Progress in Canada

E. W. R. Steacie and Science in Canada. M. CHRISTINE KING. University of Toronto Press, Toronto, 1989. xii, 243 pp. + plates. $35.

The British chemist Arthur Allmand had a favorite dictum: "A professor of one of the natural sciences. . . might be a great researcher, a great administrator or a great teacher. Sometimes he might shine in two of these categories but to do so in all three [is] unattainable for most people." Allmand managed the feat. So too did E. W. R. Steacie, the Canadian photochemist, a noted instructor at McGill University and successful president of the National Research Council of Canada.

Biographies of Canadian scientists are rare, and this one was written by M. Christine King of the University of Ottawa, who died just as her manuscript was completed. That the book is well researched and reads well is a tribute to her skills, but there is throughout a lack of detail that she might have been able to add in the editing, though Steacie unfortunately left no large body of personal papers.

Steacie was born in 1900 in Montreal into comfortable circumstances. He took his education at McGill and received his Ph.D. in 1926. McGill, to Steacie, was "the highly visible symbol of the English language community in Montreal, the epitome of its history, achievements and wealth"; it was also then the best Canadian university, and not just in the sciences. Steacie took a postdoctoral fellowship there, followed two years later by appointment as lecturer. These years are covered cursorily; so is Steacie's marriage to Dorothy Catalina Day "immediately after her divorce from a former marriage." In 1928 in the tight world of Anglo-Montreal, that must have been a sensation, but we learn nothing of it.

Steacie was a notable success as a teacher, clear, logical, succinct. His early papers were on solubility, and he was quickly into the textbook market, which suggests that the Depression pinched. The decisive experience in his scientific development seems to have been his trip to Germany and Britain in 1934 on a fellowship; he worked under Karl Bonhoeffer, initially measuring reaction rate in heavy water, "just the sort of thing I came here for." The chemistry was good, and so was Germany, "quite a pleasant place to be in these days." For an intelligent man, Steacie seemed remarkably unperceptive in his view of the first Nazi years. The coming of the war would change his immature perceptions.

By 1939, when Steacie became the director of the chemistry division at the National Research Council, he had 88 publications to his credit. Canadian science was far from world-class, but he himself had a substantial reputation in his field. The NRC had yet to make any such mark. Founded in the Great War, it had only moved into its own building in 1932, and its research work was diffuse. World War II changed all that, as C. J. Mackenzie, its president, led it into the Canadian and Allied war efforts. Steacie was Mackenzie's right-hand man, deeply involved in atomic research at McGill, in the creation of the Chalk River nuclear site, and other war projects, while trying to keep up his own research on photosensitized reactions. "On train journeys, between tasks, and especially at night, Steacie studied the scientific literature. . . ." He produced 23 papers and a book during the war, astonishing given his duties.

With the peace, Steacie developed the idea for the NRC's postdoctoral fellowships, bringing scientists to Canada on "princely" stipends. Many stayed to staff the expanding universities. In 1952, he succeeded Mackenzie and skillfully led the NRC through the "age of certainty." Canada was booming, money was plentiful, and the Liberal ministers with whom he had to deal were sympathetic. But all good times end; the economy tumbled in 1957–58, and the Progressive Conservatives came to power. There were soon attempts to bring the NRC into the civil service, bitterly resisted, and the free ride scientists had enjoyed was soon replaced by querulous questioning and demands for accountability. Steacie, for example, had been remarkably complacent about radiation hazards; his successors could not get away with that.

By the time of his death from cancer in 1962, Steacie was the greatest figure in Canadian science. He and Mackenzie had made the National Research Council into the engine of Canadian research, and Steacie had helped bring Canada "part of the way along the road from the ox-cart to the bulldozer." That was no mean achievement.

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The Language of Science

The Mathematical Tourist. Snapshots of Modern Mathematics. IVARS PETERSON. Freeman, New York, 1988. xvi, 240 pp., illus., + plates. $17.95; paper, $10.95.

Innumeracy. Mathematical Illiteracy and Its Consequences. JOHN ALLEN PAULOS. Hill and Wang (Farrar, Straus and Giroux), New York, 1989. 135 pp., illus. $18.95.

In 1930 Tobias Dantzig, professor of mathematics at the University of Maryland, wrote a book entitled *Number: The Language of Science*, declaring that the subject "deals with ideas, not with methods." Adopting a historical approach, he elucidated fundamental concepts of mathematics for the general public so well that a fourth edition appeared in 1954 and is still in print. In the fourth edition, Dantzig added a second part to take account of "the prodigious changes that have taken place since the last edition of the book appeared." Since Dantzig there have been many books designed to inform the literate nonmathematician about mathematics. Those by Paulos and Peterson are two of the most recent and provide an interesting contrast, illustrating that the universe of mathematics is now so multifaceted that entire volumes can be written on mathematical concepts without overlapping.

Paulos directs his book to the educated innumerates, defining them as those with an inability to deal comfortably with fundamental notions of numbers and chance, by which he means statistics and probability. Early in the first chapter he explains scientific notation in six lines, mainly by giving a series of powers of ten followed by numbers with the requisite quota of zeros. This is followed by illustrations of facts that are expressed in scientific notation, such as the rate of growth of a human hair expressed in miles per hour, the number of cigarettes smoked each year in the United States, and the possible states of the Rubik cube. He goes on to more esoteric data, including the volume of all the human blood in the world, the number of subatomic bits that would fill the universe (less than 10^{125} by an "easy calculation"), and the age of the universe in tiny time units that approximate the chronon, although he does not use that term. Interspersed are somewhat more mundane data such as the per capita cost of the Defense Department budget, the ratio of the speed of the Concorde to that of a snail, and the chances of catching AIDS in a variety of sexual relations.

Paulos attributes a tendency to drastically underestimate the frequency of coincidences to innumeracy and proceeds from this to take some well-aimed shots at pseudosci-