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fiset. The mutant phenotype was uncovered through a recently developed reverse genetics approach in maize. See page 1537. [Image: B. A. Ambrose and M. Mena, University of California, San Diego]

Scanning electron micrograph depicting developing female spikelets in maize homozygous for the zag1- mum1 mutant allele (magnification x115). The mutation results in a loss of floral meristem determinacy that is manifested by the production of extra silks from each floret.

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TECHNICAL COMMENTS

Genetic Data and the African Origin of Humans

Late Permian Extinctions

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NEW ADVANCES EASE IN-SITU PCR*; SLIDE SEALING ALMOST EFFORTLESS

NEW TWIN TOWERS BLOCK FITS EXISTING DNA ENGINES

Outperforms All Other Systems

WATERTOWN, Mass. — MJ Research has announced the introduction of a whole new system for performing in situ amplification reactions. These especially sensitive assays—including in situ PCR and PRINS—are used to detect low-abundance nucleic acid targets in formalin-fixed tissues and cells, and their use has revolutionized understanding of HIV-1 pathogenesis,¹² as well as other disease and genetic processes.³ Now a new system is available that addresses many of the technical difficulties that researchers have experienced. Its slide and sealing components even work well with most other makes of thermal cyclers.

The system is centered around the new Twin Towers™ in situ block, which fits any new or existing DNA Engine* or Tetrade™ thermal cycler chassis. This interchangeable block assembly features two independent towers, each of which can hold up to sixteen standard glass slides. Each tower can ramp at speeds up to 1.2⁰/sec, each has a thermal homogeneity within ±0.4⁰C slot-to-slot, and each features Peltier-Joule heat pumps with a range of 4⁰–105⁰C.

Better still are the multiplicity of sealing technologies that work well with this instrument. Of course one can use the tried-and-true method of a coverslip adhered with nail polish or rubber cement, but now two superior alternatives are available. The first, Frame-Seal chambers, employ an adhesive “frame” and polyester coverslip to create vapor-tight chambers on a slide. Even more novel is Self-Seal reagent, which is added to the reaction cocktail to seal slides and cover glasses automatically during the initial denaturation step. Both work well and outperform any other existing product.

Frame-Seal Chambers Offer Alternative for Sealing

One approach to sealing slides against vapor loss is the use of Frame-Seal™ chambers. First an adhesive “frame” is attached to a slide with mounted tissue and a release liner is removed. Reaction cocktail is added, a polyester cover slip is adhered, and the slide is then cycled. Afterwards, the whole assembly is pulled from the slide and one proceeds with hybridization.

Twin Towers System Works Well for Hybridizations Too

No longer is a separate instrument needed to incubate slides for hybridization reactions (which are usually performed subsequent to amplification). The door of each Tower so effectively seals the slots from vapor loss at steady temperatures that the mere addition of a dampened towel to one of the slots creates a humidified environment that allows hybridization without the need for any sealing whatsoever. Rather, a simple cover glass will suffice.

Self-Seal Reagent Revolutionizes Slide Sealing

An exciting new alternative for slide sealing is Self-Seal™ reagent, which makes slide sealing automatic and which lends itself well to automated processes. The reagent is composed of polymers that do not disturb amplification reactions, and it is shipped as a 2X solution in pure water. It is added to the reaction mix and a cover glass is placed on top. The slides are loaded into the cycler, and upon the first denaturation step, evaporation around the periphery creates a clot-like seal. This vapor barrier limits subsequent evaporation and amplification proceeds readily. After cycling, the cover glass is removed by soaking the slide for a few minutes in aqueous solution.

This technique allows the use of ordinary slides and cover glasses, large areas of the slide can be utilized, cover glasses are easily removed without leaving residue, and the stuff works well with archival slides. Best of all, it’s easy.

³Bagasra, Omar et al., NEJM (326) 1385-1391; 1992
²Embretson, Janet et al., Nature (362) 359-362; 1993
¹Hindkjaer, J et al., Chromosome Res (3) 41-44; 1995

FOR A DETAILED PROTOCOL


¹PCR is covered by patents owned by Hoffmann-La Roche, Inc. & F. Hoffmann-La Roche Ltd. Users should obtain license to perform the reaction.

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Pool moves
The western equatorial Pacific Ocean is characterized by the warm pool, a region of higher sea surface temperatures. The warm pool drives the world’s most intense atmospheric convection, and the migration of its eastern edge is an essential feature of the El Niño–Southern Oscillation. Picaut et al. (p. 1486) investigated the migration mechanism by deriving near-surface and surface current fields from buoy and satellite data, in combination with ocean model studies. Evidence for zonal convergence of water masses and a well-defined salinity front at the eastern edge of the warm pool was obtained, showing that zonal advection dominates the migration. The warm pool, composed of low-density fresher and warm water, is relatively isolated from the surrounding Pacific, explaining why it can easily be displaced by wind-driven currents.

Open-ocean climate record
Detailed climate records covering the last several hundred to thousand years are needed to provide a base line with which to evaluate the effects of anthropogenic emissions on climate. Although there are several detailed records available on land (ice cores, for example), records for the open oceans have been difficult to obtain because a core with a high sedimentation rate is required. Keigwin (p. 1504) now describes a record from the Sargasso Sea that has sufficient resolution. The record shows that sea surface temperatures were about 1°C warmer than today during the Medieval Warm Period (about 1000 years ago).

