RANDOM SAMPLES

edited by CONSTANCE HOLDEN

Glitch in U.K. Tech Plan

Britain's new "technology foresight" program may be a bust if ministries other than the U.K. government's science and technology office don't get more actively involved, according to a new report from the Parliamentary Office of Science and Technology (POST).

Last May, as part of a policy shake-up, British Science Minister William Waldegrave announced that the U.K. would adopt a program linking academics with industrialists to identify emerging technologies with high economic potential (*Science*, 4 June 1993, p. 1419). Next month Waldegrave will launch a series of expert foresight panels that will try to figure out how to forge better links between research policy (Waldegrave's charge) and industrial innovation, which falls in the purview of the Department of Trade and Industry (DTI).

The new report suggests, however, that key government departments, in particular the DTI, are not taking the foresight effort seriously. The DTI "is not clear on how it will act when generic technologies are identified," says POST director Michael Norton. DTI officials say it's too early to say how they will follow up on the foresight program, since the new panels won't be recommending anything until next year. But, as the POST report notes, the DTI's record for exploiting similar efforts is patchy: Last year, for instance, the House of Commons industry committee chastised the department for failing to use one of its own reports on aerospace technologies to develop a strategy to improve the competitiveness of the aerospace industry.

POST has found that in other countries that have launched crystal ball-gazing programs—such as Japan, Germany, and the Netherlands—prominent roles are played by departments responsible for industrial and economic affairs. The Dutch program, for instance, is run not by the science ministry but by the Ministry of Economic Affairs, and the Japanese effort is used by the Ministry of International Trade and Industry for strategic planning.

If the DTI doesn't shape up, some lawmakers and industrialists worry that the foresight exercise may end up as a funding scramble among academics. Says POST vice chair and Labor MP Anne Campbell: "I would be very sorry if this is hijacked by the science base."

Big Splash On Jupiter

Jovian fireworks in July. A train of comet fragments will blast into the planet.

Astronomers who gathered last week in College Park, Maryland, to plan studies of a comet scheduled to slam into Jupiter next July heard a bit of pleasing news: There should be a good show in the works.

Researchers had been worrying whether there will be anything to see, even after learning last fall that the disruption of comet Shoemaker-Levy 9 during a close pass by Jupiter in July 1992 probably left fragments large enough to pack a good-sized wallop on colliding with Jupiter (*Science*, 22 October, p. 505). The problem was that some computer simulations of the impact suggested that the comet might waste away to nothing as it hurtled hundreds of kilometers into the Jovian atmosphere. "It looked like Jupiter might swallow up" the fragments with nary a trace, says impact specialist and comet co-discover Eugene Shoemaker.

At last week's workshop, however, Mordecai-Mark Mac Low of the University of Chicago and Kevin Zahnle of the National Aeronautics and Space Administration's Ames Research Center at Moffett Field, California, reported otherwise. Their simulations of a 200,000-kilometer-per-hour entry into Jupiter's deep, gaseous atmosphere showed that a 1-kilometer fragment would explode after penetrating about 60 kilometers into the atmosphere and send a plume of glowing superheated debris hundreds or possibly thousands of kilometers above the clouds (see computer-generated rendition above).

Other, more pessimistic impact modelers were not present to defend their results, but the fine details included in Mac Low and Zahnle's simulations and their care in verifying their results "give us some confidence that we will have a plume," says Shoemaker.

Mismeasures of Productivity

Information technology was supposed to have the power to change the world. But in the U.S. service industry—an area that has invested heavily in such technology—the change, at least in productivity, can barely be noticed. According to a new National Research Council report, however, economists may simply be looking for that change in the wrong places.

New information technologies (IT) have been transforming the service sector since the mid-1970s, but the report, "Information Technology in the Service Society," says that traditional macroeconomic measures indicate that productivity growth has been pitiful. It averaged 0.7% a year during the 1980s in financial services, transportation, communications, trade, health, education, and other service sectors, which now employ 76% of the U.S. work force. "Outside of communications," which has been able to lower costs faster than other sectors, "the macroeconomic data reveal scant evidence of IT's contribution to productivity," says the report. And that's despite $750 billion worth of investments in hardware alone during the 1980s; some airlines, for instance, are said to have put more money in their reservation systems than in their planes.

This apparent low productivity growth is known to concerned policy makers as the "IT paradox," according to the report's authors, a committee headed by management professor J. Brian Quinn of Dartmouth College. Various explanations have been put forward, such as slack management owing to lack of competition in highly regulated fields. But the report finds that most benefits may be "pass through" benefits, meaning that they tend to accrue more to customers (including manufacturing concerns) than to the service industry itself.

Also, says the report, traditional productivity measurements, designed for goods-producing industries, don't reflect what's going on. Those calculations—basically output (revenue from goods) divided by input (man hours of work)—fail to cover factors such as speed, reliability, or convenience of service. Yet, as the report points out, entire enterprises, such as round-the-clock securities trading, "could not exist at their present scale and complexity without this technology." As Quinn says, the

penalty for failing to invest in IT can be quite severe: You'll go out of business. But "the alternative costs of not having these investments is not captured anywhere."

