

The Dawn of Science

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Glimpses from History for the Curious Mind

 Springer

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Preface

The development of scientific ideas is probably one of the highest intellectual achievements of *Homo sapiens*. This arose from the efforts — and, as we will see throughout in this book, sacrifices — of a number of dedicated souls. Many of these could probably have quite successfully pursued totally different vocations in life! But they involved themselves with science because they were, by and large, driven by curiosity and were fascinated by the intricacies of Nature. This led them to devote — quite often — their entire lifetimes to unravelling the mysteries of the world around them.

The purpose of this book is to share the excitement the authors feel about the historical development of scientific ideas with the like-minded, curious, educated lay-public. Needless to say, this is *not* a monograph on the history of science written by a couple of historians of science for fellow historians of science. For one, such volumes — while no doubt, excellent in erudition — can be somewhat soporific in style; our intention is that you should actually *enjoy* reading this book!

To do this in a modular and entertaining fashion, we have just picked 24 topics covering different milestones in science from antiquity till about the 17th century. We have stopped with Newton's contribution to physics and Lavoisier's to chemistry, which we think could be thought of as the end of a period that we would call the *dawn* of science. This end point, as well as the choice of the 24 milestones, does of course reflect our personal preferences. But we are quite sure that at least 20 out of these 24 topics would feature in any sensible listing of the early milestones in the history of science. All these chapters (except possibly one or two) will be accessible to anyone with an exposure to science at the high-school level.

There are some unique features which we would like to alert you to, and which should help you to enjoy it more:

- To begin with, the book is completely modular and you can dip into any of the chapters independently of the others; so you can read the chapters in any order that appeals to you. The development of ideas is presented, by and large,

chronologically and you might appreciate some chapters more if you read them along with closely related, adjacent, chapters — but this is by no means mandatory. The modularity, which makes each chapter reasonably self-contained, also implies that the book should be viewed more like a collection of essays on a connecting theme, rather than as a conventional book made up of several chapters.

- Second, you can also enjoy the material presented in the “boxes”, most of the time, without actually reading through the main text in the chapter. This is done, once again, in the spirit of modularity, and if the boxes in a particular chapter attract your attention, then you may like to read it in full! The same goes for the figures and figure captions. We have tried to make history come alive by providing a fair number of figures — typically half a dozen per chapter — with reasonably self-contained figure captions. You may want to glance through them to get an initial flavour of what the chapter contains. The figure captions include a certain amount of unavoidable text overlap with the main body of the chapter, but this should be considered a feature rather than a bug!
- Third, all the chapters contain a special diagram entitled “When” (and some of the chapters also contain a diagram entitled “Where”). This diagram summarizes the events in the historical period described in that particular chapter. To the left of the timeline, you can see the key events in science, while to the right of the timeline we have given the key events in world history (and Indian history, as you would naturally expect from two Indian authors!). This will allow you to appreciate the way science interfaced with social structures and political events as it developed.
- Fourth, we have interpreted the development of scientific ideas in a reasonably broad context. For example, we have included chapters on the exploration of the high seas, the story of the calendar system, and the development of printing in this collection of milestones. We strongly believe that they deserve a place here because of the symbiotic relationship they had with the — more narrowly defined — aspects of scientific development. Such a holistic approach towards the history of science, we feel, is not only justified, but essential.
- We started by saying that this book is intended for the lay-public and not for historians of science. But if you *do* want to know more about each of the topics covered here, we have provided ample references to the literature (with brief annotations) at the end of each chapter. Many of these works are quite erudite and

scholarly and will certainly provide you with material to whet your appetite. But if you are happy with our story-telling, you can ignore the references! We have done the research for you and, in particular, whenever some of the incidences quoted in the text are controversial, we have taken care to alert you to this.

The development of science cannot be viewed in isolation, away from the social and political context in which it is taking place. You will find that we have not shied away from commenting on the influence of social, economic, and religious developments on science. Unfortunately, these influences have been rather negative in many crucial phases, but becoming aware of this fact is an important part of one's education. In a similar spirit, we have tried to portray scientists as normal human beings with normal human weaknesses and emotions (in spite of being the intellectual giants they were).

We have also tried to correct, whenever possible, the view that history is a frozen topic. This is not true about any branch of history and certainly not in the case of the history of science. A few of the historical facts described here — such as the development of calculus in south India, centuries before Newton and Leibnitz — have come to light only within the last few decades and hence are not as widely known as they deserve to be. To that extent, the history of science is very much alive and evolving in itself.

Many people have contributed at different stages to the making of this book. Several of the chapters overlap in their intellectual content with a series of articles one of us (TP) wrote for the journal *Resonance* in 2010–2012, even though they have all undergone a significant amount of rewriting and expansion. We thank the Indian Academy of Sciences for granting permission to Springer for the reuse of the material in these articles.

Many of our colleagues went through earlier drafts of this book and provided comments. We thank Jasjeet Bagla, Yashoda Chandorkar, V. Chelladurai, S.M. Chitre, Sunu Engineer, Harvinder Jassal, Kinjalk Lochan, Sunita Nair, J. V. Narlikar, Hamsa Padmanabhan, Krishnamohan Parattu, K. Srinivasan, and Tejinder Singh for their help.

Most of the figures have been reproduced from the public domain and we thank those who made them available in this manner for the wider use of the community. In addition, some figures in Chaps. 4, 5, 6, and 24 were reproduced with explicit permission from: Wellcome Library, London (Fig. 4.4), Collection of Michigan Medicine, University of Michigan Gift of Pfizer (Figs. 5.1, 5.2, and 5.3), Wolfgang Volk, Berlin (Fig. 6.1right) and the Special collections & Archives Research Center, Oregon State University Libraries (Fig. 24.4), and we are grateful

to them for granting us this permission. (You will find the credit lines for all the figures, including those taken from the public domain, at the end of each chapter.) We also thank Manjiri Mahabal for the help she provided in her spare time as regards the organization of figures and figure credits.

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