Ice on the moon?
The Clementine spacecraft performed a bistatic radar experiment to identify the structure and composition of the lunar poles. Nozette et al. (p. 1495) believe that the same-sense polarization enhancement of the radar echo they observed in the permanently shadowed regions of the south pole are caused by the presence of ice, possibly mixed or covered with the rocky regolith. Although icy patches may not provide a unique solution for the radar signal, the authors suggest a mechanism for their presence: Volatiles, which degassed from the proto-moon or were brought in by comets, condensed and concentrated in the permanently shadowed patches of the lunar poles.

Fast, tiny dust
The cosmic dust detector on board the Ulysses spacecraft detected 11 streams of dust before, during, and after its closest approach to Jupiter in 1991 and 1992, most of which appear to emanate from the direction of Jupiter. Zook et al. (p. 1501) simulated the trajectory of the particles that impacted the detector backward in time to a specified point of origin near Jupiter and found that those dust grains that fit their model had to be faster and much smaller than had been previously thought. These simulations provide a more accurate estimate of the particle characteristics and indicate the strong influence the solar magnetic field can have on accelerating jovian dust grains away from their source.

T cell turnover in HIV-1 infection
One theory for why CD4+ cell counts decline during the course of HIV-1 (human immunodeficiency virus–type 1) infection is that rapid turnover in the effort to replace these T cells exhausts their regeneration capacity. If so, then one would expect that the length of telomeres, the structures at the ends of chromosomes, would decrease in CD4+ cells over time. Wolthers et al. (p. 1543) examined telomere length in CD8+ and CD4+ cells from samples obtained over a several year period in HIV+ individuals and found that while telomere lengths decreased in CD8+ cells, there was no significant change in CD4+ cells. This difference was not caused by some change in telomere processing, as CD4+ cells from these individuals did show decreases in telomere length after division in cell culture. These results suggest that HIV-1 infection may interfere with cell renewal in CD4+ cells.

Snail neurotrophic factor
The existence of substances in mollusks that promote neuronal growth has been controversial. Fainzilber et al. (p. 1540) describe the isolation of a peptide from snails that can cause neuronal sprouting and growth. The new factor binds to one of the mammalian neurotrophic factor receptors—known as p75—but the factor itself shows no homology to any previously identified neurotrophins.

Special delivery
Fertilization in higher plants depends on growth of the pollen tube, through which sperm cells are delivered to the ovule. Wilhelmi and Preuss (p. 1535) have identified two genes in Arabidopsis that, when mutated, disrupt the guidance mechanisms that direct each pollen tube to an available ovule. That both pollen and pistil tissue must carry the mutant genes in order for guidance to be disrupted suggests the genes may encode molecules that mediate cell-cell adhesion.

Carbohydrate library
Cell surface carbohydrates play an important role in biological recognition processes. Screening strategies to identify carbohydrate derivatives that bind to particular protein targets are hampered, however, by the synthetic difficulties because, unlike peptides and nucleic acids, stereochemistry must be controlled as monomers are added to a carbohydrate chain. Liang et al. (p. 1520) describe the use of anomeric sulfoxides to produce a solid-phase library of about 1300 di- and trisaccharides. They identified two ligands that bind more strongly to the Bauhinia purpurea lectin than does the natural ligand.
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LETTERS

The "Greenberg Hypothesis"

I would like to comment on the article "The peopling of the Americas" by Ann Gibbons, whose reporting I respect (Research News, 4 Oct., p. 31), concerning what is therein called the "Greenberg hypothesis"—that the Americas were peopled by three waves of migrations. It is said that this hypothesis is challenged by new genetic data suggesting two waves, or one wave. In this case, it appears that pertinent evidence was not taken into account.

Regarding the dating of the Amerind language, the impression may have been given that the linguistic age based on glottochronology is wedded to the Clovis culture of about 12,000 years before the present (B.P.). What we stated in 1986 (1) was that glottochronological dating has major problems, that long dates are seriously underestimated, and that "for Amerind we are dealing with a time period greater than 11,000 B.P. and beyond the limits of glottochronology."

Regarding genetic dates, Peter Forster, who is cited at the end of the article in a context of suggesting doubt regarding the three-migration scenario, has stated (2), "I was very excited to find that my results match your findings so closely."

If we evaluate the various lines of evidence, Eskimo-Aleut must be very recent and separate, given the mutual intelligibility of Alaskan and Greenlandic Eskimo and the undisputed acceptance of Eskimo-Aleut, even by conservative linguists. Eskimo and Na-Dene have entirely separate linguistic relatives in the Old World, Na-Dene being most closely related to Ket in Siberia, and Eskimo to quite other groups in northern Asia—for example, Chukchi.

Of all the sciences concerned, archaeology has the most assured dating. In a recent massive work (2), the editor Frederick West of the Harvard Peabody Museum points out (2, p. 525) the "striking parallelism" of the archaeological evidence to the three-migration theory. No one has seriously discredited Turner's dental evidence. The massive material on population genetics assembled by Cavalli-Sforza shows essential agreement, as does the early mitochondrial DNA evidence of Wallace and Torroni. A scientist should abandon an incorrect theory, but a fair appraisal of evidence from four independent sources, including new archaeological evidence, shows that this would be premature in the case of the "Greenberg hypothesis."

