Scientific Method in Ptolemy's *Harmonics*

The science called 'harmonics' was one of the major intellectual enterprises of Greek antiquity. Ptolemy's treatise seeks to invest it with new scientific rigour; its consistently sophisticated procedural self-awareness marks it as a key text in the history of science. This book is the first sustained methodological exploration of Ptolemy's project. After an analysis of his explicit pronouncements on the science's aims and the methods appropriate to it, it examines Ptolemy's conduct of his complex investigation in detail, concluding that despite occasional uncertainties, the declared procedure is followed with remarkable fidelity. Ptolemy pursues tenaciously his novel objective of integrating closely the project's theoretical and empirical phases and shows astonishing mastery of the concept, the design and (it is argued) the conduct of controlled experimental tests. By opening up this neglected text to historians of science, the book aims to provide a fresh point of departure for wider studies of Greek scientific method.

Andrew Barker is Professor of Classics at the University of Birmingham. His previous books include the two volumes of *Greek Musical Writings* (1984 and 1989), *The Language of the Cave* (edited jointly with M. M. Warner, 1992) and *The People of the New Covenant* (edited from the papers of D. M. Daldy, 1998). He is the author of numerous articles on Greek music, musical theory and philosophy. He has recently been awarded a British Academy Research Professorship to write a full-scale history of the Greek musical sciences.

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Preface

During the 1970s and 80s, it was my regular habit to take Philosophy undergraduates at the University of Warwick on a guided tour around a selection of Platonic and Aristotelian texts; and I generally found myself placing issues about the nature of knowledge, and about the procedures by which it may be pursued, firmly at the centre of our agenda. I became more and more fascinated, in the course of this annual pilgrimage through *Meno, Phaedo, Republic, Theaetetus, Posterior Analytics, Physics* and *Nicomachean Ethics*, by their intricate negotiations between what we would call 'rationalist' and 'empiricist' conceptions of the route towards knowledge in a variety of different fields of enquiry. In 1976 the University of Warwick allowed me to accept an invitation to spend two years teaching in the Faculty of Classics at Cambridge; and it was there, with my mind full of these matters, that I first stumbled, largely by accident, into the thickets of the Greek musical sciences. As I worked backwards from Aristoxenus to Plato and the early Pythagoreans, and then forwards into later antiquity, I discovered that the surviving texts of that unfamiliar tradition can be read as a record of continual controversy, not so much over musicological details as over the general character of the understanding sought by scientists in this field, the methods by which it is to be pursued and secured, and the relations that hold between the propositions of this science and those belonging to other domains. The attempt to unravel the complexities of these debates has occupied me, with a few intermissions, ever since. I translated Ptolemy's *Harmonics* during the late 1980s as part of the material for the second volume of my *Greek Musical Writings*, and the more I studied it the clearer it became that it is a landmark of major significance in the contentious and quarrelsome history of reflections on scientific method. I realised that it called for much fuller examination, from a methodological perspective, than I could possibly give it in the context of that book.

I set out on the project in 1991. A period of leave from the University of Warwick gave me the opportunity to take up a Visiting Fellowship in the Department of Classics at the University of Queensland, where I had the

leisure to work out the plan for this study and to write some extensive drafts. Over the next eight years, as I abandoned the philosophers at Warwick to join the classicists at the University of Otago, and later left Otago for Birmingham, among the distractions of administrative duties and the seductions of other research enterprises that came my way, the book progressed only by fits and starts; and it was not until the turn of the millennium that it was ready to be dropped into the lap of its amazingly tolerant publishers.

I am very grateful to the Cambridge University Press and its staff, especially Pauline Hire, for the patience they have shown, as well as for their familiar diligence and efficiency. Many thanks also to my admirable copy-editor, Muriel Hall, who read the long typescript with meticulous attention, and alerted me to a number of potentially embarrassing mistakes and obscurities. I have done my best to eliminate the former and resolve the latter; responsibility for those that remain should of course be laid at my own door. I am grateful, too, to my colleagues and students in all the universities I have mentioned for their friendship, for the conversations I have had with them over the years, and for their willingness to take an interest in my sometimes esoteric obsessions. Issues investigated in this book have been the subject of papers I have delivered at conferences and seminars in England, Australia, New Zealand, Canada, France and Italy, and I owe a great deal to the scholars who took part in discussions on those occasions. Special thanks are due to Geoffrey Lloyd, Malcolm Schofield, Tony Long, David Fowler and Annie Bélis for their long-standing encouragement of my work in this field. The intellectual stimulation and personal support I have drawn from the experience of sharing my life with my wife, Jill, has been worth more to me in this and all my other activities than I can possibly say; and she, together with our children, has done much to keep my feet somewhere near the ground. But I should like to end by expressing my particular thanks to Don and Merle Newman for the many and various pleasures of their inimitable company, and to Ross Newman, Krishna, Vidya and David, in the recesses of whose Brisbane basement so much of the spadework on this project was done, for the generosity with which they gave me the freedom of their remarkable household and Ross's almost equally remarkable car, and for their continuing friendship.