RANDOM SAMPLES

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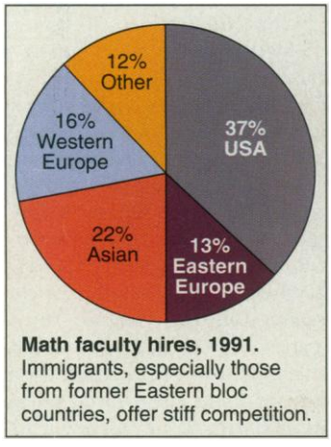
Mathematicians in the Doldrums

In the early 1970s, mathematicians with newly minted Ph.D.s faced a horrendous job market in the United States. Their plight led to a flood of reports calling for better master's programs, an expanded postdoc system, and curriculum reform.

Plus ça change. The employment outlook is even more bleak today, says a new report from a task force put together by the American Mathematical Society (AMS).* And the recipe for improving the situation is strikingly like that proposed, but largely ignored, 20 years ago.

According to the AMS survey, 5% of the 1990-91 new doctorates were still unemployed in March of this year. That may seem low at a time when overall unemployment in the United States is close to 8%, but in the years since 1977, the previous high for spring unemployment among mathematicians had been only 3%. The influx of mathematicians from Eastern Europe and the former Soviet Union is partly to blame for the job troubles, the report says. In 1990-91, these immigrants accounted for 13% of new Ph.D.s hired in doctorate-granting departments (see chart).

But the report points to a more fundamental problem: New math Ph.D.s are prepared for, and invariably turn to, academia for their first job. Mathematicians need to expand their employment horizons and consider industry—an option most still scorn and for which they are not prepared, says the task force. "I think we're going to have to change the curriculum. Graduate schools have to broaden the arena for which they are educating," says Donald Lewis, head of the University of Michigan's math department and chairman of the task force that produced the report. Among other recommendations, the task force calls for more professional master's programs that emphasize applying math to real-life problems and an increase in postdoctoral support.



Math faculty hires, 1991. Immigrants, especially those from former Eastern bloc countries, offer stiff competition.

**Employment and the U.S. Mathematics Doctorate*

'Perfume' Controls Bee-havior

She's sweet as honey. Reigning over thousands of loyal subjects who would forfeit sex and even their lives for her, she's a queen honey bee. In the mid-1980s, biochemist Keith N. Slessor and biologist Mark L. Winston of Simon Fraser University in British Columbia learned the secret of her power—she simply wears the right perfume, a cocktail of compounds called queen mandibular pheromone. And now the two researchers have gone on to discover what's in the magic potion.

The pheromone belongs to a class called "primers" that control behaviors fundamental to colony reproduction. Unlike "releaser" pheromones, which release specific behaviors, primers usually inhibit behaviors—such as the rearing of new queens. Queen mandibular pheromone is the only primer identified from any social insect.

KENNETH LORENZEN

Retinue response. Workers pick up pheromone from their queen *(center)*.

Although some components of queen bee pheromone had long been known, the full blend of five compounds yielded its secrets only after an all-out analytical assault. Slessor and Winston finally cracked the queen's secret formula by running 3000 pheromone bioassays over two and a half years, which involved exposing hundreds of batches of bees to chemicals and recording their behavior in detail.

The two scientists, whose article in the July-August issue of *American Scientist* gives the most complete picture to date of the pheromone, first noticed how the substance worked in 1985, when they coated a glass lure with extract from a queen's mandibular gland and put it on a lab bench next to some worker bees. Instead of milling about, the workers began licking and touching the lure. "We were amazed at how similarly the bees were treating a lure compared to a queen," says Winston. Indeed, what they were doing was the "retinue response," in which workers fawn over the queen, picking up pheromone-borne instructions that they dispense throughout the hive.

Hoping a little of that magic might rub off on human technology, Winston and Slessor took out a patent on the pheromone, which they have licensed to PheroTech, a company in Vancouver. Now that the ingredients are known, Slessor says, the way is open to develop a synthetic pheromone. And a cheap imitation could be a big boost for flowering crops that rely on pollination by honeybees. Bees paid about 60% more visits to crops that were sprayed with the diluted pheromone, he says.

Barbara McClintock Dies at 90

Barbara McClintock, the pioneering geneticist whose revolutionary ideas about "jumping genes" took decades to be accepted by the biology community, died last week at age 90.

In the 1940s and 1950s, through her exhaustive study of the color of maize kernels, McClintock deduced the presence of small strands of DNA that could move within the plant's genome. Her results were ridiculed at first, but the work ultimately brought her a Nobel Prize in 1983. Today, the study of transposable elements, as her jumping genes are now known, has blossomed into an active field (*Science*, 14 August, p. 884).

Russian Scientists Take to the Waves

Russian scientists, it seems, will go through hell and high water to collaborate with their colleagues in the West—well, high water, at least. Viktor Anisimov, a guidance systems engineer from the St. Petersburg Institute of Mechanics, realized that he didn't have the hard currency to fly a team of seven researchers to the Robert Gordon University in Aberdeen, Scotland, to discuss joint projects. So he borrowed a 30-foot yacht from a boating club run by several St. Petersburg research institutes and sailed the 1000 miles across the Baltic and North Seas.

For Anisimov, a keen sailor, that wasn't such a big deal. But "several of the academics who came over would rather have traveled any other way but by boat," says Aberdeen computer scientist Barry Murton. These reluctant sailors endured a 19-day ordeal to get to Scotland, and after 5 blissful days there, they're now near the end of the long sail home. But the seasickness won't have been for nought: Murton says that staff and student exchanges between Aberdeen and St. Petersburg should begin next year, and the two institutes are planning a joint research project on deep drilling techniques for the oil industry.