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References
2. P. Forster, personal communication.

Gibbons's description of the objections to Greenberg's hypothesis (that virtually all the

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"Lines of evidence"

How strong is the evidence "that the Americas were peopled by three waves of migrations"? (Above, possible migration routes about 12,000 years ago; top, the Greenberg hypothesis; below, alternative proposed routes.) Can researchers "who model protein structure" make "accurate predictions before a structure is determined by experiment"? Is another study needed about "low-level radiation risk"? Is there "consensus" about the effects of electromagnetic fields? And did "mere absence" of men during World War I turn "more women to drink"?

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indigenous languages of the Americas have a common ancestry) has linguists saying that it's impossible to trace the family tree of Amerind languages back to one 12,000-year-old ancestor, because written records go back only 5000 years. But tracing linguistic family trees is not based on written records. For most Amerindian languages, there are no such records. Language families are established by systematic comparison of phonetic data from currently spoken languages. Sometimes (although not in Amerindian linguistics), written records have been peripherally relevant to substantiating the validity of the methods used (as when 4000-year-old Hittite inscriptions turned out to confirm certain conclusions about early Indo-European).

What linguists typically disagree with Greenberg about is whether phonetic comparison of present-day languages could ever provide a warrant for suggesting a relationship going back 12,000 years. It is extremely unlikely. Languages appear to change fast enough that over that sort of time scale the phonetic similarities within a group of languages would be irretrievably obscured. That conclusion is (contra Greenberg) fairly secure, and is quite independent of the existence of writing.

The languages of the Americas could, of course, have had a common northeast Asian ancestor spoken tens of millennia ago. Historical linguists don't like that idea; they just feel obliged to point out that linguistic evidence cannot confirm it.

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Response: The article's brief mention of written records was not intended to imply that these were used to trace the origin of American Indian languages, but simply to point out that, even in the best cases, where written records exist, many linguists think that it is impossible to trace languages back to a 12,000-year-old ancestral language.

—Ann Gibbons

Protein Structure Prediction

Elizabeth Pennisi's Research News article "Teams tackle protein prediction" (26 July, p. 426) describes an ongoing project, known as CASP (for Critical Assessment of Techniques for Protein Structure Prediction) (1), to provide researchers who model protein structures with the opportunity to jointly make bona fide predictions, announced before a structure is determined by experiment. The theme of the article, that collaboration is needed for progress, is indisputable. We do not agree, however, that, among those who participated in the ab initio part of the first prediction contest "nobody really came close to predicting an accurate structure," that "predictions [of secondary structure] were no more accurate than ones made a decade ago with cruder methods," and that the assembly of predicted secondary structural elements into "a complete 3D structure" "didn't work at all," as John Moult alleges.

One advantage of the CASP approach is that the predictions are independently judged and the judges publish their opinions so that they are available to the public. This was so for the ab initio session of CASP1. The evaluations of the predictions published by the judges differed greatly from those reported by Pennisi. "For phospho-β-D-galactosidase," wrote judges DeFay and Cohen (2), "Benner and Sader [both] correctly predicted this protein to be an α/β barrel." The success came from "an exceptionally small number of 'wrong' predictions." Further, the judges wrote, "it . . . would have been unlikely if a prediction was made from the [decade-old, cruder] GOR [method for] secondary structure prediction." For synaptotagmin, the...
judges noted that "both Hubbard and Benner correctly predicted the first six strands," missing only the final secondary structural element. Despite this error, three (out of 196) possible folds were chosen to represent the beta sandwich of this protein (J); one of them was correct. This sounds "close" to us.

Predictions today are not simply contest entries; they are good enough to be applied to solve real biochemical problems. Progress has come in part through the recognition that the protein folding problem is a special example of a much older problem in organic chemistry, conformational analysis. Through this has come the realization that organic chemical approaches have something to contribute to protein folding. Science readers should therefore be encouraged to apply prediction tools to their own research problems.

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References

EMF Report: Is There Consensus?

Although the National Research Council's (NRC's) new report (1) on electromagnetic fields (EMFs) (J. Kaiser, News & Comment, p. 910) makes interesting scientific reading, it falls short as a balanced and informative public communication tool. Like its predecessor committees, the NRC panel chose not to make a prominent display of the true state of scientific uncertainty in their ranks; instead, it issued a carefully worded conclusion that "no conclusive and consistent evidence shows that exposures to residential electric and magnetic fields produce cancer." This presentation is regrettable for two reasons.

First, rational people may choose to take action to eliminate or reduce risk even when the probability that the risk is real is less than that associated with "conclusive and consistent evidence." The NRC report provides the public with no judgments about how likely or unlikely it is that EMFs really cause cancer. All we can glean from the conclusions is that the panel thinks that there is something less than perhaps a 90% chance that the EMF hazard is real. A more neutral approach, and one that addresses the public's information needs more effectively, would have been for the committee simply to report the range of members' subjective judgments of the probability that EMF exposure is truly hazardous.

