RANDOM SAMPLES

edited by CONSTANCE HOLDEN

Geneticist's Palette: Coloring Chromosomes

Just as color changed the face of television, color may soon revolutionize the way both researchers and physicians look at chromosomes.

When first developed in 1988, chromosome "painting," the coloring of DNA strands with fluorescing molecules, or fluors, could only label one chromosome at a time. But what scientists really need is to be able to see them simultaneously. Now in the April *Nature Genetics*, Yale University geneticists report using combinations of five different fluors to impart a different hue to each of the 24 human chromosomes. The easy-to-see colors should greatly improve on pre-"paint" karyotyping technology, which creates sometimes murky patterns of black bands in each chromosome.

"This is a pretty powerful extension of the chromosome painting technology," says Joe Gray, a molecular cytogeneticist at the University of California, San Francisco. "This is certainly the first time that somebody has been able to efficiently label all the chromosomes." The technique makes it much easier for clinicians and researchers to tell if part of one chromosome is stuck to another, to detect the presence of additional DNA, or to monitor the complex chromosomal rearrangements in tumor cells.

SPEICHER *ET AL.*

Color-coding. Multihued chromosomes in squamous cell line show things are seriously awry.

Developed by Yale's Michael Speicher and his colleagues, the multicolor technique involves several dye and filter combinations. One stain outlines all the chromosomes. Another five are combined, in different numbers and combinations, to pieces of DNA, each of which will latch onto a particular chromosome, thus giving it a unique set of fluorescing wavelengths. With special filters that transmit a narrow range of wavelengths, a camera attached to a fluorescence microscope and a computer can translate these wavelengths into different colors. And voilà! Color-coded chromosomes.

Speicher says the technique can be used to spot regions of DNA that are identical across species. And, because the DNA pieces also bind to RNA, researchers can gain a better sense of how a particular gene is functioning.

Last Word on "Science In American Life"

While the American Chemical Society (ACS) has washed its hands of the controversial exhibit, "Science in American Life," it sponsored at the Smithsonian Institution in Washington, D.C., irate critics of the exhibit can take solace in the fact that its allegedly anti-science message seems to have passed right by most of the visitors.

The critics say the exhibit, which has been running for almost 2 years now, focuses far too much on chapters of disillusionment in science, such as Three Mile Island and the Challenger explosion (*Science*, 5 August 1994, p. 729). But a December survey of close to 900 visitors revealed that they generally had a "very strong positive attitude" toward science and technology and that "this attitude was unaffected by the exhibition." The survey, independently conducted by the Smithsonian's Office of Institutional Studies, indicated that only 7.5% of the visitors thought the message of the exhibit was that science has risks as well as benefits. Only 2.6% mentioned "problems/dangers."

Robert Park of the American Physical Society says that the survey merely shows "that the exhibit is so shoddy that no message of any kind gets through." Other scientists insist there is a message, and a bad one. ACS board chair Joan E. Shields, writing in the 11 March issue of *Chemical & Engineering News*, described the exhibit as "a politically correct, revisionist historical display of science as a litany of moral debacles, environmental catastrophes, social injustices, and destruction by radiation."

The ACS tried to negotiate changes in the show, but finally gave up in January after the Smithsonian presented it with a list of alterations that it said would cost the ACS $400,000. Shields, who characterized the proposed changes as both "trivial" and "outrageously expensive," says: "We've gotten a lot of correspondence from our members saying 'can't you do something.' We're basically saying we can't—we can't work with the Smithsonian management."

