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Strange snows of Venus

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William A. Wulf
Epitracheal gland (EG) of a *Manduca sexta* (tobacco hornworm) pharate pupa. The gland is composed of a large lanka cell (left, ~140 micrometers in diameter), which produces the ecdysis-triggering hormone, and two smaller glandular cells (right). Individual EGs are attached to the ventral side of the tracheal tube adjacent to each spiracle, comprising a peripheral, segmentally distributed endocrine system of 18 glands per animal. See page 88 and the Perspective on page 40. [Image: Dusan Zitnan]
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**Tunable magnets**
The ability to control magnetic phase transitions in molecular compounds would be useful in data recording and device applications. Sato et al. (p. 49) synthesized a class of mixed valence chromium cyanides whose magnetic transitions could be electrochemically tuned. Initially ferrimagnetic, the compounds can be switched reversibly between ferrimagnetic and paramagnetic states through reversible redox reactions.

**Hard calculations**
Carbon nitrides are being scrutinized as a class of materials with extreme properties, including hardness comparable to or greater than that of diamond. Teter and Hemley (p. 53) investigated the structure and stability of several C–N compounds using theoretical calculations. A cubic form of C₃N₄ that is stable at high pressures may have a bulk modulus greater than that of diamond. Their analysis also suggests that previously predicted B–C₃N₄ compounds may not actually be stable.

**Critical parallelism**
Combinatorial optimization tasks, such as the traveling salesman problem, are usually solved by using computationally demanding local search techniques that find a minimum or maximum of some mathematical function. Macready et al. (p. 56) discuss the implications of performing such searches in parallel in order to find better solutions faster. As the degree of parallelism increases, the performance in finding solutions increases, but then reaches a critical point where they become no better than a random search.

**Overcoming impairments in language learning**
Functional plasticity of the brain as a result of experience—that is, changes in processing of sensory inputs—has been demonstrated in experiments on humans as well as non-human primates. Merzenich et al. (p. 77) and Tallal et al. (p. 81) present an example of this effect on comprehension of modified, language-based phonemes by language-learning impaired (LLI) children and how this training can result in improvements in the comprehension of unmodified language (see the news story by Barinaga, p. 27). After training with computer games designed to hone their temporal processing skills for acoustic stimuli, LLI children improved their game scores and also improved in their performance on standardized tests using normal, unmodified speech.

**Water clusters**
One way to gain insight into the structure of liquid water is to examine the structure and dynamics of small water clusters. Cruzan et al. (p. 59) and Liu et al. (p. 62) present analyses of vibration-rotation-tunneling spectra for the water tetramer and pentamer, respectively. The data for tetramer, which forms a quasi-planar ring, may help constrain the interaction potential for bulk water. The pentamer, which may be one of the predominant arrangements in liquid water, forms a slightly puckered ring.

** Denied clearance?**
Patients with cystic fibrosis (CF) are prone to respiratory infections caused by the bacterium Pseudomonas aeruginosa. Pier et al. (p. 64) provide evidence that mutations in the cystic fibrosis transmembrane regulator (CFTR) may disrupt a host-defense mechanism that is important for clearance of this bacterium from the respiratory tract. Cultured airway epithelial cells expressing the most common mutant form of CFTR were defective in internalizing P. aeruginosa, but not other bacterial pathogens. In a mouse model, inhibition of P. aeruginosa internalization produced a build-up of bacteria in the lungs.

**Shell games**
Many organisms can form biominerals from calcium carbonate as they grow. Moreover, such organisms often exert control over which polymorph is formed, calcite or aragonite. Falini et al. (p. 67) report experiments showing that macromolecules in contact with the mineral components of mollusk shells have a primary role in determining which polymorph forms. Macromolecules extracted from aragonite sections induced aragonite growth in vivo, and those extracted from calcite portions induced calcite growth. These macromolecules actively nucleate their respective calcite polymorph rather than inhibiting the competing form.

