

Cambridge University Press

0521530679 - Redirecting Science: Niels Bohr, Philanthropy, and the Rise of Nuclear Physics

Finn Aaserud

Frontmatter

[More information](#)

---

## Redirecting Science

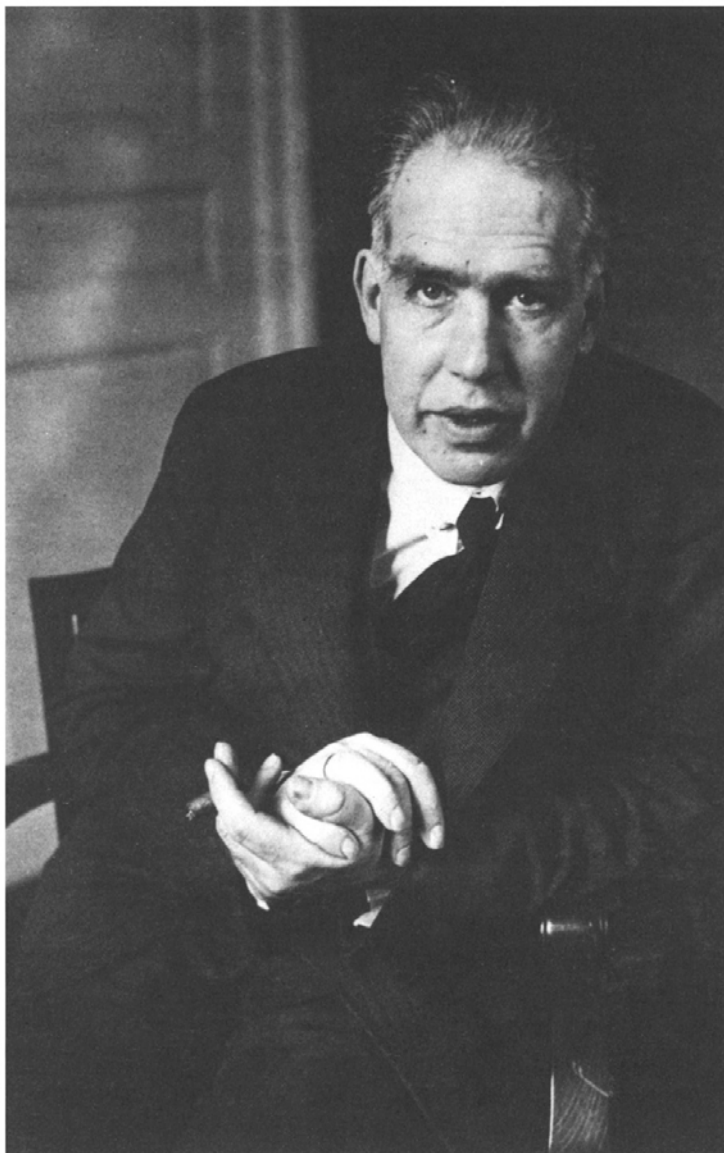
Cambridge University Press

0521530679 - Redirecting Science: Niels Bohr, Philanthropy, and the Rise of Nuclear Physics

Finn Aaserud

Frontmatter

[More information](#)



Niels Bohr, 1885–1962.

Cambridge University Press

0521530679 - Redirecting Science: Niels Bohr, Philanthropy, and the Rise of Nuclear Physics

Finn Aaserud

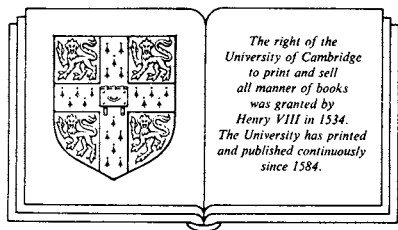
Frontmatter

[More information](#)

