

Preface

In my writing about Nobel Prizes I profit from access to the unique Nobel Archives as they become available for scholarly analysis after the 50 years' secrecy period. They represent a world unique real time analysis of the advance of natural sciences as recognized by the prizes. The nominations vary in length, but not infrequently they are quite informative. However, the most valuable part of the archives is the thorough reviews, at the time made almost exclusively by members of the committees. Thus these analyses have been made by the best scientists in the discipline in Sweden and get their strength from the evaluators' accumulated insights into their science furthered by their participation in the work of the Nobel committees and their capacity for objective evaluations. Potentially they may also have weaknesses reflecting subjectivity of analysis and also difficulties in detaching oneself from prevailing opinions and appreciating the paradigmatic quality of new knowledge. The emergence of dramatically new insights often offers surprises and requires a major reassessment of accepted facts. The advance of knowledge represents one of the most, if not *the* most important quality in the progress of human cultures and civilizations. Presenting the story of the advance of science has many challenges. To what degree is it possible to popularize the complex discoveries made for a broader audience? Like any writer I always have an invisible reader or listener when the text is being formulated.

In the second book of Cicero's *De Oratore* there is a formulation that appeals to me. It reads in Latin *Neque ab indoctissimis neque a doctissimis legi vellem*, which freely translated and turned into a positive formulation might read "I should like to be read, not by the ignorant, nor yet by the very learned," which may be interpreted to mean the educated public. This obviously

is not a well defined readership, but it is my hope that the joy of advancing knowledge might be contagious — possibly I am tainted by my background as a virologist in using this term. Reading the books of life, unraveling the remarkable inventiveness of evolution, is a uniquely enriching experience. It represents a never-ending journey that in an exceptional way is illustrated by the discoveries recognized by the Nobel Prizes in natural sciences. These prizes can be used as a guide to a journey through the continuously advancing field of medical sciences and of life sciences in general. Learning about the history of the human species and about our relations to the rest of nature is absolutely critical for developing health care that gives the best possible quality of life for each individual. It also provides guidance as to how we can best carry out our responsibility as stewards of Earth.

A book of the present kind obviously contains a lot of facts and hence cannot be read like a well-crafted novel. Certain sections like the recording of the way different Nobel committees have handled individual nominees by necessity include names of many nominators and of reviewers. The author's ambition is to extract from these rich materials the essentials in recognition and acceptance of the new discoveries. In addition it is important to note to what extent priorities in the advance of a field have been allocated appropriately. It is not possible to write in a neutral and detached way about new discoveries, since they are made by people. Hence a good part of the stories presented concerns the individuals, the committed scientists, who are instrumental in the progression of the scientific enterprise. But it is also about the environment in which they develop their successful science. Thus the major emphasis in these books is on individuals and institutions, with hindsight that we may learn something about the nature of the remarkable individual, and to a certain extent collective creativity that is the source of the relentless progression of knowledge. Having said this it is important to emphasize that science is not a predictable venture. This is of course the reason why it is so exciting to follow, but at the same time politicians who provide the major part of the resources that allow scientists to conduct their free science might wish that the results deriving from the efforts could to a larger extent be foreseen.

In this, my third book on Nobel Prizes, I have written about fields which are more distant from those with which I am most familiar, like infectious diseases, immunology and molecular biology. Thus the first three chapters deal with the exciting advances in the field that came to be called neurophysiology or neurobiology. The focal point is the prize in 1963 to John Eccles, Alan Hodgkin and Andrew Huxley, who discovered the ionic mechanisms involved

in excitation and inhibition of the nerve cell membrane. I have tried to put this prize into a context by also presenting the previous development of the field as illustrated by earlier Nobel Prizes and to a certain extent also later developments as highlighted by ensuing prizes.

The following chapters 4 to 6 use the 1964 Nobel Prize in physiology or medicine to Konrad Bloch and Feodor Lynen as a second focal point. They described the complex synthesis of the biologically very important molecule cholesterol, a process involving more than 30 steps. Again prior knowledge in the field is illustrated with reference to earlier prizes in both chemistry and in physiology or medicine. The later developments leading to the introductions of so-called "statins" for prevention of atherosclerosis is emphasized. The last three chapters of the book take us back to an analysis of the development of the field that came to be called molecular biology. This has been discussed at length in my two previous books, *Nobel Prizes and Life Sciences* (2010) and *Nobel Prizes and Nature's Surprises* (2013). In this book one chapter each is devoted to André Lwoff, Jacques Monod and François Jacob, the colorful French recipients of the 1965 prize in physiology or medicine.

