-

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