

2000 ASHG AWARD FOR EXCELLENCE IN EDUCATION Introductory Speech for F. Clarke Fraser*

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It gives me enormous pleasure to introduce the recipient of this year's award for education, Dr. F. Clarke Fraser. I will, of course, review the achievements for which he deserves this award, but, as one of Clarke's students, I would also like to bring you a little more personal insight into the reasons why Clarke is such a great teacher and mentor.

Clarke graduated from Acadia University in Nova Scotia and planned on studying medicine before becoming, as he says, "hooked on genetics" while studying biology. In 1940 he joined the new Department of Genetics at

McGill University in Montreal, as a graduate student of Arthur Steinberg, who had arrived to take his first job after graduation from Columbia University in New York. Steinberg, of course, went on to become one of the first presidents of the American Society of Human Genetics and an early editor of *The American Journal of Human Genetics*. Clarke's master of science thesis concerned the effects of inversions on recombination in *Drosophila*, but he quickly moved on to mammals—his Ph.D. work was on mutations affecting hair structure in the mouse. Interestingly, one of the mutations he studied, the *rhino* mutation, has recently been shown to involve a gene where mutation leads to a form of human baldness. After a quick stint in the Royal Canadian Air Force, Clarke enrolled as a medical student, with the clear intent of obtaining the credentials needed for his goal of applying genetics to medicine. His bent for education demonstrated itself early, while in medical school, with a series of four articles on the principles of medical genetics, written for the *McGill Medical Journal* beginning in 1947.

It is perhaps hard for much of the audience to understand what rare insight Clarke had at the time. Almost everyone who was then interested in human genetics or providing what was becoming known as genetic counseling had a Ph.D., rather than an M.D. There was no place for genetics in the curriculum or the academic structure of medicine—and very little interest or understanding of its potential among the medical profession. It is an amazing tribute to his prescience and strength of purpose that Clarke was able to set up the Department of Medical Genetics at the Montreal Children's Hospital, almost immediately after graduation from medical school in 1950, when he was only 30 years old. He thus became Canada's first medical geneticist, and his medical genetics department was one of the first in North America. There were trained a succession of graduate students, physicians, and genetic counselors who have had a very significant impact on the course of human genetics in both Canada and the United States. From it, for example, came the first president of the American Board of Medical Genetics and the American College of Medical Genetics, Dr. David Rimoin, as well as numerous other prominent medical geneticists in our society. I was lucky enough to be one of Clarke's first Ph.D. students

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to do a thesis in human genetics, an opportunity available almost nowhere else in North America at the time.

In those early days, there was no established field of genetic counseling. We learned pretty much by doing, by making mistakes, and by listening to our patients. Clarke taught us by example. As we watched his gentle and compassionate approach, we learned never to make judgments about our patients' abilities to comprehend their situation or about our ability to make decisions for them. Only a couple of years ago, I had the opportunity to meet with a family that Clarke was seeing for counseling at the Children's Hospital in Montreal. It was wonderful to see that the old magic was still there, in the warmth that was evident between him and his patients. Clarke's contributions to the philosophy of genetic counseling have been more formally conveyed to others in numerous publications and lectures on the subject. He has also coauthored several textbooks, one of which, *Nora and Fraser's Medical Genetics*, has gone through four editions and is still a favorite among our medical residents because of its frankly clinical approach. Clarke has also made, together with his students, major contributions to the recognition, description, and classification of human malformation syndromes. Recently he has taken on the task of preparing those wonderful little synopses called "minimims" for the OMIM database. These allow one to cut to the chase, rather than having to read the entire evolutionary history of genetic knowledge on a given condition.

Throughout his career, Clarke remained as a faculty member in the Department of Genetics (later Biology) at McGill, where he maintained his mouse laboratory. He was also a pioneer in the field of teratology, a method of studying development by investigating the effects of prenatal maternal exposure to environmental agents. Again, he brought the insight of a genetic perspective, demonstrating for the first time that strain differences in mice could produce quite dramatic differences in the action of prenatal exposures on development. His promotion of the multifactorial model of liability to birth defects, particularly cleft lip and palate, has been highly influential in the field. Clarke also served on numerous national and international committees concerned with human malformations and teratogens. Most recently, he led a Canadian "Royal Commission on New Reproductive Technologies," which developed an important document concerning the present uses and future directions of such technologies in Canada.

On a personal note, Clarke was the immediate reason why I became hooked on genetics. As an undergraduate, I decided that he was, by far, the best-looking professor teaching biology, and therefore I would take his course. Clarke describes this course, called "Developmental Genetics," as being taught by the Socratic method. I am

not sure exactly what this means, but it was certainly my first experience with a course where we not only read the original scientific literature but also were encouraged to think of reasons why the authors' conclusions might be wrong. Clarke would also commonly give us 5 minutes to compose a definition of some complex genetic term, such as "gene," "penetrance," or "allele." This was valuable training in the principle that Clarke instilled in us: if you really understand it, you *can* explain it precisely in words.

I will try to repress the urge to reminisce about my graduate-student days. Suffice it to say that things were somewhat more informal than today: the students routinely ate lunch with all the faculty around a big wooden table. Our graduate-student seminars were held in the evening, at the home of the departmental chairman, accompanied by delicious cinnamon rolls baked by the chairman's wife, and known to all as "seminar buns." Clarke's office door was always open. In retrospect I wonder how he managed to accomplish all he did with the constant parade of students who besieged him.

Thinking back to those days over 40 years ago when Clarke was my teacher and then graduate-student mentor, I realize how little of the facts that I learned—or the work that I did—are still relevant today. But the mark of a great teacher is not the imparting of facts nor the guidance through any particular student research project. It is the ability to transmit the things that matter in the long run: an enthusiasm for science, a love of the truth, a healthy skepticism concerning both dogma and apparently exciting new data, the ability to design meaningful experiments, and the tools to express oneself clearly. In addition, Clarke brought special qualities which underlay his interest in medical genetics. By watching and participating in his interactions with patients, we learned respect for both him and the patients. Something else I think is worth mentioning is that, in those early days when women were not really welcome in medicine or in science, there was never a single moment when I felt that my opinions or my work mattered less to Clarke because I was a woman.

Clarke's achievements have not passed unrecognized. He was elected the youngest president of our society in 1961, and he received the Allan Award in 1979 and the March of Dimes Award in 1987. He has also been awarded numerous honors in Canada, including the Blackader Award of the Canadian Medical Association, in 1968, the prestigious Order of Canada, in 1985, and the Prix de Quebec, in 1999.

Clarke now lives in his beautiful ancestral home in Bear River, Nova Scotia, with his wife Marilyn. From there he continues to dispatch "minimims." Congratulations, Clarke, on this well deserved recognition of your contributions to education in human genetics.