

Cutting a Path in Genetics and International Diplomacy

The newly elected president of the Estonian Academy of Sciences has long been a scientist-diplomat, first in dealings with the Soviet Union, now with the European Union

TARTU, ESTONIA—Rather than take the long route to the entrance of his building, Richard Villems leads a visitor through the trees at the back door. “The student way,” he says, hopping over a ripped section of the metal fence. At 60, the silver-haired geneticist seems to have lost none of his agility. Known for his research on early human migrations, which is currently challenging some long-held views of the peopling of the world, Villems has played another, public role as well—helping build a research infrastructure in his native Estonia and lending vigor to an academic world that was until recently beholden to bureaucrats in Moscow.

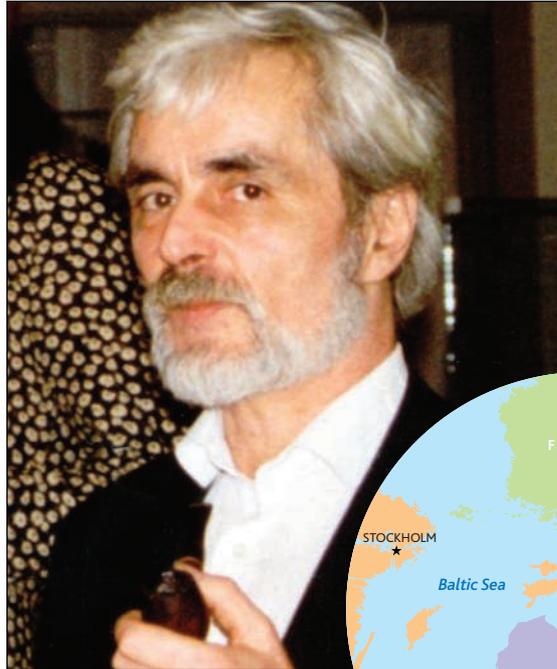
Villems, who was elected president of the Estonian Academy of Sciences last month, nods at a squat concrete building: “That’s where I lived for 4 years when I was a medical student,” he says with a smile. Back then, “you had to be careful what you said,” because people could be expelled from the university or even arrested for politically incorrect behavior.

Things have changed here. This could be the campus of an Ivy League university in New England. Graduate students amble along the wet stone paths carpeted by autumn leaves, carrying on discussions in half a dozen languages. Villems chats among them casually and puffs on his ever-present pipe. And like a well-established Ivy League professor, Villems excuses himself to deal with the paperwork for several multimillion-dollar research grants.

Russian soldiers pulled out of Estonia only 10 years ago; the nation quickly reoriented itself toward the West and was granted membership in the European Union (E.U.) just this May. While most other former communist central and eastern European nations are struggling with poverty and a drain of expertise to richer neighbors, Estonia has emerged from the former Soviet Union’s dominion as an economic and academic success story.

Unusual among the new democracies, Estonia’s transformation has been spearhead-

ed in large part by its scientists, says Ene Ergma, an astrophysicist who is now the leading politician in the Estonian parliament. She credits Villems as a “science diplomat,”



Mover and shaker. Villems’s research on the peopling of Estonia has led to a new view of early human migration.

helping turn Estonia into a budding scientific powerhouse. Villems’s influence is bound to grow.

Follow the DNA

The Estonians enjoyed a “special status” that allowed a somewhat more relaxed intellectual life than that of others within the Soviet empire, says Villems. One reason, he says, is that the Estonians have always been a breed apart. Their language, like Finnish and Hungarian, comes from a root unrelated to the languages spoken in the rest of Europe. Along with their linguistic oddity comes the riddle of their genetic origins. The prevailing theory once held that the Estonians arrived in a single migration from the Ural mountains in Siberia, but it has been supplanted in the last decade by a more complex theory that the population is a mix of tribes that migrated from several directions.

Villems began to puzzle over this question in the late 1980s. His new passion was opportune. Techniques were just emerging that allow researchers to reconstruct the human family tree using DNA sequences, tracing the split and migration of different populations right back to the appearance of *Homo sapiens* in Africa more than 100,000 years ago. And Villems had by then gained the prestige and independence to choose and pursue his own project.

Villems had been a rising star among Soviet molecular biologists. In the 1970s he was one of the chosen few allowed to do research in the West, first as a postdoc at Uppsala University in Sweden and then at the University of Edinburgh, U.K. After these experiences, Villems resolved to help bring Estonian science up to speed. The laboratory resources available at the time were “quite minimal,” he says. So in 1984, armed with nothing more than a 13-page argument for increasing funding for modern molecular biology, he sidestepped the bureaucratic hierarchy and went straight to the U.S.S.R. Council of Ministers in Moscow, the body with final say over the distribution of research funding within the Soviet Union.

“That was a brilliant act of diplomacy,” recalls Jaak Järv, a chemist at the University of Tartu. “Almost no one knew how to deal with such a huge bureaucracy,” but Villems pulled it off. The committee rewarded the upstart Estonian with the equivalent of a

\$9 million grant to create a molecular biology institute on the campus in Tartu, now called the Estonian Biocenter. This was “more than the total that all Estonian scientists had ever received in grants,” says Villems. That sum has since been multiplied many times over by private donors and research charities wooed by Villems and others, particularly after the E.U. designated the Biocenter as one of its 34 “Centers of Excellence” in 1999.