# Redirecting Science

NIELS BOHR, PHILANTHROPY,  
AND THE RISE OF NUCLEAR PHYSICS

Finn Aaserud



CAMBRIDGE UNIVERSITY PRESS

CAMBRIDGE

NEW YORK PORT CHESTER MELBOURNE SYDNEY

Cambridge University Press  
 0521530679 - Redirecting Science: Niels Bohr, Philanthropy, and the Rise of Nuclear Physics  
 Finn Aaserud  
 Frontmatter  
[More information](#)

PUBLISHED BY THE PRESS SYNDICATE OF THE UNIVERSITY OF CAMBRIDGE  
 The Pitt Building, Trumpington Street, Cambridge, United Kingdom

CAMBRIDGE UNIVERSITY PRESS  
 The Edinburgh Building, Cambridge CB2 2RU, UK  
 40 West 20th Street, New York NY 10011-4211, USA  
 477 Williamstown Road, Port Melbourne, VIC 3207, Australia  
 Ruiz de Alarcón 13, 28014 Madrid, Spain  
 Dock House, The Waterfront, Cape Town 8001, South Africa

<http://www.cambridge.org>

© Cambridge University Press 1990

This book is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of Cambridge University Press.

First published 1990  
 First paperback edition 2002

*A catalogue record for this book is available from the British Library*

*Library of Congress Cataloging-in-Publication Data*

Aaserud, Finn.  
 Redirecting science : Niels Bohr, philanthropy, and the rise of nuclear physics / Finn Aaserud.

p. cm.

Includes bibliographical references.

ISBN 0 521 35366 1 hardback

1. Nuclear physics – Research – Denmark – History. 2. Science and state – Denmark – History. 3. Research – Denmark – Finance – History.

4. Bohr, Niels Henrik David, 1885–1962. I. Title.

QC789.2.D4A27 1990

539.7'0720489 – dc20 89-48317

CIP

ISBN 0 521 35366 1 hardback

ISBN 0 521 53067 9 paperback

Cambridge University Press

0521530679 - Redirecting Science: Niels Bohr, Philanthropy, and the Rise of Nuclear Physics

Finn Aaserud

Frontmatter

[More information](#)

---

To Hilde and Knud

## Contents

---

Acknowledgements	<i>page</i>	ix
Introduction		1
Prologue: The Copenhagen spirit		6
1 Science policy and fund-raising up to 1934		16
Emphasis on experiment		17
Rising prestige		18
The International Education Board		21
The International Education Board and other institutes at Copenhagen University		28
Activities up to 1934		34
Conclusion		36
2 The Copenhagen spirit at work, late 1920s to mid-1930s		38
Interest in the atomic nucleus up to 1934		39
Interest in biology, 1929 to 1936		68
Conclusion		101
3 The refugee problem, 1933 to 1935		105
Background		106
The first year: Preferred approach		107
The Rockefeller Foundation's Special Research Aid Fund for European Scholars		124
The earlier careers of Franck and Hevesy		130
Origin of experimental nuclear physics		146
Conclusion		161
4 Experimental biology, late 1920s to 1935		165
Reorganization of the Rockefeller philanthropies		166
		vii

viii	<i>Contents</i>	
	Emergence of a new policy	171
	The new policy meets Copenhagen science	182
	Consolidation of the new policy	188
	The Copenhagen experimental biology proposal	191
	The Carlsberg Foundation's support of nuclear physics	198
	The formal application for experimental biology support	202
	Experimental biology supported	206
	Conclusion	211
5	Consolidation of the transition, 1935 to 1940	213
	Acquisition of funding	213
	Rise of the experimental biology project	220
	Consolidation of nuclear physics	228
	Conclusion	249
	Conclusion	252
	Notes on sources	261
	Unpublished material	261
	Published material	266
	Notes	280
	Index	339