**Behind the shedding**
In insects, the brain peptide eclosion hormone has been thought to be the trigger for ecdysis, the shedding of cuticle during development. Zitnan et al. (p. 88; see the cover and the Perspective by Truman, p. 40) describe the discovery of a previously uncharacterized insect endocrine system. A series of segmentally repeated glands, the epitracheal glands, produce a hormone, Mas-ETH. When injected into larvae, pupae, or adults, Mas-ETH rapidly causes preecdysis and subsequently ecdysis.
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The Bell Curve: A Statement

In 1994, a highly publicized book, Richard Herrnstein and Charles Murray's *The Bell Curve* (1), claimed that IQ is largely genetically determined and that the differences in IQ between ethnic groups are substantially explained by genetic factors. We are especially concerned about the impact of *The Bell Curve*, and books developing similar themes, because we believe that the legitimate successes of the Human Genome Project in identifying genes associated with human diseases should not be used to foster an environment in which mistaken claims for genetic determination of other human traits gain undeserved credibility. . . . As geneticists and ethicists associated with the Human Genome Project, we explore *The Bell Curve's* misrepresentation of the state of genetic knowledge in this area and the misuse of genetics to inform social policy.

We urge consideration of the following three points:

First, Herrnstein and Murray invoke the authority of genetics to argue that "it is beyond significant technical dispute that cognitive ability is substantially heritable." Research in this field is still evolving, studies cited by Herrnstein and Murray face significant methodological difficulties, and the validity of results quoted are disputed. Many geneticists have pointed out the enormous scientific and methodological problems in attempting to separate genetic components from environmental contributors, particularly given the intricate interplay between genes and the environment that may affect such a complex human trait as intelligence. Second, even if there was consensus on the heritability of cognitive ability, lessons from genetics are misrepresented. The authors argue that because cognitive ability is substantially heritable, it is not possible to change it and that remedial education is not worth the effort or cost. This is neither an accurate message from genetics nor a necessary lesson from efforts at remedial education. Heritability estimates are relevant only for the specific environment in which they are measured. Change the environment, and the heritability of traits can change remarkably. Saying a trait has high heritability has never implied that the trait is fixed to be. Height is both genetically determined and dependent on nutrition. Common conditions in which genetics play a role, such as diabetes or heart disease, can be corrected with insulin or cholesterol lowering drugs and diet. The disabilities associated with single-gene conditions, such as phenylketonuria or Wilson disease, can be prevented or significantly ameliorated by medical or nutritional therapy.

Third, the more scientists learn about human genes the more complexity is revealed. This complexity has become apparent as more genes correlated with human genetic diseases are discovered. We are only beginning to explore the intricate relationship between genes and environment and between individual genes and the rest of the human genome. If anything, the lack of predictability from genetic information has become the rule rather than the exception. Simplistic claims about the inheritance of such a complex trait as cognitive ability are unjustifiable; moreover, as the history of eugenics shows, they are dangerous.

Genetic arguments cannot and should not be used to determine or inform social policy in the areas cited by Herrnstein and Murray. Since the lessons of genetics are not determin
ministic, they do not provide useful information on deciding whether or not to pursue various programs to enhance the capabilities of different members of society. Those decisions are moral, social, and political ones.

Lori B. Andrews
Dorothy Nelkin
National Institutes of Health—Department of Energy Joint Working Group on the Ethical, Legal, and Social Implications of Human Genome Research (ELSI Working Group), 31 Center Drive, Bethesda, MD 20892-2152, USA

References and Notes
2. A longer version of this statement was endorsed by the National Society of Genetic Counselors.

Genetic Patents

I would like to comment on the article “Scientists attacked for ‘patenting’ Pacific tribe” by Gary Taubes (News & Comment, 17 Nov, p. 1112). The Rural Advancement Foundation International (RAFI) is not questioning molecular biology but rather the ethics of patenting human genetic material. The basis of RAFI’s concerns about patenting genetic material from the Hagahai tribe in Papua New Guinea have been clearly laid out in the “Blue Mountain Declaration,” which states

The humans, animals, microorganisms and plants comprising life on earth are part of the natural world into which we were all born. The conversion of these life forms, their molecules or parts into corporate property through patent monopolies is counter to the interests of the peoples of the world.

No individual, institution, or corporation should be able to claim ownership over species or varieties of living organisms. Nor should they be able to hold patents on organs, cells, genes or proteins, whether naturally occurring, genetically altered or otherwise modified.

Substantial numbers of people around the world are developing a consciousness that there is something ethically wrong with the patenting of life forms, particularly human genetic material. For example, the Parliament of the European Union voted last 1 March against the issuance of such patents. Those of us who discuss these matters at churches, union halls, and community assemblies find that ordinary Americans are appalled when they find out about the patent applications that have been filed.