Armed with the modern tools of biology, Villems attempted to trace Estonians’ origins through the DNA of the mitochondria, which is passed down from mother to child, and the Y chromosome, which passes from father to son. In principle, by comparing the mutations that accumulate in these gender-linked indexes, the age and origin of modern populations can be worked out. It’s well established, for example, that all modern



humans trace their parentage to a female line that emerged from Africa more than 100,000 years ago. But sorting out individual European populations is a big challenge. There has been so much mixing among the original tribes over history, says Villems, that “to get the real answers you have to go deeper in time, farther out in the context” than the peopling of just Europe.

Sleuthing the Y-chromosomal DNA of Estonians, for example, seems to lead back to ancient populations from Borneo and the Sunda Islands that spread up to eastern Siberia before the last Ice Age. But if this turns out to be true, says Villems, “it will be beyond any present-day ‘standard scenario’ of gene flow over the past 20,000 years.” Getting the answers is only possible by placing Estonians within “the big picture.” And to piece together that picture, Villems has amassed an “amazing” collection of European and Asian DNA samples, says Thomas Gilbert, a British molecular anthropologist now at the University of Arizona in Tucson who has collaborated with Villems.

According to what Villems calls the “Tartu school,” the emerging picture differs from the mainstream view. Villems, along with his research group, particularly Toomas Kivisild, has been publishing research indicating that *Homo sapiens* migrated from Africa to India and “incubated” there about 60,000 years ago before spreading out to people the rest of the world. The theory “is completely their own,” says Peter Forster, a molecular anthropologist at the University of Cambridge, U.K., and “it has been gaining a surprising amount of acceptance.” Forster says it would force a major revision of the field if it bears out.

Championing science

Soon after the Soviet Union crumbled, Villems became a scientist-diplomat for his country, first by negotiating Estonia’s early entry into the E.U.’s research funding scheme. Ergma believes that this “gave us a head start” over the other former Soviet states. Now Estonia boasts one of the best Internet networks in Europe as well as a small but fast-growing high-tech industry.

At the top of Villems’s to-do list at the Estonian Academy of Sciences, which holds sway over the government’s science policies, is “to secure our place in the European Research Area.” His experiences in Moscow were excellent preparation. In a flashback to the days when Estonian scientists had to fight for a piece of the pie within the Soviet Union, their focus is now on Brussels, where the E.U.’s \$22 billion scientific budget is divided up among its 25 member states. Ergma agrees that winning this external funding is crucial. “Although Estonian salaries are low, so is the cost of living,” she

says. “But a centrifuge or a computer is just as expensive as elsewhere. So we desperately need structural grants.”

A necessary step for Estonia to remain competitive, as Villems sees it, is to reduce what he calls the “mediocracy” in his country’s science. Sounding like a draconian thesis adviser, he says that after years of Soviet exploitation, “some Estonian researchers have a sense of entitlement, that they should be funded without having to do excellent work.” He plans to make sure that Estonian research institutions and projects are assessed by peer-review from outside the country.

Villems says another major problem to be tackled is Estonia’s “missing generation” of scientists. The academy estimates that about 1000 students stampeded away from science into more lucrative fields

such as business shortly after Estonia’s independence. To achieve what Villems calls “critical mass” among the ranks, science education will be getting a boost to attract the first generation of Estonians who never knew communism. And an equally important strategy, says Villems, is to offer start-up grants to lure successful Estonian researchers back home after doing postdocs abroad.

Villems has his work cut out for him. Entering his office is like plunging into a cave made of paper: Books line every wall, and piles of articles cover every surface. Squeezing into the chair at his computer like a pilot climbing into a cockpit, Villems chuckles at the chaos around him: “I don’t mind it.”

—JOHN BOHANNON

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Academic Careers

Family Matters: Stopping Tenure Clock May Not Be Enough

University policies aimed at giving women time to have a family and a career are no match for the pressure to publish

As a rare woman faculty member at Stanford Medical School in the late 1970s, neurobiologist Carla Shatz put her quest for tenure ahead of her desire to start a family. But as she toiled away in the lab, working on a range of problems in developmental biology, her biological clock was ticking faster than she realized. By the time she earned tenure in her late 30s, her reproductive years had passed. “For 4 years, I tried every fertility treatment that was available,” says Shatz, now 57 and a professor at Harvard University. “Nothing helped.” The disappointment, she says, contributed to the breakup of her marriage.

In the past decade, dozens of universities have changed their tenure policies to accommodate the family needs of their faculty members. They’ve adopted rules that provide time off from tenure-track positions, created part-time tenure slots, and spread the gospel about the need to make room for family choices in the climb up the academic ladder. But those changes aren’t making much of a dent in the cultural norms that put a premium on productivity, especially at the start of an academic career. Last month, at the annual meeting of the Association for the Study of Higher Education, two researchers who surveyed women faculty members around the country on their attitudes toward extended tenure summed up the problem in the title of their talk: Fear Factor.



Two for one. Dawn Lehman and Marc Eberhard, husband-and-wife civil engineers at the University of Washington, say that sharing one faculty slot has eased the pressure on childcare.

“Simply having a policy in the faculty handbook is not enough,” says Lisa Wolfwendel of the University of Kansas in Lawrence, who presented the data with her colleague, Kelly Ward of Washington State University in Pullman. Although the fear that a tenure extension could hurt their