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Vivianne Nachmias

Vivianne Thimann Nachmias was born in California to English immigrants; at age three, her family drove east to Cambridge, Massachusetts, where her father became professor of plant physiology at Harvard. "He was demanding and abstracted, but warm, and made science exciting," she remembers of her father. Nachmias' fond memories of her childhood include skating on the frozen Charles River and playing pirates in the Harvard Observatory, then a wilderness. She attended the Buckingham School for girls (now merged with Brown & Nichols) as well as the local public school. But she "rebelled at the narrow-minded academic and snobbish social environment of Harvard," and is grateful to her mother, an artist, who represented a "counter-balancing force."

The family bought an old, run-down farm house in New Hampshire where during the War, her mother took care of children from England and Austria; there they enjoyed tremendous freedom. Nachmias' ninth and tenth grade science teacher was a Ph.D. refugee scientist who had a major influence on her developing interest in biology and chemistry. "She taught us rigorously and showed us interesting phenomena like hydra opening its mouth to feed, and sodium skating on water; she let us experiment; we even came in on a Saturday to do electrolysis," recalls Nachmias gratefully.

Nachmias chose Swarthmore College because it was coed, Quaker and emphasized great teaching. She intended to study chemistry, but found the Chemistry Department too remote from biology. The Biology Department, in contrast, had a "charismatic chairman, Robert Enders, who was always ready for conversation and questions. On Sunday evenings he had gatherings at his house for students who would sit around the fire (he had cut the wood himself, of course) and discuss science, adventure and philosophy."

During her junior year, the family took a sabbatical in England and Vivianne went along to study organic chemistry and math. Her lack of acceptance by the English students instilled in her a lifelong sympathy to people excluded from the majority.

Notwithstanding Enders' enthusiasm and a good classical education in embryology and physiology, as well as the invertebrate course at Woods Hole, Nachmias feels her biology education was limited by the absence of genetics and microbiology. One of Nachmias' classmates at Swarthmore was ASCB member Maxine Singer, now President of the Carnegie Institution. Frustrated Swarthmore offered no biochemistry, they developed, with others, their own seminar. Of her classmate, Singer recalls, "her commitment to biology was clear and unquestioned and she seemed firmer in her interests than others. She was also quieter than some of us, who tended to be noisy. But she was steel in expressing her views."

After graduation in 1952 with highest honors, Nachmias went to Radcliffe to study the brain. But an approach was not clear — cellular neurobiology did not exist as a field at that time. She earned a Masters degree in Biochemistry, doing several projects in the lab of George Wald, whose course she still remembers for his quips such as "... in my anecdotage". She decided that to study the brain, she needed to study medicine, so she crossed the river to Harvard Medical School. An influential teacher there, Helen Padykula, taught her histology; decades later, Padykula became the ASCB's second woman president (after Betty Hay in 1976).

After Medical School and more lab projects, Nachmias graduated in 1957 from the University of Rochester, where her husband, Jack Nachmias, had taken a position. She then took a postdoc with Louis Flexner at the University of Pennsylvania. But Nachmias found the "grind and find" approach unsatisfying for studying the brain so she sought a cellular approach. So she took a second postdoc, with John Marshall, who was working on the mechanism of endocytosis in the giant amoeba *Chaos chaos*. This study led to Nachmias' first important discovery: by stimulating the amoebae she detected by electron microscopy the elusive basis of motility — masses of thin and thick filaments in the cytoplasm.

Nachmias joined Haverford College where she was a research associate and visiting assistant professor in Biology for six years. "Haverford had a new electron microscope," she explains, "and was eager to have someone share in its use (and care)." She earned a grant from the NIH and did research and adhoc teaching while she raised her two children, Lisa and Sarah. She and her husband took a year's sabbatical in Cambridge, England, where "by good fortune" she worked with Hugh Huxley and showed that the thin filaments from the motile slime mold *Physarum* would interact with the subfragment of the head of muscle myosin to form arrowheads essentially identical to those that Huxley had just discovered using muscle actin and myosin. (She recalls the drive to Heathrow at 4 a.m. to pick up preparations sent by her colleague Dietz Kessler the night before). This cross reaction showed clearly that the muscle-like proteins were not confined to muscles, which had been thought to be the case. Similar results were reported at about the same time by Tom Pollard and Ed Korn.

