

Briefings

edited by CONSTANCE HOLDEN

Canine Genome Project

Call it a kinder, gentler type of animal research. In a study modeled on the first phase of the human genome project, researchers are developing a genetic linkage map to help find the genes responsible for several hundred diseases in man's best friend.

The ultimate goal is a simple blood test a vet or breeder can use to determine whether a dog is carrying a gene for, say, hip dysplasia, blindness, or copper toxicosis.

The project is being conducted by two human geneticists, George Brewer and Vilma Yuzbasiyan-Gurkan of the University of Michigan, and three veterinarians, William Schall, George Padgett, and Ulreh Mostosky of Michigan State University. They have received a \$750,000, 5-year grant—the largest ever for dog health research—from the American Kennel Club, the Morris Animal Foundation, and the Orthopedic Foundation for Animals, Inc.

The first task is to find 400 DNA markers or "landmarks," spread around the chromosomes, for construction of a map with landmarks spaced every 10 million bases or so. It should then be possible to find the rough location of a disease gene by seeing whether it is inherited along with a marker. From there, developing a diagnostic test is relatively straightforward.

How many genes are ultimately detected this way will depend on research money, says Brewer, who estimates that, once the map is in hand, it will still cost about \$20,000 to \$40,000 to seek out each disease gene.

But he is optimistic, saying that the genetic map will be a far more powerful tool in dogs than in humans. "In species



Broddingnagian Robot. Giant, 12-foot-tall robots like the prototype above being developed at Carnegie Mellon University may one day be stalking the hills and valleys of the moon and Mars. Dubbed Ambler, the creature will traverse rough terrain wheeled vehicles can't get to, propelling itself on its six legs like a cross-country skier. The electrically powered Ambler, unlike previous interplanetary vehicles, will be "autonomous"—capable of making its own decisions with a general set of instructions. It will be able to construct three-dimensional maps of its environment which it will study to decide where to go and what samples to collect. Commissioned by NASA, the Ambler is one of the concepts being looked at under the agency's planetary Rover Program. Now that Ambler has shown it can rove, the next step is integration of its perception and planning and control functions.

where breeding is controlled, you can have a big impact on gene frequency."

Perils of Perestroika

What have Soviet economic planners been doing for the past 5 years? Getting increasingly confused, apparently. U.S. scientific policy-makers got a first-hand impression last

week of the chaos that threatens perestroika when a group of them met at the National Academy of Sciences for a free-ranging discussion with members of visiting President Mikhail Gorbachev's delegation.

Present were ten high-ranking Soviets including economist Stanislav Shatalin, member of the President's Council, who talked at length about the dilemma facing the economy.

He described a system floundering in a void between centralized planning and a market system. At this point, said Shatalin, there's no going back—the centralized economy is "a shattered base that can't be glued back together... the whole system of government ownership is now bankrupt." But the costs to society of moving ahead are tremendous in terms of rising prices and unemployment. What's more, no one knows how to ease the transition.

"In '88 we had the impression our economy would get moving," said Shatalin. But now "we see the methods we have been applying simply don't work. We are trying to prop up this table with two rocky armchairs—the market system and the central plan. The attempt at symbiosis between these... has produced rather regrettably sad consequences," he said through an interpreter. "To be frank, the economic situation has not only worsened, but it is getting still worse with every passing day." He said, "it has now become clear there is no resolution to our problems without a market system in every sense."

How to do it? Soviet economists have experience in shifting from a market system to a planned system, said Shatalin, but shifting back is much hard-

Malaise Amid Russian Dreams

You might not have guessed it from man-on-the-street interviews on the nightly news of angry Soviet citizens, struggling to get a loaf of bread or a sausage from depleted supermarket shelves, but Mikhail Gorbachev's theories of economic perestroika are far from dead in Russian hearts: in one surprising result from an otherwise gloom-ridden survey of Soviets, about half the respondents favored private enterprises and fewer than 25% were opposed. An "entirely unexpected" finding, considering what is being reported in the Soviet press, was that close to one-third would not mind starting their own businesses. And the proportion favoring private ownership was even higher among farmers.

These were among findings from a survey conducted by the new National Public Opinion Research Center established in Moscow in 1988. Reporting on the results during a recent visit to

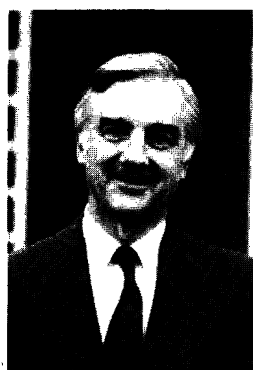
the United States was the center's director, leading Soviet sociologist Tatiana Zaslavskaya, who is also president of the Soviet Sociological Association and an adviser to Gorbachev.

Zaslavskaya told a Georgetown University audience last month that findings from the survey as a whole show that Soviet citizens are becoming increasingly cynical, pessimistic, and polarized by ethnic antagonisms. The unprecedented set of public opinion polls, conducted in 1989 and early 1990, found that, while a majority of respondents said they "completely supported" Gorbachev last year, substantially fewer than half do now as the country's economic crisis has deepened.

