candidly states that

This is not a standard regional geology, and the selection of the title allowed me to emphasize tectonic models, but at the same time to document the stratigraphy and igneous events. I have always taught my students that every aspect of geology involves interpretation . . . This book is, therefore, a personal interpretation of the region.

In addition, it contains much information on Tertiary oil and gas basins, but "Unfortunately, mineral deposits [Hutchison's speciality] have been excluded due to length constraints". Hutchison is meticulous in his documentation and conscientious in his presentation. I disagree with a number of his interpretations, but am happy to see that he almost always mentions the alternatives and gives references to them.

The 30-page reference list at the end of the book is an invaluable introduction to the scattered sources of information in South-East Asia, and some of the few critical omissions (for example, the 1986

thesis of N. Sikumbang on late Cretaceous obduction in the Meratus Mountains) are readily excusable given the author's remoteness from large geological libraries. The volume is well produced, and is richly illustrated by line drawings of maps, stratigraphic columns and sections; 17 photographic plates are also included. A drawback here, though, is the paucity of seismic reflection profiles.

All those interested in the geology of South-East Asia, especially its terrestrial parts, or in Tethyan tectonics in general, will benefit from reading Hutchison's book. Because of the tremendous tectonic diversity it documents, it will also be a handy reader for a general course on tectonics at the post-graduate level. □

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Growing pains

John de la Mothe

E. W. R. Steacie and Science in Canada.

By M. Christine King. *University of Toronto Press: 1989. Pp. 243. \$40, £24.*

In 1939 when the photochemist, E. W. R. Steacie, left McGill University to become Director of the National Research Council's (NRC) Chemistry Division, science in Canada was just beginning to become a force to be reckoned with. Until the late 1930s, Canadian science had been in an embryonic state and was far from being world-class. Christine King's intention is to tell how, in the next 20 years, a transformation came about in large part because of Steacie's efforts.

The shallowness of science's roots in Canada can be gauged from the situation in 1918. Then, only 11 doctoral degrees in science had been granted in the entire country; only two or three universities had what could be considered extensive research programmes; and the total value of industrial research and development performed in the country was estimated at less than \$135,000 per year. The NRC — which had been founded in 1916 and which had been given the broad mandate of stimulating and coordinating research and development in Canada — had yet to make much of a mark. But what had begun as a one-person operation with an annual budget of \$91,600 had grown, by the time of the outbreak of the Second World War, to an institution with a staff of 300, a budget of nearly \$1 million and a substantial building of its own. The NRC was to gain further strength during the war

and afterwards burgeon into a centre of excellence to which researchers from five continents would gravitate.

The first years of peace were good for Canada. The economy was booming, money was plentiful and the ministers of the Liberal government were sympathetic — even enthusiastic — about building the NRC. The research assistance which the NRC had begun to give to Canadian industry during the war continued with increasingly recognizable (and recognized) effect. Agricultural machinery, mining and transport equipment, construction standards, and pulp and paper processing were all areas which became acknowledged Canadian strengths worldwide.

During this period, industrial research was only one facet of the NRC's activities. With the energetic involvement of Steacie as Director, and later as Vice-President and then (in 1952) as President, the NRC actively promoted the development of a university research system in Canada. Among the obstacles were the antagonism of the big universities to the NRC, as well as the growing sentiment among politicians that the NRC's large budgets should first be questioned, and then, if approved, fed directly into Canada's economic development (and not its ivory towers). In the early 1950s, Steacie negotiated in masterly fashion with the universities and with government officials on three basic propositions: that the universities' duty is to "give society what it needs, rather than what it wants"; that the university is the cornerstone of any nation's research system and capability; and that Canada would suffer a severe shortage of scientific researchers, and run the risk of losing ground economically to other

nations, unless something was done.

Steacie's arguments were hard fought but ultimately well received. Of particular importance was his idea of the NRC's postdoctoral fellowships, which would bring scientists to Canada on "princely stipends". As a result of this programme and the NRC's growing research reputation, many researchers not only came to Canada, but stayed, thereby helping to build the university system.

All was not plain sailing, however, either for the NRC or for Steacie. In 1958, the incoming Conservative government immediately began moves to bring the NRC into the civil service. As in Britain, the scientific civil service was a poor relation in terms of both salary and stature. It was a change of policy that was bitterly resisted as it spelt greater management and political accountability for NRC's researchers, and the end of their freedom of scientific enquiry.

In the end, the political pressures won out. But in 1962, when Steacie died of cancer, he had undoubtedly become the greatest figure in Canadian science. In his own modest terms, he had made the NRC one of the main engines of the Canadian research system, and so, as Christine King says, helped "Canada come part of the way along the road from the ox-cart to the bulldozer".

Christine King, who was tragically killed soon after completing the manuscript of this book, attempts to tell the story of a now-powerful institution and of the men who guided it. Above all, her intention is to give some insight into the powerful personality of the NRC's leader at a time when science in Canada was in its formative years. Sad to say she succeeds only in part. Although the book is thoroughly researched and reads well, it fails to convey either a rounded picture of Steacie's character or the actual tensions between science and government that affected his ambitions and directed his choices (and that still exist in Canada today). To some extent, this is the consequence of the style of the book. Scientific biographies such as this tend to portray the protagonist in an heroic light, blurring the background of other personalities and the politics which are an essential part of the overall picture. Nonetheless Dr King's contribution is to recall an important individual at an important time in Canadian history, and for that her book is to be welcomed. □

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• Volume 1 in the series *Aperiodicity and Order* was reviewed in *Nature* earlier this year (338, 550; 1989). Academic Press has now published the second volume, *Introduction to the Mathematics of Quasicrystals*, which, like the first, is edited by Marko V. Jarić. Price is \$59.50, £42.50.