The writing of this book was started in early 2014 when I had the privilege of spending seven weeks at the Stellenbosch Institute for Advanced Studies (STIAS) in South Africa. Its director Hendrik Geyer and his senior administrative officer Maria Mouton provided the best of conditions for the work. The stay allowed very stimulating contacts with other visiting scientists, representing many different disciplines. I also had a generous offer to return to STIAS in early 2016, but regrettably I could not accept this for family reasons. However, what made the 2014 stay unique was that three other scientists, friends of mine for more than 40 years in the field of virology, also stayed at STIAS during the same time. A remarkable friendship was nursed by the contacts at work and at play. The three friends Marian Horzinek from the Netherlands, Frederick Murphy from the U.S. and Marc van Regenmortel from France and South Africa have given valuable advice at any time I have been writing about viruses, which, when relevant, I of course have a tendency to do. In particular they contributed to Chapter 7 which ended with a virocentric view of biology, a theme that is likely to re-emerge in possible forthcoming books.

As mentioned I needed a lot of advice when writing about the field of neurophysiology. Sten Grillner, an authority in the field and a good friend since my later time at the Nobel committee at the Karolinska Institute made a very thorough review of the three first chapters in their close to final form. I am very grateful for this analysis and for his recommendations for modifications.

Others who inspired me in the writing were Derek Denton, Torsten Wiesel and Peter Århem. They all gave valuable suggestions. Erik Kandel provided me with very useful reading material. Thomas Starzl provided important information on his early interaction with Horace Magoun, a near prize recipient presented in Chapter 2. Bodvar Vandvik gave valuable information on Fridtjof Nansen's contributions as a neuroscientist including a reference (in Norwegian). Nils Uddenberg's recent books on the history of medicine (in Swedish) gave some additional inspiration to the text and also provided suggestions for some pictures.

Chapter 4 starts with a description of the development of chemistry, later biochemistry, at the Karolinska Institute. Jan Trofast, a specialist on Berzelius, gave valuable comments on this remarkable pioneer in the field of chemistry. Thomas Tydén and Ami Ekman allowed me to learn more about the fascinating Hammarsten family and in particular the chemist Einar Hammarsten, who played a central role in the impressive growth of the discipline of chemistry at the Institute during the first half of the previous century. Thomas Lindahl, Hammarsten's last student kindly provided personal comments on their interaction, cited in the book. In the presentation of Hugo Theorell, the first Nobel Prize recipient at the Karolinska Institute (see front cover), I received valuable advice from his sons, in particular Henning Theorell, who himself has written about his father. My cousin Lars-Johan Norrby, an emeritus physical chemist at Stockholm University, made valuable remarks on the general text of the chapter and in particular on his father Johannes. Ragnar Björk, who himself has written in Swedish about Theorell, also gave valuable advice on this chapter.

In the autumn of 2014 Theodore Friedman arranged a conference in La Jolla to commemorate Frederick Sanger. Many of Sanger's students and collaborators participated in this meeting. Because Sanger, a unique two-time Nobel prize recipient in chemistry, had died in 2013 the archives relating to his first Nobel Prize had become available for reviewing in 2014. I presented a summary of their content at the enriching meeting and this gave an incentive to write Chapter 5. This chapter also discusses Sanger's second Nobel Prize which recognized his development of a technique for sequencing of DNA, which has completely revolutionized the field of molecular biology. I received valuable comments on the impressive developments of this technique from Craig Venter and Mark Adams at the J. Craig Venter Institute in La Jolla. I have a close connection to this Institute as the Vice-Chairman of its Board of Trustees. It allows me to get access to books of value for my writing about Nobel Prizes

and this is arranged by contacts with Julie Adelson, the legal advisor to the Institute. Chapter 5 also presents Arne Tiselius, a Swedish Nobel laureate (see cover picture) and for decades a very central figure in the Nobel Prize work. Tiselius made a major impression on me already during the writing of my two previous books on Nobel Prizes. Contacts with his son Per Tiselius, a physician in the charming city of Sigtuna, provided precious personal information. His private clinic in this city is in part a museum commemorating his father.

Chapter 6 highlights the 1964 prize to Bloch and Lynen and to write this I needed to learn more about sterols, a large family of biomolecules of wide-ranging importance in biology and medicine. K. C. Nicolaides made recommendations of general textbooks on the subject and later read some of my texts and proposed corrections. Invaluable contacts were established with Joe Goldstein, who together with Michael Brown received the 1985 Nobel Prize in physiology or medicine for their elegant and medically very important studies of cholesterol metabolism. I received many valuable review articles and also learnt a lot about the field from the email contacts. In 2036 or later the Nobel archives will be available for historians of science who want to write the full story of research on cholesterol that led to the introduction of critical modes of preventive treatments markedly reducing the impact of cardiovascular diseases.

Chapters 7 to 9 brought me back to more familiar grounds of research, but still I relied on many valuable contacts for advice. First and foremost I would like to mention Georg Klein. He represents a unique source of information, because of his exceptional memory and also the simple fact that he has been involved in the Nobel Prize work at the Karolinska Institute since 1958 and for many subsequent years. Another important source of information from the same time is Peter Reichard. I also received valuable help and good reading material from Simon Wain-Hobson and in particular Agnes Ullmann at the Pasteur Institute. It was a joy, but also a daunting challenge, to write about the three French intellectual giants Lwoff, Monod and Jacob.