The survey, based on face-to-face interviews, involved a set of questionnaires administered to various subgroups in a sample of about 3000 people representing the population of the U.S.S.R. It contained a vast range of detailed questions on social, economic, and political issues.

er. For example, "we haven't reached any understanding as to the reason for rising prices." There is "no basis for predicting unemployment." He said, "the problem of convertibility of the military complex [to consumer ends] is very poorly thought out." And "we have not thought through raising the interest on savings" to bring interest rates above the 10% inflation rate. A program for selling stocks and bonds to the population has "not really been thought through."

Concluded Shatalin, "without help from the West, we will not be successful in establishing an effective system."



Derek Bok

End of Bok Era

Derek C. Bok will leave the presidency of Harvard University next spring after 20 years in the post.

Bok has presided over a period of sustained growth and change at Harvard, which has included development of a core curriculum, creation of the John F. Kennedy School of Government, and an increase in the university's endowment from \$1 billion to nearly \$5 billion.

Bok, 60, said one reason he is leaving now is that Harvard is about to begin a long-term \$2-billion fund-raising campaign that "calls for continuity."

Among those mentioned as possible successors is the Kennedy School's dean Robert D. Putnam. Harry Rosovsky, former dean of arts and sciences who will become acting dean this summer, was in the lead until he took himself out of the running.

Harvard officials said a search committee will be formed shortly.

Repression in Sudan

The two-man delegation sent by the AAAS and several medical organizations to investigate jailings of scientists by the Sudanese government is back. And they report that, although many of detainees have been released, the overall situation has not improved. Nearly 80 scientists, engineers, academics,

	Japan		European Community	
	R&D	Product Introduction	R&D	Product Introduction
Advanced Materials	● ▼	— ▼	+	●
Advanced Semiconductor Devices	●	— ▼	+	●
Artificial Intelligence	+	+	+	+
Biotechnology	+	+	+	+
Digital Imaging Technology	● ▼	— ▼	● ▼	— ▼
Flexible Computer-Integrated Manufacturing	+	●	+	— ▼
High-Density Data Storage	●	— ▼	+	●
High-Performance Computing	+	+	+	+
Medical Devices and Diagnostics	+	+	+	+
Optoelectronics	●	— ▼	●	+
Sensor Technology	+	●	+	●
Superconductors	● ▼	● ▼	●	●

Current status: + = U.S. Ahead
● = U.S. Even
— = U.S. Behind

Trend: ▲ = U.S. Gaining
◄ = U.S. Holding
▼ = U.S. Losing

Bad news from the competitiveness front. A Department of Commerce survey* has identified 12 emerging technologies that together could account for annual worldwide sales of \$1 trillion by 2000. Though the United States is now at least on a par with Japan in R&D in each technology, the above chart indicates Japan is ahead in introducing products in five areas and is starting to pull ahead in several others. The European Community is also catching up fast in some areas. Says the report: "Before the year 2000, the United States will lag behind Japan in most emerging technologies and will trail [Europe] in several of them."

*Emerging Technologies: A Survey of Technical and Economic Opportunities (Technology Administration, U.S. Department of Commerce, spring 1990).

and health professionals have been locked up since a fundamentalist Islamic military government took over last June.

Eric Stover of the AAAS and Chicago physician Quentin Young were particularly con-

cerned about the fate of Sudanese Medical Union official Mamoun Mohamed Hussein, who was sentenced to death for protesting the arrest of colleagues. Another physician, Sayed Mohammed Abdallah, was sentenced to 15 years in prison. Groups from around the world have been pressuring the government on behalf of the prisoners. Sudanese physicians at the Ministry of Health staged a work slowdown in April, and last month a group met with the Sudanese president to appeal for the release of Mamoun and Sayed.

Days later, just before the visitors' arrival, both were released. A number of other professionals have been freed—including University of Khartoum biologist Farouk Mohammed Ibrahim (see *Science*, 13 April, p. 167). But Stover says the situation is a "revolving door." Four more doctors were put behind bars during his visit.

Questions about perestroika show the public is divided about economic reforms, said Zaslavskaya. With regard to social issues, 28% thought social justice had diminished in 1989. Over half the respondents predicted that inter-ethnic hostilities would continue to increase. Growing social instability is reflected by the greatly increased fear of unemployment and the perception of a widening gap between rich and poor that occurred between last summer and this spring. "The 5 years of perestroika have clearly demonstrated that not only the command-administrative system of economic control, but the entire social system should be dismantled," said Zaslavskaya.

She said the past 70 years have left a legacy of cynicism and alienation from authority that threaten current reform efforts. Only about one-third of the respondents had confidence in the country's ruling councils, and there has been a "precipitous fall" in the prestige of the Communist party—only

19% now have "complete confidence" in it while 30% have none at all. About 20% had become "completely disappointed" in Socialist ideas.

Zaslavskaya said the polls demonstrate that there is a growing "moral and spiritual vacuum" that is being filled with nationalist, religious, and mystical preoccupations. She said there is a widespread "loss . . . of most elementary moral criteria," as shown in high tolerance for swindling and theft. Disillusionment with ideals comes through in responses to a question on "for whom and in what relations our country can serve as an example": 55% replied "for no one and in nothing."

Overall, in Zaslavskaya's analysis, public consciousness in the Soviet Union is marked by "instability, morbid sensibility, and explosiveness" as well as "rising polarization." There is "continuing growth of pessimism, disappointment, and indifference to current events, including the fate of perestroika itself."