The members of RAFI are not “anti-science.” They have not attacked the Institute of Medical Research in New Guinea. They have asked how and in what fashion the Hagahai gave their approval to the patenting of their genetic material. They have asked how and in what fashion the individual whose cell line has been immortalized gave “informed consent” to this procedure. They have asked how having a “clear understanding of the concept of ownership” can be construed as approving the ethics of patenting a human cell line, as many people in Europe and North America who understand ownership also oppose such patents.

To raise such questions is essential to the necessary public discourse that must be conducted about these scientific and institutional developments.

Philip L. Bereano
Department of Technical Communication, University of Washington, Seattle, WA 98195, USA

Explaining “Linguistic Features” of Noncoding DNA

In the article “Hints of a language in junk DNA” (Research News, 25 Nov. 1994, p. 1320), Faye Flam described the statistical

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analysis by Rosario Mantegna et al. (1) which suggested that “junk” or noncoding DNA has the structural features of a language. We argue that most of the observations in their analysis, which was based on Zipf’s law and Shannon redundancy, have a much simpler origin: In the sequences examined, noncoding DNA had greater variance in nucleotide composition than did coding DNA, a fact which is implicit in figure 3 of their paper (1).

For their statistical analysis, Mantegna et al. subdivided the DNA sequences into “words” of fixed length, n, and then computed the “word” frequencies. Mantegna et al. then show that the Shannon redundancy, R(n), is nonzero in noncoding DNA (as in natural languages) and is significantly larger than that of coding DNA.

The redundancy R(1) of single “letters” A (adenine), C (cytosine), G (guanine), and T (thymine) reflects the nucleotide composition and increases with increasing variance of the distribution. Thus a larger R(1) for noncoding than for coding DNA simply means that nucleotide frequencies are more uneven in noncoding DNA. The increase in R(n) with increasing n observed by Mantegna et al. (1) is the same in both kinds of DNA [see figure 3 in the paper by Mantegna et al. (1)] and thus does not serve to discriminate between coding and non-coding DNA.

Unequal nucleotide compositions also go a long way toward explaining the differences in the Zipf plots obtained for noncoding DNA (2). Most of the observations made by Mantegna et al. (1) may thus be trivial consequences of uneven nucleotide frequencies. This explanation does not rule out the existence of a hidden “language” in noncoding DNA, but it removes any superficial evidence for this hypothesis. A more detailed discussion will be published soon in Physical Review Letters (2, 3).

Sebastian Bonhoeffer
Andreas V. M. Herz
Maarten C. Boerlijst
Sean Nee
Martin A. Nowak
Robert M. May
Department of Zoology,
University of Oxford,
South Parks Road,
Oxford OX1 3PS, United Kingdom

References
3. N. E. Israeloff et al., ibid., in press; R. N. Mantegna et al., ibid., in press; R. F. Voss, ibid., in press.

Coral Bleaching

A Random Samples item (10 Nov., p. 919) erroneously reports that a “National Science Foundation–sponsored meeting of reef scientists concluded in 1991 that global warming was not the ‘culprit’ for the widespread bleaching of reef corals in the Caribbean.

The 1991 interdisciplinary workshop did not explicate global warming completely. The summary of the report (1) produced by the workshop and unanimously endorsed by the participants, states clearly

With respect to the issue of coral reef “bleaching,” the group concluded that recent increases in reported events were indicative of increasing ecosystem stress, and that many of the events appear to be associated with local high temperatures. However, other stresses are also known to cause bleaching, and our knowledge of both coral stress responses and the detailed nature of climate change make it impossible at present to claim that coral bleaching is an early indicator of the global greenhouse effect. This detailed finding was as strong reinforcement of the perceived need for systematic monitoring as a basis for research.

In our zeal to observe the phenomenon of coral bleaching and to ascribe a cause to it, we must exercise appropriate scientific control.
caution and base our conclusions on scientifically defensible evidence. The evidence is still not conclusive as to whether we can dismiss or substantiate a role for climate change in that phenomenon.