SCIENTISTS RANKED BY NUMBER OF HOT PAPERS

Name	Institution	Field	# of Papers
1 Bert Vogelstein	Johns Hopkins Univ.	Molecular biology	13
Kenneth W. Kinzler	Johns Hopkins Univ.	Molecular biology	13
2 David Beach	Cold Spring Harbor Lab	Molecular biology	11
3 Gregory J. Hannon	Cold Spring Harbor Lab	Molecular biology	10
4 James N. Ihle	St. Jude Children's Hosp.	Signal transduction	9
5 Bruce A. Witthuhn	St. Jude Children's Hosp.	Signal transduction	7
Olli Silvennoinen	St. Jude Children's Hosp.	Signal transduction	7
Paul M. Borsenberger	Eastman Kodak	Materials science	7
Ramon Parsons	Johns Hopkins Univ. (Vogelstein team)	Molecular biology	7
Bruce A. J. Ponder	Univ. of Cambridge	Molecular biology	7
Michael Karin	Univ. of CA, San Diego	Signal transduction	7

It's hot paper time again at the Institute for Scientific Information (ISI). And for the third year in a row, Johns Hopkins molecular biologist Bert Vogelstein tops the list of hot paper–producing scientists—sharing honors this time with colleague Kenneth W. Kinzler. The ISI ranks scientists according to the number of papers they have authored that were cited "significantly more" than papers of the same age and type in the same journals over the last 2 years. According to ISI, "Vogelstein, with over 35,000 total citations of his work since 1981, now stands second only to Robert Gallo among the most cited scientists of the last 15 years." Paul Borsenberger of Eastman Kodak (#5), who studies photoconductivity in molecular solids, is also worthy of note as the only physical scientist to make the list since it began 3 years ago.

As for "hottest papers" of 1995, ISI gives the top spot to David Ho of the Aaron Diamond AIDS Research Center in New York for "Rapid turnover of plasma virions and CD4 lymphocytes in HIV-1 infection" (*Nature*, 12 January 1995), which got 126 citations in that year.

Foreign Students Losing Yen for Japan

In the land of the rising yen, Japan's hopes of luring more foreign students are being deflated by its ever-more-expensive currency. According to the Japanese Ministry of Education, Science, Sports and Culture (Monbusho), there were 53,847 foreign students in Japan in 1995, only 60 more than in 1994. But money isn't everything: More than 85% of Japan's foreign students come from else-

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where in Asia, and many are looking to English-speaking countries for higher education.

The latest numbers are bad news for the nation's plans to host 100,000 students per year by 2000. Hiroki Taura, director of Monbusho's student exchange planning office, blames the appreciation of the yen, which stands at 105 per dollar compared with 145 in 1990, and Japan's long-running recession, which makes it hard for students to find part-time jobs. Indeed, Chun Seong-Yong, a Korean Ph.D. candidate in inorganic materials engineering at the Tokyo Institute of Technology, says that when the yen suddenly jumped in value by nearly 20% a year ago, "a number of fellow students had to quit in the middle of the term."

Then there is the language problem. A Taiwanese official in Tokyo notes that as fewer Taiwanese students are coming to Japan, many more are heading overseas, especially to Canada, Australia, and the U.K. For those thinking of international careers, "English is in," he says. "Private companies are much more interested in hiring students who have studied in English-speaking countries than those who have studied in Japan."

Monbusho is hoping to boost Japan's flagging attractiveness by increasing scholarships and building dormitories so foreign students can avoid Japan's phenomenal rents. Says Taura: "We'd still like to emphasize that an education at a Japanese university is very worthwhile."

New Squid on the Block

For 60 years the *Loligo pealei* squid has been king of the holding tanks—and lab benches—at the Marine Biological Laboratory (MBL) in Woods Hole, Massachusetts, where neurobiologists gathered to study its giant nerve axon. Now another squid has swum into town, attracting another group of scientists. For researchers at the MBL and the neighboring Woods Hole Oceanographic Institution (WHOI) have figured out how to raise the 4-cm-long *Euprymna scolopes* to maturity, setting it up to become the flagship model for animal-bacterium relationships.

The new squid, a Hawaiian species, has been an object of scientific interest for 6 years now, even making the cover of *Science* in 1991 (6 December; article on p. 1491), because of its live-aboard glow-in-the-dark bacteria, which prevent it from casting a shadow that alerts predators to its presence. But scientists have been frustrated in attempts to raise it because *Euprymna* tended to die during a 2-week "critical period" after hatching.