In 1973, Nachmias took an associate professorship in the Department of Anatomy at the University of Pennsylvania; Jack was already on the faculty there in Psychology. Nachmias continued work on cell motility, purifying myosin from the slime mold by a new method, similar to a method Pollard was working on for platelets and showing that it had two light chains and could form thick filaments. Physarum was also important because the plasmodium has no microtubules, previously thought essential for cytoplasmic streaming. She and her first graduate student, Justin Fallon, showed that motile myoblasts contain a non-muscle myosin as well as muscle myosin and that the two proteins are segregated within the cells.

Influenced by her medical training, she began to study motile proteins in blood platelets, a good model system largely ignored by cell biologists at the time. She and Dan Safer recently showed that the very large G-actin pool in platelets is maintained by binding to a small peptide, thymosin beta four, previously thought to be a thymic hormone. She also found that platelets contain high amounts of capping protein. Closely related peptides have been identified by Safer in some invertebrates.

Joe Sanger, Nachmias' longtime colleague at Penn, remembers how pleased he and others were "to be joined by a senior investigator interested in the movements of cells." The two taught histology and embryology to first-year medical students, where among other things she came up with the "outlandish idea" of playing Siskel & Ebert, discussing scientific questions instead of movies.

After twenty-five years as a faculty member at Penn, Nachmias became Professor Emerita in 1998. She continues her research on coregulation of the actin based cytoskeleton by thymosin, and still teaches histology, but has turned her attention to science education, centering on students in the H. C. Lea School, a University-affiliated school in the 1960s and an experiment in integration. Her daughter had two great teachers there before the experiment fell apart.

"The school is now like many inner city schools: overcrowded, overregimented and underfunded," laments Nachmias. Based on her experience, Nachmias concludes that "I think kids are being robbed of their native curiosity. They seem to have very few chances in or out of school to actually do things, to manipulate and explore the environment — in brief, to experiment. We must give them these opportunities". Last year Nachmias and Fred Stark, a former graduate student, ran a successful six-week "Saturday Science" hands-on biology program for Lea students at a local community college lab. Her effort is independent of, but similar to, the program her classmate Maxine Singer has organized through the Carnegie Institution on a larger scale in Washington, D.C.

Nachmias was appalled when a graduate from a good high school in Philadelphia told her that she "had never looked in a microscope, and that the academic middle school where she teaches had no microscopes." Nachmias comments with restrained anger, "this is symptomatic of the incredibly unequal opportunities that exist in education — we are a wealthy country that values scientific literacy, and is about to enter the high-tech 21st century. We must support exciting science at the elementary and middle school level where interest develops, and make equal opportunity a reality."

Urban gardening and an after-school science club this year have reinforced these impressions and the great need for science education for teachers as well. Nachmias was able to purchase thirty used microscopes from the medical school to install in Lea's classrooms with help from SmithKline Beecham and the Penn Center for Community Partnerships.

Jack Nachmias, a visual psychophysicist, is supportive of his wife's new interests despite the clutter caused by miscellaneous objects for projects. Twice chair of psychology at Penn, he is now retired, "which means that he leaves for work at 8:30 instead of 8," notes his wife. Lisa is now a lawyer specializing in estates and elderlaw in New Haven; Sarah is a computer specialist at Penn. There are two grandchildren, Annie, 8, and Luke, 5; the former enjoys painting while the latter likes to write stories — their mother speculates that maybe they will do books together one day. Nachmias plans to finish several papers and to continue "at a snail's pace", writing and teaching. However, she remarks nostalgically, "I wish there were a 'senior postdoctoral' position, so I could have the fun of experimenting without the responsibility — the best of scientific life."