I am grateful for the full support given to me by World Scientific Publishing in the development of this, the third of my books on Nobel Prizes. In particular I would like to thank its Chairman Professor Kok Khoo Phua and the highly competent editor Kim Tan who with great patience has given support and advice in the processing of the large material for the book. Pleasant working conditions have been provided for me at the office in Singapore and in this city I have also received support from various colleagues, in particular a long-time friend, the President of Nanyang Technical University, Professor

Bertil Andersson. We were simultaneously members of the Board of the Nobel Foundation for a number of years.

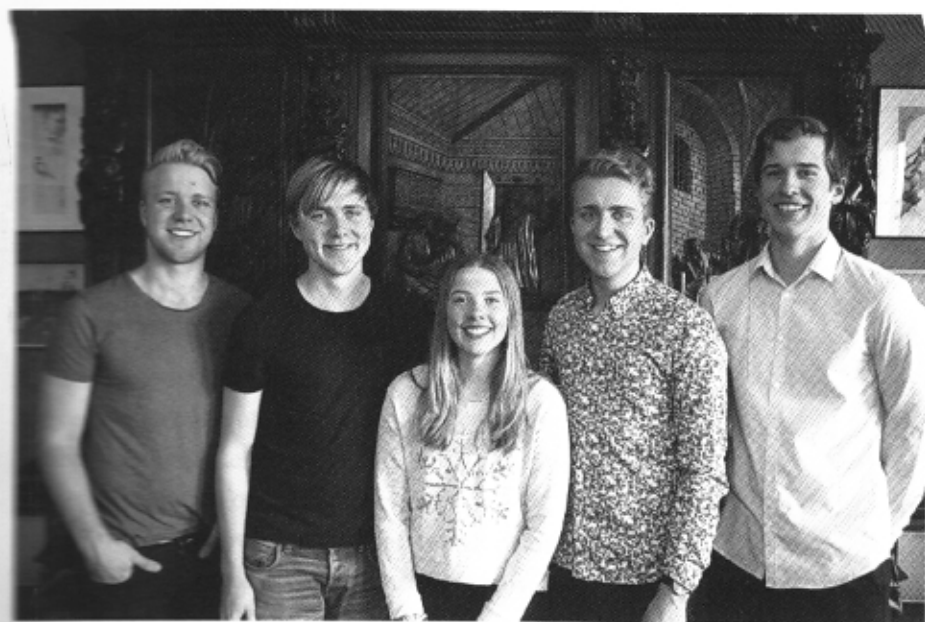
Not having English as my native language I need assistance to ensure that the English used is idiomatic. As in the case of my previous books Harry D. Watson has provided expedient and careful reviewing of the texts. Sven and Dagmar Salén Foundation generously covered the costs for this work.

I have received regular support from many different parts of the Nobel system. The Director of the Nobel Museum Olof (Olle) Amelin has shared his interest in my work. Nobel media gave access to the 2000 interview of Andrew Huxley by Joanna Rose. At the Karolinska Institute the secretary of the Nobel committee for physiology or medicine, Göran Hansson, and later his successor Urban Lendahl, have given me permission to examine the archives that progressively became available. During my January visits and also on other occasions Ann-Mari Dumanski and Tatiana Goriatcheva have looked after me well.

For many years I have had my office at the Center for the History of Science at the Royal Swedish Academy of Sciences. This location is ideal because the Nobel archives for physics and chemistry are only 30 seconds away and in particular because of the very attractive working environment created by all the colleagues sharing this milieu. The Director of the Center Karl (Kalle) Grandin has generously made the resources of the institution available to me and in addition he has personally spent many hours with me working on the picture material for the book. Furthermore when I have become stuck at my computer he has swiftly helped me out. My other colleagues Maria Asp, Anne Miche de Malleray, Jonas Häggblom and Åse Frid have shared their enthusiasm and knowledge and innumerable topics of comprehensive or smaller dimensions have been aired at the breaks from my work at the desk. Very special thanks go to my next door neighbor at the Center, Bengt Jangfeldt. He is a highly qualified Slavist and humanist who has published a number of high quality books. Hence we can share the joy and challenge of writing, but also discuss essentially any kind of intellectual problem, in particular if it transcends the border between the humanities and natural sciences.

At the end of this Preface I would like to thank my family. My wife of 57 years, Margareta, is a remarkable life partner, who by now knows all my strengths and weaknesses. She intuitively knows what kind of encouragement or restraint I need. Our three children, to whom I dedicated my previous book, provide continuous support and encouragement of my endeavors. Time passes on and our five grandchildren, at the time of publication of this book, have

reached the age of 15–23 years. I would like to dedicate this book to them all — Heimir, Smári (Samuel), Sindri, Henrik and Lisa. They represent the future and will have opportunities to follow the advance of science and share in the application of new unexpected knowledge in the shaping of an ever better world.



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