Second, those readers unfamiliar with the long-standing scientific uncertainty over EMF health effects may miss the nuances of the NRC committee's conclusions and come to the mistaken belief that scientists have concluded with certainty that EMFs pose no health hazard. Indeed, this inference was the gist of many news stories that followed the release of the report. We might ask how different those news reports would have looked had the committee reported the complementary and equally true conclusion that "no conclusive evidence shows that EMFs are safe."

Keith Florig
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Low-Level Radiation

It is hard to see what good taking another look at low-level radiation risk would do (ScienceScope, 27 Sept., p. 1787). Five previous reports have created nothing but controversy (1). In each report, one faction identified 0.1 Gray as the lower limit of acute and cancerous effects (1), only 100 times below the lethal dose and unchanged in 30 years of intense research. And each time a second faction insisted on exaggerating scientific uncertainty and creating artificial risks in order to “save lives.” Hard numbers were usually buried under an inch of paper, but the frightening speculation appeared on page 1.

Not mentioned in those five reports is the important fact that radon has been safely regulated by a reasonable standard predating the Environmental Protection Agency (EPA) standard. That standard, still in use, corresponds to a cumulative dose only five times lower than the 0.1-Gray threshold (2). Yet surveys with exceptional statistical power show that this standard is safe (3).

References and Notes
2. Calculated from the 4 pico-Curies per liter action level for radon [“Technical support document for the 1992 Citizen’s Guide to Radon” (EPA 400-R-92-011, Environmental Protection Agency, Washington, DC, 1992)]. The lowest carcinogenic dose in miners with an odds ratio greater than 3 is 226 working level months (WLM) (J. Sevc, Health Phys. 54, 27 (1988)). Conversion factor: 10 pico-Curies per liter per year = 1 WLM.

Women Alcoholics at Bellevue, 1918–1919

Data published in Science’s pages in a 1936 article about historical trends in alcoholism admissions at Bellevue Hospital in New York City are probably mistaken. The questionable data occur in a paper authored by alcoholism, vitamin, and cholesterol researcher Norman Jolliffe (1901–1961) (“The alcoholism admissions to Bellevue Hospital” 83, 306 (1936)).

Jolliffe’s paper reported a generally downward trend in the proportion of female (to male) Bellevue alcoholism admissions from 1902 to 1933—the latter, national prohibition’s final year. The trend was punctuated however by a sudden spike in 1918 and 1919, when the proportion of female admissions virtually doubled to 41.8% and 39.5%, respectively. Jolliffe offered two guesses for the occurrence. First, it might have been “due in part to an increase of social drinking occasioned by entertaining soldiers embarking for and returning from overseas.” Second, the unhappiness caused by the war-time absence of men turned more women to drink. Jolliffe cleverly deduced that the absence of men, and not worry about men’s safety in combat, explained the rise, incidentally, by noting that female admissions were almost as large in 1919 as in 1918, even though hostilities had ceased by the latter year.

In 1990, I exchanged correspondence with the late Mark Keller, longtime editor of the Journal of Studies on Alcohol, who worked as Jolliffe’s editorial and research assistant in the 1930s. Keller noted that a mixup had occurred in the collection of data for Jolliffe’s Bellevue admissions paper. He explained that both of Jolliffe’s hypotheses for the female admissions spike were moot because
the increase in the proportion of female admissions never actually happened. A change in admissions-recording practices, he explained, was the source of the apparent spike.

The previous [pre-1918] and later [post-1919] statistics were filed by the famous Dr. Menas Sarcos Gregory. During the war he went into Government service. The deputy who substituted for him ... did something different from Gregory. He filed "all" the alcoholic admissions in the entire Bellevue Hospital, whereas Gregory used to file only the Alcoholic Ward admissions, in the old days, and the Psychiatric Division admissions since it got its new building. This obviously accounted for the seeming increase of female admissions in those two years; for apparently there was a policy of admitting most drunken women to the general medical wards rather than to the 'alcoholic ward' in Psycho. Likely, too, that in the old Alcoholic Ward (pre-1930s) there wasn't much room for women.—This error in the 1936 Science paper had never been corrected.

Keller's statement implies that more than the spike was awry in Jolliffe's admissions trend-lines. If the female admissions were underreported in years before and after 1918 and 1919, then both female admissions and, by extension, total admissions trends reported in Jolliffe's paper are likely problematic.

Keller noted that he had intended on more than one occasion to write Science about the matter, to illustrate, he said, the "vagaries of hypothesizing," but he apparently never got around to it.

The data offered in Jolliffe's 60-year-old paper retain more than merely archaic interest. Figures relating to alcoholism admissions and alcohol consumption during national prohibition are used and of interest to, for example, both sides in the current national debate over drug decriminalization. (see, for example, E. A. Nadelmann, Letters, 1 Dec. 1989, p. 1104)

I hope and trust that Keller and the good Dr. Jolliffe would have been relieved and pleased to see this little matter finally cleared up!

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Corrections and Clarifications
The Random Samples item "Locus for Parkinson's" (15 Nov., p. 1085) incorrectly stated that scientists analyzed blood samples from 400 members of a Parkinson's-prone family. The scientists actually analyzed 28 blood samples from the 400-member family.

In the letter by Peter Beare (18 Oct., p. 325), the page number given for Lloyd E. Bloom's editorial of 2 August should have been "559," not "869."