Birth Control and High Blood Pressure

Researchers at a fertility clinic in Long Island are planning an unusual trial for a hypertension drug: They want to see if it acts as a contraceptive on men. After 10 men taking the drug Procardia showed up on their doorstep with fertility problems, reproductive biologist Susan Benoff and her colleagues at North Shore University Hospital's fertility clinic in Manhasset decided to investigate the medication's sperm-incapacitating properties. The tipoff came from one man whose apparently normal semen failed an in vitro attempt to fertilize his wife's egg. Researchers then tested the sperm for the acrosome reaction, which involves the release of enzymes to break into the ovum's tough zona pellucida—and it flunked.

Benoff says the scientists suspected the drug might be the culprit because it blocks calcium-ion channels in cell membranes, and sperm have "voltage-dependent calcium channels which are important for the induction of the acrosome reaction." She and her colleagues are now looking to round up 50 to 100 men, aged 25-45, who are taking hypertension medication and who are not seeking to sire children. They will be placed on Procardia for 3 months and then switched to an alternative medication (such as one that works by vasodilation) for another 3 months. Their sperm will be checked for changes in its ability to bind a sugar called mannose on the surface of the egg (which Benoff says is believed to be involved in the zona-induced acrosome reaction), and for the acrosome reaction itself. The scientists hope their results might lead to something that has so far eluded researchers: a safe, inoffensive, and reversible male contraceptive.

Designer Cattle With Ultrasound

Beef producers have a new high-tech tool to help them determine if the final destination for their animals is a 4-star restaurant or the nearest greasy spoon.

Using off-the-shelf medical equipment to take ultrasound readings of the amount of fat in the ribeye muscle on the upper back, two Iowa State University researchers are grading cattle on the hoof—branding the meat "select," "choice," or "prime" before the animal has gone to slaughter. The usual method is for slaughterhouse graders to eyeball carcasses and give them a grade. But when pitted against graders at a meat packing plant in Minnesota, ultrasound grading on both live animals and hot carcasses was more accurate and just as fast, say the inventors of the technique, animal scientists Gene Rouse and Doyle Wilson.

Ultrasound grading, the scientists claim, could not only take the subjectivity out of the grading process, but could lead to the breeding of higher quality cattle. Cattlemen are looking to the technology to help them breed animals with more succulent intermuscular fat and less subcutaneous and "seam" fat. Such cattle would be much leaner but would maintain the flavor that only fat can provide. And being leaner, naturally, they would need less food. The Iowa Cattlemen's Association is already using the method in their bull evaluation program.

"The cattle industry is moving into the area of value based marketing," says Rouse. "Producers are looking for the best fit in certain types of markets. That includes a high-quality product for white-table-cloth restaurants as well as a very lean product that could go into the fast-food industry." The pickiest gourmands, of course, may start asking for ultrasound snapshots to verify the quality of their meals.

Hiring Thaw at FDA

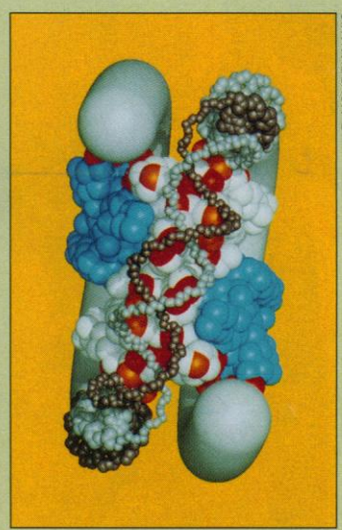
A program to accelerate the review of new drug applications at the Food and Drug Administration (FDA) was derailed last month when assistant secretary for health Philip Lee ordered a hiring freeze throughout the Public Health Service (*Science*, 17 December 1993, p. 1807). The freeze included FDA and left the already understaffed program without the means to hire additional personnel. But while the job chill at PHS continues, the drug program has been unfrozen, as of last week. The agency will be able to continue hiring scientists to review applications—good news for biotech and pharmaceutical executives who often wait for months, even years, for the agency to respond to new drug applications.

In 1992, those delays prompted industry, Congress, and FDA to forge a law that allows the agency to charge up to $100,000 per drug application and use the money to hire more reviewers. The agency added 144 new reviewers and support staff in 1993, roughly a 14% increase. It was, however, 242 fewer than originally planned, partly because of delays in collecting user fees last year, says an FDA official.

Last month's hiring freeze riled industry, which objected to paying fees without a concomitant improvement in the review process. So Lee backed down and, in an 11 January memo to FDA commissioner David Kessler, stated he would "permit FDA to address its new statutory responsibilities."

At the Core of the Chromosome

This first high-resolution image of a "gene endoskeleton" shows strands of DNA winding around a protein core, forming the fundamental unit of all chromosomes, the nucleosome. Scientists have long dismissed this core structure, a bundle of proteins called histones, as an "inert spool," mere scaffolding for the DNA, says Johns Hopkins University biophysicist Evangelos Moudrianakis. But what high-resolution images are showing is that "the protein structure 'talks' to DNA with a very specific pattern of positive charges [red and orange dots], which seem to 'mate' with the pattern of negative charges on the DNA backbone," he says. "No one, including us, was anticipating such exact complementarity between these two patterns." This finding should help scientists learn more about the forces that keep DNA tightly coiled, and the accordion-like opening and closing of the histone structure that is required for gene expression and replication.



The heart of life's matter. Histones are blue and white; DNA is grey tube.

Moudrianakis and his colleague Gina Arents of the department of biology used x-ray crystallography to achieve this computer-generated image. Base pairs in the midsection of the DNA tube are stripped away, leaving only the backbone, to reveal the histone-DNA complementarity. The work is described in the 15 November *Proceedings of the National Academy of Sciences*.