C. F. D'Elia
Maryland Sea Grant College, University of Maryland, College Park, MD 20742, USA

R. W. Buddemeier
Kansas Geological Survey, University of Kansas, Lawrence, KS 66046–2958, USA

S. V. Smith
Department of Oceanography, University of Hawaii, Honolulu, HI 96822, USA

References

Rare Trees

The Florida torrey was described in Random Samples (8 Dec., p. 1573) as "the rarest tree in North America." With a population size of only 1500, it is indeed rare; but several other trees may be more worthy of this title. For example, Franciscan manzanita (Arctostaphylos hookeri ssp. franciscana) is presumed extinct in its native habitat on the San Francisco Peninsula, and only occurs in cultivation (1). Another possible candidate is the Presidio manzanita (Arctostaphylos hookeri ssp. ravenii), also native to the San Francisco Bay area, which appears to have a single clone (1). If full species status is required to be North America's rarest tree, I nominate the Catalina Island Mountain Mahogany (Cercocarpus traskiae), whose population size has dwindled to six adult trees (2). This distinctive species is restricted to a gully on the southwest side of Santa Catalina Island off the coast of California. When the population was first discovered in 1897, it consisted of more than 40 trees, but it has declined rapidly over the past century because of overgrazing by introduced herbivores. Fortunately, it appears to be making a rapid recovery as a result of the recent construction of a fence around two of the remaining trees. More than 70 seedlings have been observed in the fenced area (2).

Loren H. Rieseberg
Biology Department, Indiana University, Bloomington, IN 47405, USA

References

Italian Academic Turnover

Susan Biggin (News & Comment, 10 Nov., p. 909) is to be congratulated for the clarity of her description of the conundrum of national competitions for university appointments in Italy. Retirement mechanisms are another peculiarity of Italian academic life that are difficult to explain to the international scientific community. Although full professors retire at age 77, at age 72 they officially abandon their chair and enter a special category ("fuori ruolo"), which implies relief from conventional academic duties, but allows them to retain full salary and the right of sitting—and voting—in faculty councils. In the past, chairs could be immediately open for a new appointment. However, because of recent financial constraints in Italy, new appointments for existing chairs now require the availability of ad hoc financial coverage, which in fact is precluded by the simulta-
Useful Antisense

In her Research News article "Antisense has growing pains" (27 Oct., p. 575), Trisha Gura illustrates the uncertainty that has been encountered when one asks how antisense compounds really work as drugs. The article does not touch on another area where antisense as a technology has worked as it is supposed to and has readily produced products in the market. The genetically engineered Flvr-Savr tomato is transformed with an antisense polygalacturonase gene for delayed softening and increased durability. The antisense expression of a stearoyl-acyl carrier protein desaturase gene has also modified the Brassica seed's oil (canola), resulting in a high-stearate phenotype (1) that could form the basis of a natural margerine.

References

Corrections and Clarifications

In the heading of the review of Brethren of the Net: American Entomology, 1840–1880 (22 Dec., p. 2035), the surname of the author of the book was misspelled; the correct name is Sorensen.

The figure accompanying the Research News article "Can nuclear waste keep Yucca Mountain dry—and safe?" by Wade Roush (15 Dec., p. 1761) was inadvertently inverted.

In the article "China's unique environment favors large intervention trials" by Jeffrey Mervis ("Science in China," 17 Nov., p. 1149), Linxian county is incorrectly referred to as "Linxian Province." In the table on page 1138 of the same issue, the last item, the "CAS [Chinese Academy of Sciences] Institute of Virology, Beijing," should have been the "Institute of Virology, Chinese Academy of Preventive Medicine, Beijing."

Reference 12 of the Report "Defective lymphoid development in mice lacking Jak3" by T. Nosaka et al. (3 Nov., p. 800) should have included the following citation: P. Macchi et al., Nature 377, 65 (1995).

In the response by J. Craig Venter to the letter to the editor "Pioneering work" (29 Sept., p. 1805), the words "base pair" and the abbreviation "bp" should have read "base."

The News article "Tracing Croatia's 'disappeared'" by Eliot Marshall (29 Sept., p. 1812) should have stated that Kupres is a town in southwestern Bosnia, not northern Croatia.

Letters to the Editor

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Space Station: Storm Brewing in '96

The international space station, which enjoyed balmy skies last year, seems headed for thunderclouds in 1996. U.S. Vice President Al Gore and Russian Prime Minister Viktor Chernomydin will meet in Washington in late January to try to resolve a complicated dispute over what the orbiting laboratory should look like. That disagreement could upend the project's political prospects in Congress, say congressional staffers and National Aeronautics and Space Administration (NASA) officials.