The ScienceScope item "NIH's harvest of special projects" (11 Oct., p. 167) reported incorrectly that a $200,000 grant went to the National Biomedical Research Foundation. In fact, the grant went to the National Foundation for Biomedical Research.

In the map accompanying the News & Comment article "India's spreading health crisis draws global arsenic experts" (11 Oct., p. 175), Bangladesh should have been shown as east of West Bengal, not north of Nepal and Bhutan.

Letters to the Editor
Letters may be submitted by e-mail (at science_letters@aaas.org), fax (202-789-4669), or regular mail (Science, 1200 New York Avenue, NW, Washington, DC 20005, USA). Letters are not routinely acknowledged. Full addresses, signatures, and daytime phone numbers should be included. Letters should be brief (300 words or less) and may be edited for reasons of clarity or space. They may appear in print and/or on the World Wide Web. Letter writers are not consulted before publication.
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NSF Drafts New Guidelines for Proposal Reviews

When it comes to judging the 30,000 grant proposals it receives each year, the National Science Foundation (NSF) is hoping that less is more. Next month NSF plans to unveil new draft guidelines for peer review that would ask reviewers to apply a shorter, clearer list of criteria.

NSF now asks reviewers to think about four yardsticks when they assess a proposal: the competence of the researchers, the idea’s scientific merit, its utility or relevance, and its effect on the scientific infrastructure. The new guidelines, however, would have reviewers consider just two things—the quality of the proposed research and its likely impact. The latter could involve everything from mentoring minority students to developing new technologies.

"We're still in the business of picking the best research by the best people," says NSF director Neal Lane. But by slimlining the criteria, which were last revised in 1981, NSF officials hope reviewers will express their feelings more clearly and program managers will be better able to assess proposals. Reviewers had a particularly tough time with the question of the relevance and utility of the research, says Lane. "As a result, they tended to ignore it. We want to get away from such a narrow interpretation of possible impacts."

The draft guidelines will be unveiled on NSF's home page—http://www.nsf.gov—and e-mailed comments are encouraged. NSF hopes to issue final guidelines next spring.

RAC Gets New Lease

When Harold Varmus, head of the National Institutes of Health (NIH), proposed last summer to do away with a 15-year-old advisory panel on gene therapy, he didn't anticipate much fuss. But the public response to NIH's plan to abolish the Recombinant DNA Advisory Committee was surprising. NIH received 71 comments, two-thirds opposed to ending RAC. The result: Varmus announced last week that the board will continue, but with two key changes. Membership will drop from 25 to 15, and RAC will be allowed to comment on—not approve—proposed experiments. The RAC itself will discuss the plan on 9 December.

Cancer Board Leaders Chosen

There's a new kid on the block in health policy—the National Cancer Policy Board (NCPB), a 20-member group based at the National Research Council (NRC). Last week, two cancer experts agreed to lead the panel: Peter Howley, chair of pathology at Harvard Medical School, will be its chair, and Joseph Simone, executive director of cancer care programs at Huntsman Cancer Institute in Salt Lake City, will be vice chair.

The panel was created at the behest of Richard Klausner, head of the National Cancer Institute (NCI), who says he wants "a neutral forum" where stakeholders can hammer out a cohesive strategy for fighting cancer. Howley was unavailable for comment, but Simone told Science he sees the NCPB as filling a gap. Existing NCI advisory boards mainly deal only with research policy, but this group, which will include cancer survivors and policy-makers, will cover many topics. "NCI doesn't feel comfortable getting into societal issues such as the economics of medicine or cancer services," says Simone. The NRC sent out 300 letters last week soliciting nominations to fill out the board.

Ward Valley Scientists Threatened With Suit

The final studies needed to pave the way for opening a low-level nuclear waste site in Ward Valley, California, are on hold after the firm that is to run the site threatened to sue scientists planning to conduct the research.

The decade-long public debate over Ward Valley seemed to die down last year after a National Research Council (NRC) panel concluded it was unlikely that radionuclides would leak from the site into the water table. But the panel also recommended more tests on how fast tritium left from nuclear tests decades ago was moving through local soil (Science, 15 March, p. 1488). The Department of Interior (DOI), which now owns the site, asked Nevada hydrogeology contractors Scott Tyler and Martin Mifflin, who were on the NRC panel, to collect soil samples, and Lawrence Livermore National Lab was to analyze them.

As reported last week in the Los Angeles Times, however, lawyers for US Ecology Inc., the firm hired by the state to run Ward Valley, sent letters to Tyler and Mifflin calling the requested studies "stonewalling." The firm said it has already invested $60 million in the site, and warned Mifflin: "Should you continue your participation... please do so based on the knowledge that US Ecology intends to seek compensation from any persons or entities whose conduct wrongfully injures its interests in this matter." As a result, says Mifflin, "I'm not sure whether there will be a contract or not [to conduct the research]."

Since receiving the 30 September letters, Mifflin and Tyler have been negotiating with DOI to be indemnified. A DOI spokesman says that's proving difficult because "the government just doesn't do that [indemnify contractors]." But DOI is awaiting word from the Justice Department, which would handle its legal role, on some arrangement that might protect the scientists.
Playing Hardball at USC

The University of Southern California (USC) has issued an angry statement calling a suit brought against the university on 14 November by 17 medical school professors "frivolous and irresponsible."