Now, however, Woods Hole researchers have found they can keep the creatures alive by changing their diet from tiny crustaceans to larger mysid shrimp. The squid—only 2 mm long at this point—are able to get enough nutrition to live through the critical period by latching onto and devouring the shrimp, which are twice their size, explains WHOI microbiologist Paul Dunlap.

RUBY/MCFALL-NGAI/ORMEROD

Win-win. Squid harbors helpful microbes *(inset)*.

This should enable researchers to examine the squid's unique relationship with the bacterium, *Vibrio fischeri*, in greater detail. This duo provides the only true model of animal-bacteria mutualism to date, the researchers say. "It's going to become very important that we understand how animals impact with bacteria" in biomedical research, says Margaret McFall-Ngai, a developmental biologist at the University of Southern California. She and USC microbiologist Ned Ruby have spent the past 6 years raising *Euprymna* through the first week, studying how the bacteria and animal influence each other. Scientists often focus on bacteria that harm their host rather than on mutually beneficial relationships, McFall-Ngai says: "This gives us the opportunity to do that."

Taxonomy Helper

Since the Earth Summit 4 years ago, biodiversity experts have talked up a storm about cataloging all 1.5 million of the world's known species in a single Internet database. Now a plucky group of U.S. government biologists appears to be making a start—at least for North American species. Their Interagency Taxonomy Information System (ITIS), which will go fully on-line this month, aims to put all the tens of thousands of known North American flora and fauna on the World Wide Web.

The project will bring order to the sometimes unsystematic world of systematics. To Southerners, for example, a catfish is a freshwater fish, while in New England the term applies to certain marine fish. Government resource managers also have to cope with the mix of both common and scientific names used by various agencies. "They're crying out for stability in nomenclature," says Elaine Hoagland, president of the Association of Systematics Collections, which is helping ITIS in the project.

Created by the Environmental Protection Agency (EPA) and other agencies, ITIS is starting out with a data set of 128,000 species from the National Oceanographic Data Center that is being checked for quality by taxonomists. To handle inconsistencies in nomenclature, ITIS will register a species under the various names by which it is known, but when given a query will point the user toward the most widely accepted scientific name, thereby reflecting the latest taxonomic consensus. It will also provide references and the names of experts on that species.

EPA's Barbara Lamborne says ITIS should be useful for biologists outside government as well as agencies. Amphibian expert David Wake of the University of California, Berkeley, agrees that such a resource will be a boon if it does, indeed, prove to be sufficiently "malleable" to reflect differences of opinion. The ITIS URL is http://www.itis.usda.gov/itis/.

Gallics See Remotest Galaxy

Like Olympic long jumpers, astronomers keep setting records for the most distant observed galaxy—and keep breaking them. The latest candidate has emerged as a result of measurements by a team led by Patrick Petitjean of the Institut d'Astrophysique de Paris-CNRS, who have found evidence for a galaxy forming next to a quasar when the universe was only 10% of its present age.

Petitjean's team, which includes Emmanuel Pécontal of the Centre de Recherche Astronomique de Lyon, David Valls-Gabaud of the Observatoire de Strasbourg, and Stéphane Charlot of the Institut d'Astrophysique de Paris, report in the 4 April issue of *Nature* that they used a spectrograph at the 3.6-meter Canada-France-Hawaii Telescope in Hawaii to determine that the redshifts—a measure of distance from Earth—of the quasar and a nearby radiation-emitting body were the same (4.7), proving that they were within a few thousand light-years of each other.

Then the team set about figuring out what the nearby body was. They analyzed the broad-band radiation coming from it and found there was too much to be produced by anything but a group of very young, very hot stars. Such light could possibly be produced by a cloud of warm, glowing dust surrounding the quasar, but Wallace Sargent at Caltech calls this "unlikely."

"It's an exciting discovery," says David Turnshek of the University of Pittsburgh, because emission from galaxies had previously been seen only out to redshifts of about 3 and absorption "shadows" of possible galaxies out to redshifts of 4.4 (*Science*, 9 February, p. 754). Such studies, he adds, "are looking at places in the universe that might be affected by [a nearby] quasar." So the question remains as to how typical of the early cosmos this latest entry into the galaxy sweepstakes might be.