## Acknowledgements

---

Many people have taken part in the long journey to the completion of this book, and it is impossible to thank them all. The project started as a PhD dissertation in the History of Science Department of the Johns Hopkins University, where I worked from 1980 to 1984. I am particularly grateful to my two dissertation advisers, Russell McCormach, who guided me until he left Hopkins in 1983, and Robert Kargon, who saw me through to completion. I could hardly have made it without either the long, quiet, and intense discussions with Russ or Bob's benevolent impatience to have me finish. Many students at Hopkins also contributed importantly to my thinking. I am particularly grateful to Michael Freedman for spending innumerable hours to penetrate the structure and content of my dissertation. His labors made me see more clearly both what my work was all about and how I could communicate it to others.<sup>1</sup>

When I moved to Copenhagen in 1980, I soon came to know Hilde Levi, who had come to Bohr's institute as a refugee from Germany in 1934. She was now working on a biography of George Hevesy, with whom she had worked as an assistant from the mid-1930s until the Second World War. Never hesitating to provide unrestrained criticism of my work, she soon became, in effect, my on-site adviser and close friend. Through her, I came to know Knud Max Møller, another amateur devotee to the history of science, with unmatched knowledge of local sources in any form. Like so many others who have known them, I benefited from their services without being given a sense that anything was expected in return; I have counted on their help throughout my work on this historical project. In thankfulness, I dedicate this book to them.

I am equally thankful to Erik Rüdinger, who, as director of the



x *Acknowledgements*

Niels Bohr Archive (NBA) and general editor of Niels Bohr's Collected Works, was always ready to provide help and advice, including a close reading of an early version of the manuscript. His knowledge of historical material on Bohr is unmatched. Like Hilde and Knud, he continued to help through extensive letter writing after I left Copenhagen in 1985.

I would like to extend my special thanks to Niels Bohr's son, Aage Bohr, who carried on the tradition of excellence in physics. Despite a heavy schedule, Aage always took time to express his confidence in my work. At various times, he also shared his experiences with me, and provided detailed criticism of an early manuscript for this book. I hope I have lived up to Aage's confidence at least to some extent.

My thanks go also to Erik's staff at the NBA and to my many friends at the Niels Bohr Institute who added to my life both personally and intellectually. I am particularly grateful to the physicists – in residence or visiting – who shared their experience of the institute between the world wars and at several stages provided constructive criticism.

For personal reasons, I spent the academic year 1981–82 in Oslo. I am grateful to Hans Skoie of the research division of the Norwegian Research Council for Science and the Humanities for providing me with an office and working facilities during this crucial phase of my work. It was a pleasure to work there.

In 1985, I moved to New York City to take up work at the Center for History of Physics of the American Institute of Physics (AIP). Working next to the Center's Niels Bohr Library, with its extensive holdings – especially of oral history interviews – I was never far from the basic sources for my book. Although both my historical and administrative tasks at the Center had nothing to do with my book project, my employers Spencer Weart and Joan Warnow were always encouraging me in my labors to complete my book. I am grateful to them for that, as well as for Spencer's comments on a late version of the manuscript. I would also like to thank the Center's staff for all the different kinds of help it has provided.

This book is based to a great extent on archival work, also outside the NBA. In that connection, I would like to express special gratitude to the late Warren Hovious – and also to Thom-

*Acknowledgements*

xi

as Rosenbaum – at the Rockefeller Archive Center in Pocantico Hills, New York, to Niels Petri at the Carlsberg Foundation Archive in Copenhagen, and, again, to Spencer Weart and Joan Warnow at the AIP. Their help has been inestimable.

I want to direct my special thanks to everybody who allowed me to correspond with and interview them about their experiences of Niels Bohr and his institute between the world wars. Their contributions were invaluable both in bringing history to life and in providing encouragement for the completion of my work. A partial list of such contributors is given in the “Notes on sources” at the end of the book.

Toward the end of the work, this book has profited immeasurably from the critical eye of two people whom I want to thank. First, Tom Cornell, former fellow student and now historian of science at the Rochester Institute of Technology, read the manuscript and annotated it almost beyond recognition. I have taken most of his suggestions into account. Subsequently, my manuscript editor Ronald Cohen introduced an equal number of suggestions, changes, and corrections into the manuscript, improving the end result even further. I despair at the thought of how the book would have read without the help of Tom and Ronald.

