Preface

In 1988 I wrote a paper for *School Science Review*, in which I described some of the science involved in chocolate making and followed this by two experiments that could be tried in the classroom. As a result of this I received letters from both pupils and teachers requesting more information or new experiments to try. Subsequently I was contacted by Chris Butlin, who was then developing a food option for the Salters' Physics Advanced Level course. This resulted in some of the science of chocolate being included in this option. The numerous talks given by my colleagues and myself to junior schools, societies and universities also convinced me that there was a genuine interest in this topic and that people were not just coming for the free samples.

When, therefore, the Royal Society of Chemistry asked me if I would write a full book on this topic, aimed at schools and universities, I agreed to do so, without realising the amount of work involved. It was very gratifying, however, to learn in 2006 that the sales were such that a second edition of the book was required. Several people had commented that they wished to know more about the health and nutrition aspects of chocolate and, as a lot of research has recently been carried out in the area, this seemed the ideal subject for a new chapter. In addition, in 2005 New Scientist published a book entitled *Does Anything Eat Wasps*? in which the question was asked about how are bubbles put into Aero®. Possible solutions are given here as part of a second new chapter.

Having graduated in physics, the book is naturally biased in this direction, although I have tried to include a substantial amount of chemistry and even some mathematics in the project work. Several

of the chemical terms used in industry are different from those taught in schools. I have attempted to use the current terminology and have included a glossary in the hope that it will be useful, if someone is not familiar with the term in the text. This glossary also explains some of the industry's own technical names.

This book should be especially useful for someone studying food science at university or who is about to join the confectionery industry. Although a scientific background is required to understand the more difficult sections, such as fat chemistry or the Maillard reaction, most of the rest of the book should be readable by 16–18 year olds. Here I have attempted to show how concepts such as latent heat, relative humidity *etc*. play an important part in the making of something as apparently simple as chocolate. I hope that this in fact might prove to be a "painless" way of learning about them.

Several sections are relatively simple and can be adapted by teachers of GCSE science or even younger pupils. This is especially true of the projects described in Chapter 12. These are meant to be just basic ideas that can be adapted according to age. All use apparatus or ingredients that should be easy to make or obtain. The appropriate safety precautions must, of course, be taken especially for those involving glass, heat or chemicals.

Finally I would like to thank my wife Dorothy for her help with the book and our sons Christopher and Richard for their help with the diagrams, together with John Birkett, Patrick Couzens, Peter Geary, Duane Mellor and Lynda O'Neill for correcting the script, or testing the projects to ensure that they worked. I am also grateful to Awema, Blackwell Science, Loders Croklaan and Palsgaard Industri A/S for their permission to reproduce picture, diagrams and tables. In particular, Figures 1.2, 2.3, 3.5, 3.6, 3.10, 3.13, 3.14, 4.9, 4.11, 4.12, 5.2, 5.3, 5.8, 5.10, 5.13, 6.8, 7.1, 7.5 and 9.8 are all reproduced from *Industrial Chocolate Manufacture and Use* with the permission of Blackwell Science and Figures 1.3 and 1.4 with the permission of the Nestlé Archives, Vevey, Switzerland.

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