The suit, charging breach of contract, came more than 2 years after USC sent a new contract to members of the medical school's Basic Science faculty that would reduce salaries by 25% by basing annual pay on nine instead of 12 months' work. It also would link salaries to researchers' success at obtaining outside grant money. The new terms were issued after a 3-year pay freeze, according to the plaintiffs' Los Angeles lawyer, Jeffery W. Kramer.

Kramer says the university is trying to balance its budget "on the backs" of the Basic Science faculty, and, in doing so, is violating its own tenure guidelines. "Being tenured carries with it the idea that you need to pay these people enough money," says Kramer. If the university carries through with its plan, "then tenure at USC has no meaning."

The plaintiffs, who make up about half the tenured Basic Science faculty at the USC School of Medicine, say their old contracts were restored. Failing that, they are seeking damages to cover past and future salary losses.

But in a 19 November response, the university made clear it doesn't plan to back off. "We have made our decision," Provost Lloyd Armstrong said, "and the medical school is running a deficit and has to be "restructured." But the plaintiffs are taking the position that "the university has no right to require them to do their fair share in meeting the challenges," he charges in the statement. "We think it is irresponsible for this tiny fraction of our 1075 medical faculty to expect us to bleed [other parts of the university] just to maintain the status quo in the medical school."

Armstrong further says that the university has "the right to tie salaries to performance," and that the 9-month work year is routine for faculty at other USC schools and elsewhere.

New Life for Pyrenees Observatory

One of the oldest high-altitude astronomical observatories in the world, the Observatoire du Pic du Midi, perched on a 2872-meter high peak in the French Pyrenees, is undergoing a facelift.

The 118-year-old observatory, which can be reached only by cable car, is costly to run because of its inaccessibility and the harsh weather conditions on the peak. For 10 years, the observatory, which includes a 2-meter telescope and several solar instruments, has been threatened by closure. Now, however, the Université Paul Sabatier in Toulouse, which runs the observatory, hopes to save it by turning it into a combination scientific and tourist site. They hope that, eventually, the visiting public will pay half the facility's operating costs of $2.4 million a year.

The $24-million construction project, the centerpiece of which is a much larger cable-car system to carry 600 people an hour, started 2 months ago and is expected to be completed by the end of 1998. "It is a major project here in the Pyrenees region," says astronomer Gérard Coupinot of the university, who heads the refurbishing of the astronomers' work space.

The observatory "will not be a museum," says Coupinot. The public will be allowed to roam most of the 5000-square-meter site. Astronomers will actively bring their work to tourists—for example, showing them photographs taken by the telescopes the previous night. Plans also include sinking about $3 million into the observatory itself. A new 8-meter dome will be built for the solar instruments, and quarters for the approximately 20 astronomers and technicians working at the observatory will be renovated. Facilities for geophysical and atmospheric probes and even high-altitude medicine (mountain accidents are becoming more frequent, says Coupinot) are also in the works.

Finally, the restructuring will involve measures to protect instruments from the vibrations, dust, and heat caused by the 200,000 visitors that are expected yearly.

Bad Karma for Gamma Seekers

For astrophysicists probing the mystery of high-energy blasts from space, known as gamma-ray bursts, the failure of the Russian Mars '96 launch on 17 November was more than a disappointment. It was the third disaster in 2 weeks.

A gamma-ray detector the size of a Walkman, which cost an estimated $750,000, went down with the Russian craft. It was meant to serve as the third point in a triad of sensors orbiting Earth, the sun, and Mars that would have made it possible to "triangulate," or pinpoint the location of, gamma-ray bursters 100 times more precisely than is currently possible, says Kevin Hurley, a University of California, Berkeley, physicist who led the team developing the device. No one knows what causes gamma-ray bursts, which last from seconds to minutes, occur about once a day, and can come from anywhere in the sky. Researchers
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(continued from page 1471)

need precise coordinates to train powerful telescopes on bursts for signs of faint light emissions or radio waves that might represent the signature of whatever is causing the rays. Otherwise, they must keep using wide-field telescopes that “don’t get down to these really faint magnitudes we think the sources are probably hiding at,” says Hurley.

For burster-seekers, the Mars probe mishap is the latest in a string of failures. Scientists had turned to the Russians because a detector aboard the U.S. Mars Observer mission was lost in 1993 when the spacecraft vanished after reaching orbit. On 4 November, a $15 million NASA-funded satellite dedicated to gamma-ray burster research, as well as an Argentine satellite with burster-related equipment, was destroyed when the launch went awry.

NASA plans to put a burst detector aboard a Mars probe scheduled for a 2001 launch that could act as the third point in the sensor triad. But Thomas Cline, a pioneer burster researcher at NASA’s Goddard Space Flight Center in Maryland, frets that, by then, the cash-strapped agency might have pulled the plug on gamma-ray sensors aboard the Compton Gamma-Ray Observatory now circling Earth, or those on the Ulysses sun probe. The loss of either would make a Martian outpost useless.

**Fight Colds With Sociability**

In any given office or household, cold viruses tend to hop around, skipping some people while infecting others. A study of 276 adults has now bolstered the idea that those who are most stressed are also most likely to get sick.

