Dominique Toran-Allerand

Don't call her a women's health researcher, but Dominique Toran-Allerand knows more about estrogen than almost anyone else. And she earned that knowledge by questioning dogma every step of the way.

Walking into Dominique Toran-Allerand's office is a bit like entering a time warp. She has run her lab, a dark set of rooms on the sixteenth floor of a building at Columbia University, since 1973—and it shows.

She offers this reporter tea, then boils the water for it in a large beaker on a rather rusty two-burner iron stove. The milk comes from a clear plastic bottle in the fridge, marked with a white label. (She has also been known to toast bagels at the stove with a long-handle spatula). The lab is otherwise quiet, and a lone researcher works two doors down.

But never mind appearances. From this lab have emerged results that revolutionized research on the hormone estrogen—repeatedly. "I think anybody who works on estrogen stands on the shoulders of Dominique," says C. Sue Carter, co-director of the Brain Body Center at the University of Illinois at Chicago. "She was way ahead of her time."

Toran-Allerand was among the first to show that estrogen interacts with growth factors in the brain to stimulate nerve cells and, later, that it acts through a signaling cascade. Her most famous work dates back to the late 1960s, when scientists believed that the brain was organized along strictly masculine or feminine lines. Some even used the cerebral cortex to represent areas of the brain that didn't respond to estrogen.

Applying a technique she had perfected in the lab of Columbia researcher Margaret Murray, Toran-Allerand showed that, in fact, slices of nervous tissue respond beautifully to estrogen, sprouting axons and dendrites; in the absence of estrogen, nothing happened. Despite her striking data, she recalls, "it was a very difficult thing to convince people of."

That may be putting it mildly. Suggesting that estrogen directly stimulates several regions of the brain, including the cerebral cortex, was tantamount to heresy. When she first presented her data at meetings, scientists laughed or ignored her. But over time, others began to find evidence that fit the model and, years later, the theory finally gained acceptance. "Dogma dies with great difficulty," she says.

Toran-Allerand is famous not just for the advances she made, but for the gorgeous photographs that illustrated them. "I can still see the pictures," says Carter, who liked them so much that she used them as teaching tools. "They were so beautiful."

Fittingly, Toran-Allerand is just as memorable. Her friends have vivid recollections of meeting her for the first time, recalling small details decades later. She was always physically striking, they say, with white hair cut in a pageboy style, and just as self-confident. "She's such a personality, she didn't blend, she always stood out," says former postdoc Farida Sohrabji, now an associate professor of neuroscience at Texas A&M University.

French by birth, Toran-Allerand lived in Paris till World War II, when her parents moved to New York state. In Paris, she and her cousins were in awe of their great-aunt—a physician who regaled the family with colorful stories from her life as a syphilologist inspecting the city's whorehouses.

Inspired by her great-aunt, Toran-Allerand attended Smith College and began planning for a career in medicine. But she was in for a rude shock when she arrived at Albany Medical College after graduation. "I went from an all-women's college to being the only female in the class," she recalls. She was also the only female medical intern and the only female resident at Albany, and later the only female neurology resident in her year at Columbia.

At group dinners, she was frequently relegated to the wives' corner, teachers referred to her as 'Mister' and fellow students called her a nurse in front of patients. "I think they thought it was pretty funny but it was not easy actually," she says. "It was kind of lonely."

She was deeply affected by the blatant discrimination and it perhaps contributed to some of the adjectives people ascribe to her—irascible, high-strung, volatile. But it also made her resilient and fearless in defending her unpopular theories. "I like working in areas where nobody knows anything," she says. "I've spent virtually my entire career challenging dogma. But most of the time, it turned out that dogma needed challenging."

Toran-Allerand is now on to a new challenge. For the past few years, she has been building the case that 17-alpha estradiol, thought to be an inactive isomer of estrogen, activates a signaling cascade, acting through a new receptor that she dubs ER-X. "What she's after is terribly important and not very well understood—once again," says Carter. "If she's right, it's very, very important."

But once again, few apart from her loyal friends believe her. She says the receptor has proven unusually difficult to clone, but grant reviewers have taken a bleak view of her theory, forcing her recently to lose a postdoc.

Toran-Allerand has never led a large lab, choosing instead to work with just one graduate student, a couple of postdoctoral fellows and the odd college or high school student, and training each one herself.

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Wayne Bentham came to her lab as a 16-year-old high school student. While students in other Columbia labs scoured the literature and assisted lab members, Bentham learned to anesthetize rats, excise the brain and divide it into specific sections. "Looking back on it, it was remarkable that she was able to teach this to a high school student," says Bentham, now medical director of outpatient psychiatry at the University of Washington.

By all accounts, Toran-Allerand is adept at the untraditional—and she has definite ideas of how things ought to be done. A teabag creates maximal flavor without bitterness after precisely 16 dips, for example, and—because she believes tissues should be cultured free of antibiotics—dishes should be washed seven times for a surgical level of cleanliness, a number she established based on experiments with radioactivity.

Bentham returned to her lab each summer and spent a year there after graduating from Princeton University. During that time, he says, she took an interest in him, as she did with others in the lab, that went beyond work. She once heard him whistle a Bach melody and every year after that, he recalls, bought him music and scores either for his birthday or Christmas; she also took him to his first concert at Lincoln Center in New York City.

These days, less money has meant there are fewer people in the lab to benefit from her generosity. And in the past three years, a painful condition that fuses her neck and the middle of her spine has worsened, causing her to stoop when she walks.

Never one to let adversity get her down, however, Toran-Allerand is still standing tall in her research. "I think if you don't use your brain, you age," she says. "I'd be happier if it weren't so difficult getting grants. But other than that, I think it's wonderful."

Apoorva Mandavilli, New York