The trouble began last month, when a team of Russian space officials visiting Johnson Space Center in Houston proposed making the aging Mir space station the core of the new international facility. First launched in 1986, Mir has lasted far longer than anticipated. After last year's successful dockings between Mir and the space shuttle, Russian politicians are now loath to throw away the facility—yet they cannot afford to operate Mir and build their portion of the new laboratory. Making Mir part of the international station would solve their problem.

But this solution creates a headache for NASA Administrator Daniel Goldin, who has sold the current station plan to Congress by insisting it's a solid and final design. "The U.S. side went berserk" when it learned of the Russian proposal, one source close to the negotiations says. NASA officials worry that Mir is unsafe and that the Russians are trying to wiggle out of their commitment to provide new hardware for the station. They also know that a new dispute could heighten concerns of lawmakers already skeptical of Russian participation.

NASA and Russian engineers now are hard at work on a series of options, including a compromise that would incorporate at least two of Mir's modules into the new station design, according to NASA officials. They hope to finish by mid-January, in time for the political heavyweights to make a decision.

O'Leary Under Fire

Despite last year's attacks from House Republicans intent on dismantling it, the Department of Energy (DOE) remains intact. Now Republicans are targeting its chief, Hazel O'Leary. A 20 December letter from seven House chairs criticized O'Leary for extensive overseas travel and for using dubious statistics in justifying these trips as trade missions. Last week, O'Leary defended the trips, asserting that they have led to almost $20 billion in business for U.S. companies. "I stand by the numbers," she said in a written response.

DOE officials say the criticism, the latest in a series of political problems for O'Leary, is a witch hunt by Republicans eager to smear the department. "This is a concerted, orchestrated campaign," complains one. He adds that lawmakers like Rep. Dana Rohrabacher (R-CA), chair of the House Science energy and environment subcommittee, "have a plan" to force O'Leary's resignation.

But Rohrabacher legislative aide Rick Dykema claims that lawmakers are simply concerned about the use of taxpayers' money. He says Rohrabacher is concerned that O'Leary could be using research money for non-research-related travel, although another Hill staffer says DOE documents have not yet provided evidence of this. "We're just fulfilling our oversight role," he adds.

The White House's response to the criticism was low-key. O'Leary's attention-grabbing and independent style, sources say, leave her with few allies among White House officials, who are preoccupied in any case with budget negotiations.

Genome Sequencing Project in Limbo

DNA sequencers—itching to get started on a large-scale effort to decipher the human genome—are getting worried that the government's budget stalemate (see p. 22) could derail their plans.

This is a "make or break time" for the genome program, says Craig Venter, director of The Institute for Genomic Research, a private research outfit in Gaithersburg, Maryland. DNA sequencers in Britain have already received a hefty 7-year pledge of support from the private Wellcome Trust (Science 271, 903). Meanwhile, U.S. researchers are concerned that their sequencing effort may get sidelined if a proposal by the National Center for Human Genome Research (NCHGR) to spend up to $20 million a year on rapid sequencing projects and automated technology doesn't get funded this year. "What's done by [U.S.] funding agencies in the next 6 months will have long-term consequences," says genomics researcher Philip Green of the University of Washington.

Researchers competing for the funds say about half of the 20 teams that submitted proposals last summer are already out of the running, while four or five groups claim to have received favorable reviews in December. NCHGR was to make final selections by early February and to distribute awards in April, and staffers declined to comment on the status of the review. But now researchers are starting to wonder when or if the overall Human Genome Program will be able to afford the initiative at all. NCHGR officials won't know the answer until Congress approves the center's 1996 budget, tucked into a bill to fund the entire Department of Health and Human Services and several other agencies.
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Getting a Picture of Sight

By using a brain imaging technique in which active neurons emit flashes of light, scientists in Israel have been able to zero in on small groups of cells that work in concert—"coherent neuronal assemblies." Identifying such assemblies has been "the Holy Grail" of brain theorists, says neuroscientist Terrance Sejnowski of the Salk Institute in San Diego. Tracking them should enable scientists to decipher neuronal firing patterns—responses to particular stimuli—that have previously been obscured by the brain's ongoing self-generated activity.