Helle Bonaparte, secretary at the NBA, provided crucial criticism at the proofing stage.

In addition to the people already mentioned, many others have commented on some or all parts of my developing manuscript, and at different length. I would like to extend special thanks to Pnina Abir-Am, Stephen Cross, Shannon Davies, David Favrholt, Paul Forman, Robert Friedman, Carsten Jensen, Jørgen Kalckar, Robert Kohler, Sharon Kingsland, Helge Kragh, Jens Lindhard, Abraham Pais, Philip Pauly, Mogens Pihl, Roy Porter, Nils Roll-Hansen, Stefan Rozental, Jan Teuber, Jan Vaagen, Charles Weiner, Sheila Weiss, Victor Weisskopf, and Aage Winther. Three anonymous readers of the manuscript for Cambridge University Press made several useful comments. I would also like to thank Helen Wheeler, my editor at Cambridge, for her positive attitude toward my work. It has been a pleasure to work with her.

In this evolving computer age, the manuscript has been through as many wordprocessing programs as revisions. Many

## xii *Acknowledgements*

people have contributed to helping me with the programs and transfers between programs. I would like to extend special thanks to Bitten Brøndum and Björn Nilsson at the Niels Bohr Institute; to Carol Weinreich, formerly at the Johns Hopkins Computing Center; and to Roman Czujko of the AIP.

I am thankful to several people and institutions for permission to use a variety of material. Above all, I want to thank Aage Bohr, who allowed me to quote from his father's papers. Spencer Weart, Thomas Rosenbaum, A.E.B. Owen, Niels Petri, Sandra Taylor, Ehud Benamy, and Anita Kerkmann have permitted me to quote from material respectively from the American Institute of Physics, the Rockefeller Archive Center, the Cambridge University Library, the Carlsberg Foundation Archive, the Lilly Library of Indiana University, the Hebrew University of Jerusalem, and the Staatsbibliothek preussischer Kulturbesitz in West Berlin. Hilde Levi and Victor Weisskopf have allowed me to quote from unpublished interviews with them and to use photographs from the collections of the NBA. The widows of Felix Bloch, Max Delbrück, and Samuel Goudsmit have allowed me to quote from their husbands' unpublished papers, while Jenny Arrhenius, Elisabeth Lisco, Bodil Schmidt-Nielsen, and Louise Slater Huntington – daughters respectively of George Hevesy, James Franck, August Krogh, and John Slater – have permitted me to quote from unpublished material of their fathers. D.K Hill has allowed me to quote his father, the physiologist A.V. Hill.

Concerning reproduction of photographs, I would like to thank Hilde Levi for permission to use photographs from the collections at the NBA; when no credit is given with the caption of a photograph, it comes from the NBA. I would like to mention, among other sources for photographs, John Wheeler, who not only allowed me to reproduce two pictures from a series of previously unused photographs that he took in the 1930s, but also personally saw to it that I could have prints in time for publication of this book.

In its first stages, my work was supported by the Norwegian Research Council for Science and the Humanities. It has also been supported by the Danish Ministry of Education and the U.S. '76 Foundation – a temporary organization established in Denmark from the proceeds of the Danish involvement in the

*Acknowledgements*

xiii

bicentennial of the American Declaration of Independence. Grants from the Rockefeller Archive Center facilitated my research there. I am grateful to these sources for making my work financially possible. Professor Aage Winther at the Niels Bohr Institute helped in providing working facilities and in securing my financial existence there.

I have reserved my last expression of gratitude to Gro Synnøve Næs, my life's companion and best friend, and our little son, Andreas. Gro has contributed importantly to this work in all places and at all levels, from structuring the general argument to typing the individual words. My thanks are due to her for that great effort, as well as for her encouragement all along this long journey. Andreas's exemplary behavior and cheerful disposition during his first two years of life made the completion of this work both possible and rewarding.