But it’s not just any kind of stress, says Sheldon Cohen, a psychologist at Carnegie Mellon University in Pittsburgh. It’s “persistent interpersonal conflicts” that put people at risk for catching colds, he reported at the Third International Congress of the International Society for Neuroimmunomodulation, held this month in Bethesda, Maryland. Furthermore, “people who are more socially integrated are at considerably less risk,” said Cohen.

The findings stem from an ongoing study by Cohen in Pittsburgh, which follows up on his earlier work in Britain looking at the impact of psychological factors and lifestyles on health. In that study, “people with higher stress levels [were] more likely to develop colds,” Cohen says.

His team has now gone a step further by evaluating the types of stress that affected health. As in the British study, they exposed individuals to a cold virus, then kept them isolated for 5 days to see who got sick. They also interviewed subjects about the stresses they’d experienced over the past year. “It turns out that it’s only enduring social conflicts that puts people at risk,” Cohen reports. For example, a person involved in a bad marriage or supervised by a mean boss was more likely to catch cold than someone who merely had an isolated marital blowup or a tough day at the office. A dearth of social connections also appears to take a toll. People with few types of social contacts, including work, family, or clubs, were four times as likely to get sick as those with six or more types of social contacts.

“The data are very solid,” comments John Sheridan, an immunologist from Ohio State University Health Sciences Center in Columbus. And, he says, they are in line with epidemiologic research showing that people with strong social networks live longer.
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Few things figure big in animal behavior. To meet personal needs, there are food, health, shelter, and sex. Then there is the well-being of other individuals, some of them unrelated, others closely related. That distinction is crucial. Animals generally act more altruistically toward relatives, and are more competitive vis-à-vis unrelated individuals. In birds that have helpers at the nest, helpers generally choose to aid close relatives. Ground squirrels are more likely to emit alarm calls to warn relatives. Workers of naked mole-rats and paper wasps work harder when assisting a closely related queen.

As for nepotism, of course, humans are no exception. A brief survey of history—and anyone’s daily life—will reveal ample evidence. Nepotism is moreover institutionalized in many laws. In the absence of a written will, for example, the law dictates that property is passed on to the closest relatives. Tax laws reflect relatedness in some countries. In Germany, wealth passed on to close relatives is taxed substantially less than wealth passed on to distant ones.

Why would relatedness matter? And why would naked mole-rats and paper wasps care about closely versus distantly related queens? In Evolution of Social Insect Colonies, Crowizer and Pamilo provide evolutionary answers to these questions based on the tenets of kin-selection theory. Kin-selection theory proposes that, in a world governed by natural selection, heritable traits are perpetuated not only through the production of offspring but also through the enhancement of the well-being of kin that also carry these traits. Like begets like, therefore, not only directly, by producing descendant copies, but also indirectly, by fostering collateral. So goes the theory.

Empirically, kin-selection theory has been confirmed in the most diverse organisms, but no group has figured more centrally and more controversially in its development than the social Hymenoptera (ants, bees, and wasps). Because of the genetic quirks of a “haplodiploid” system of sex determination (males are haploid, females are diploid), workers are more closely related to their sisters than to their brothers, and under some circumstances are more closely related to their sisters than to their own offspring. These unusual relations provide a litmus test for kin-selection theory, because workers should favor their closely related sisters over their own offspring and both of these over their distantly related brothers. This, then, according to the theory, is a genetic raison d’être for sociality: Worker behavior evolves because workers are selected to rear their closest relatives, which sometimes happen to be sisters rather than offspring. Also, worker favoritism of sisters over brothers alters the sex ratio, and this, again according to the theory, conflicts with the more balanced sex ratio preferred by the queen. Female-biased sex ratios therefore create a fundamental conflict between queens and workers, yet at the same time facilitate social evolution.

Hence the subtitle “Sex Allocation and Kin Selection” of Crowizer and Pamilo’s superb book, a much-needed summary of the vast body of literature generated since W. D. Hamilton’s seminal work on kin selection 30 years ago. In summarizing the literature, the book is exceptionally complete (close to 700 references are cited). The ground covered is astounding, including detailed treatments of both theoretical and empirical studies on social insects. Crowizer and Pamilo themselves have contributed substantially to the field, and it is fair to say that no better team could have tackled the enormous task of writing this book.

Evolution of Social Insect Colonies focuses entirely on the so-called “genetic” factors in social evolution, particularly the interplay between sex ratio and relatedness in modulating social evolution, as well as the various modulators of relatedness such as mating frequency and queen number. In contrast, the book (as the authors admit) gives short shrift to ecological factors that also shape processes of social evolution. Thus it does not resolve the long-standing debate of the relative importance of genetic versus ecological factors in hymenopteran social evolution. But it lays out a convincing case regarding genetic factors. Any future debate now will have to incorporate both genetics and ecology.

Crowizer and Pamilo’s discussion of theory is at times fairly mathematical, but this should not deter the mathematically illiterate (like me) from reading the book. Though the mathematical arguments require a working knowledge of population genetics, models are carefully embedded in qualitative discussion of biological implications, easily accessible to non-theoreticians. In addition, detailed summaries at the end of each chapter highlight basic issues and broader implications in non-mathematical terms.