Scientists at Israel's Weizmann Institute have been able to home in on these assemblies in the visual systems of cats with the aid of a technique called Real-Time Optical Imaging (R-TOI), which yields far finer spatial and temporal resolution than that afforded by other brain imaging methods. Amos Arieli, Amiram Grinvald, and colleagues at the institute's Grodetsky Center for Research on Higher Brain Functions applied voltage-sensitive dyes to the brain surfaces of anesthetized cats. The dyes, taken up by cell membranes, converted neuronal discharges into flashes of light. A photodiode array "camera" recorded the flashes while the cats were exposed to pictures of moving vertical and horizontal lines. In a new twist on the technique, the researchers also inserted an electrode into one neuron to record the precise timing of its firing, and used the optical readings to spot neurons that fired in concert with it.

The team, including Alexander Sterkin and Ad Aertsen, reported in November, at the annual meeting of the Society for Neuroscience in San Diego, that by monitoring the ongoing activity and by averaging the response patterns from many presentations of the visual stimulus, they were able to predict—for the first time—how a cell group would respond in both space and time to a given stimulus each time it was presented.

Eric Kandel of Columbia University calls the work a "substantial advance," because "it allows one to record the electrical activity of many cells and at the same time actually visualize them in space." Says Sejnowski: "The exciting news from optical recording is that these neural assemblies are alive and have much to tell us."

Supercomputing Program Superseded

Rapid advances in computer technology, such as powerful desktop machines, have caught up with the National Science Foundation's (NSF's) supercomputing program. Since 1985, it's supported four heavyweight centers, in San Diego, Urbana-Champaign, Ithaca, and Pittsburgh. But following the recommendations of an expert panel, NSF's governing body, the National Science Board, last month decreed that the program will turn into a broader one called Partnerships for Advanced Computational Infrastructure.

Two or three "leading edge" centers will probably be selected next year, each of which must form alliances with smaller centers run by universities, industry, and the military (Science, 1 September, p. 1213). The arrangement is designed to give more researchers access to supercomputing facilities and facilitate optimal use of midlevel computers in the network.

The centers will be funded—if budgets allow—at the current rate of $65 million a year for 5 years. The current centers, which get about 50% of their funding from NSF, will likely be top contenders, although at least one is going to be scrambling for other sources of funds. Preliminary proposals are due 1 April.

Whistleblower Woes

Blowing the misconduct whistle isn't easy: More than two thirds of scientific whistleblowers experience negative consequences of their actions, including, for 1 in 4, a loss of a job. So says a study conducted for the Office of Research Integrity (ORI) at the U.S. Department of Health and Human Services by the Research Triangle Institute in North Carolina.

The report, released last month, is based on mailed surveys answered by 68 of the 127 whistleblowers in ORI's files of misconduct investigations completed since 1987. Most vulnerable to reprisals, it says, are students and lower level faculty involved in high-profile cases in the basic sciences. Institutions hate "notoriety" and will close ranks against the whistleblower, notes the report. ORI Director Lyle Bivens adds that some whistleblowers "become consumed" by their causes and "can destroy their lives in the process of seeking justice."

Nonetheless, he says, despite the price whistleblowers pay, "I was struck by the percentage of people—approaching 80%—who said they would do it again." Bivens says a federal regulation to be issued in preliminary form next summer should give whistleblowers more protection. It will be along the lines of existing voluntary guidelines that urge institutions to respond to allegations of retaliation with either a formal investigation or independent arbitration.

Walter Stewart of the National Institutes of Health, a longtime critic of his employer's handling of whistleblowers, says trying to prevent retaliation isn't enough. There should also be provision to "reward or make whole" careers that have been damaged, he says.
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Hoffman, R. Orthotopic or orthodox? Why orthotopic transplant metastatic models are different from all other models. J. Cellular Biochem. 58: 1-6 1995

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32. The two-dimensional (2D) gas model of dynamically rough surfaces: Because the undulations are statistically excited and strongly overdamped, the lipid bilayer exhibits a random surface and may be considered a 2D analog of a semiflexible chain. The undulations are characterized by a mean square amplitude (c² = ⟨u²⟩) (c, is called the roughness coefficient) and a lateral correlation length ξ characterizing the lateral range over which the orientations of the local membrane normals are correlated with n(ξ) = exp(-ξ/ξ). Following Helfrich (26), the fluctuating blayer may thus be considered as a 2D gas composed of a flat piece of dimension c² that fluctuate in the normal direction with amplitudes c² exhibiting thermal energies 1/2kT. The damping pressure energy per unit volume is of the order of n/kBT where ξ is the roughness coefficient and correlation length are related by ξ = Vr/kBT. Because ξ ∝ η, Eq. 3 for P is known for this case.
40. E. Sackmann et al., unpublished results.
41. I thank T. Feder for providing the unpublished results on adhesion. This article was written during a fruitful sojourn at the Institute for Theoretical Physics of the University of California, Santa Barbara, supported in part by the National Science Foundation under grant PHY93-04305. I gratefully acknowledge the hospitality of J. S. Langer and the staff of the institute and enlightening discussions with many visitors of the Biomedical Program of 1994. I thank P. Pincus and S. C. Safinya for the invitation to this program. Much of the work is based on a year-long cooperation with H. Ringsdorf and his group.
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of the usual synthesis or deprotection protocols is required. RNA oligomers incorporating the unusual 5' to 2' linkage at specific sites can be used to study the structure of biologically active RNA, such as the active site of ribozymes. BioGenex. Circle 141.

- Recombinant Screening and Template Prep Kit

The GeneScout kit is for rapid recombinant screening and template preparation for manual and automated DNA sequencing. The kit allows rapid analysis of recombinant colonies without doing plasmid minipreps. Bacterial colonies or viral plaque lysates can be used directly in a polymerase chain reaction (PCR) amplification. In addition to being faster than conventional techniques, the kit generates single-stranded sequencing templates for optimal use with sequencing polymerases. GeneScout produces template that is clean and free from PCR buffers, salts, and excess primers. Genosys Biotechnologies. Circle 142.

- Binding Resins

Actigel ALD and Actigel Superflow are high-binding, fast-coupling, stable activated resins for affinity separations. Coupling efficiency for proteins, antibodies (up to 50 mg/ml), and peptides is 90 to 98%. Leaching of Actigel ALD is less than 0.1 ppm, so it can be used longer than less stable resins. Reproducible coupling can be performed in a pH range from 3 to 10 and temperature range from 4°C to 40°C. Sterogene. Circle 143.

- Magnetic Glass Coupler

MPG Hydrazide is a magnetic porous glass product used to covalently couple antibodies, RNA, glycoproteins, and carbohydrates. The linkage to the superparamagnetic borosilicate glass particles is accomplished by oxidation of the carbohydrate moieties on the ligand. These activated ligands covalently bind to the surface of the MPG Hydrazide particles by forming stable hydrazone bonds. The immobilized ligands are suitable for downstream applications where solid-phase chemistry applies, such as isolation or purification of biomolecules and enzyme assays. CPG, Inc. Circle 144.

- Buffer Stain Remover

The Ethidiclean System removes virtually all ethidium bromide and Sybr Green nucleic acid stains from laboratory buffer. The proprietary Ethidiclean resin changes color to demonstrate binding of stain. Once buffer is passed through the resin, it is safe for disposal down the drain, which can save significantly in hazardous waste expenses. The laboratory size unit can process more than 200 liters of buffer and bind in excess of 100 mg of stain. American Bioanalytical. Circle 145.

- Literature

1995/96 Product Guide highlights more than 2000 immunological reagents, including monoclonal antibodies (mAbs) for flow cytometry; mAbs to human, mouse, rat, and viral antigens; growth factors; polyclonal antibodies; fetal bovine serum; and more. Accurate Chemical and Scientific. Circle 146.

Filtron Facts is a newsletter with a recent issue focusing on how to select the appropriate molecular weight cutoff of membranes in protein, nucleic acid, and viral applications. Filtron. Circle 147.

PowerMX X-ray Microanalysis System details how this system provides comprehensive analytical solutions to a wide range of microanalysis problems, including both qualitative and quantitative analysis. EDAX. Circle 148.

Crystallization Research Tools contains not only product information, but useful "Info and Ideas" columns with facts and advice on growing macromolecular crystals. Hampton Research. Circle 149.

Autosampler Vials '96 is a 53-page booklet featuring a complete line of vials, closures, and accessories. Kimble Kontes. Circle 150.