Evolution of Social Insect Colonies is the most comprehensive treatment to date of issues of sex allocation and kin selection, starting with Shaw-Mohler’s conceptualization of sex-ratio evolution and ending with the most recent developments, such as Boomsma-Grafen’s split sex-ratio theory. Thus I recommend the book as an introduction for novices, as well as a refresher for veterans in the field. It undoubtedly will provide ample inspiration to research on social insects. The numerous tables summarizing parameters from empirical studies will, I predict, stimulate further debate ar-

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**Vignette: Natural Languages**

Every person thinks its own speech near to nature, since the merest child learns it with ease. Flawless vocabulary and grammar made French the vehicle of Cartesian clarity, its syntax the very mirror of innate infant thought. . . .

Linguistic chauvinism peaked in the 17th century, but similar views remain current. To this day, the writer Franz Stark acclaims German as a “highly precise yet graphic and emotional language of clear and direct expression” and creative force, the tongue of science and intellect. Dutch and Portuguese speakers boast a range of speech sounds that lets them master any language. English, the current lingua franca, inspires Voltairean accolades. “Our infinitely adaptable mother tongue,” intones Simon Jenkins, is globally dominant due not to imperial diffusion but inherent merit—“no clicks, tones or implosives,” a phonetic alphabet, creative flexibility: “the sooner the world speaks English, the happier and more prosperous it will be.” Thus language seems an inherited blessing unique to us, yet at the same time a nonpareil that others should adopt or emulate.

—David Lowenthal, in Possessed by the Past: The Heritage Crusade and the Spoils of History (Free Press)
**PRODUCTS & MATERIALS**

**Teflon Pipette**
The Teflon Minipet is a syringe-style repetitive dispenser designed for corrosive and high purity applications. It features a unique Teflon three-way valve that provides fluid contact with only Teflon and borosilicate glass. The construction allows for accurate, repeatable aliquoting of virtually any solvent or acid. It is available in four sizes: 1 ml, 4 ml, 10 ml, and 30 ml. Bel-Art Products. Circle 138.

**Hybridoma Serum-Free Media**
EX-CELL 610-HSF and EX-CELL 620-HSF are two new serum-free hybridoma media. Both are low protein (11 mg per liter) and support a wide range of cells including lymphoid cells, epithelial cells, and B-cell hybrids of murine, rat, and human origin. JRH Biosciences. Circle 139.

**Data Acquisition and Analysis Software**
Snap-Master version 3.1 is data acquisition and analysis software for Windows 95, Windows 3.1, and Windows for Workgroups. This new version has a Sensor Database; expanded analysis functions, including sensor management; and improved data presentation and reporting elements. The Sensor function performs linear data scaling and conversion to engineering units, assigns channel numbers to incoming data, and manages the Sensor Database. In addition to the standard arithmetic, trigonometric, calculus, and statistical functions, Snap-Master includes 12 logic functions, 18 filter functions, and many more, for a total of more than 50. HEM Data Corp. Circle 140.

**Monoclonal Antibodies**
Three new epitope affinity-purified monoclonal anti-phosphotyrosine antibodies for signal transduction research are available together in a cocktail or as horseradish peroxidase or Sepharose conjugates. Zymed Laboratories. Circle 141.

Monoclonal antibody (mAb) Kay-10 reacts with mouse Fas ligand expressed on activated T lymphocytes of selected strains of mice. The antibody is suitable for use in flow cytometry. Other reagents for apoptosis research include antibodies to Fas, bad, bak, bcl-2, bcl-x, PARP, and human Fas ligand. PharMingen. Circle 142.

New mAbs to c-erbB-2, c-erbB-3, epidermal growth factor receptor, and c-myc can be used in the study of oncoproteins. The mAb SMMS-1 can be used to stain the heavy chain portion of smooth-muscle myosin. The mAb BGX-PR88 can be used to stain progestosterone receptor in formalin-fixed, paraffin-embedded tissue sections. The determination of the status of this and other steroid hormone receptors has become widely used in research into hormone-related cancers. BioGenex. Circle 143.

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million pixels. It bundles a digital camera with software imaging processing and applications that enable the capture, manipulation, enhancement, and management of high-resolution microscope images. **Pixera. Circle 144.**

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**Literature**
Implementation of a Robotics System for High Throughput Screening Utilizing Glow Luminescence highlights the time-saving advantages of combining cell-based assays with automated liquid handling, multi-detector luminescence measurements, robotic integration, and automated data processing. Expanding the Frontiers of Microsample Analysis is a brochure on the TopCount microplate scintillation and luminescence counters. Features include counting of up to 12 samples at a time for radioisotopic and luminescent labels and counting samples in 384-well microplates. Options include stacker cassettes for up to 40 microplates and a selection of crosstalk-free microplates. **Packard. Circle 147.**

MultiScreen Assay System brochure provides information on a 96-well filtration system designed to simplify all types of separations, including biochemical assays, nucleic acid purifications, and drug discovery techniques. The system is offered with a choice of membranes and plate materials for various applications. **Millipore. Circle 148.**

**Hermle/Labnet Centrifuges** describes a line featuring compact microcentrifuges, general purpose centrifuges, and high-performance models. **National Labnet. Circle 149.**

A User’s Guide to Gel Permeation Chromatography (GPC) reviews the practical and theoretical aspects of GPC, including sample considerations, mobile phase selection, and calibration procedures. It includes an extensive library of GPC applications. **Phenomenex. Circle 150.**