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12

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**Naṣīr al-Dīn al-Ṭūsī's *Memoir on Astronomy***  
(al-Tadhkira fī 'ilm al-hay'a)

F.J. Ragep

Naṣīr al-Dīn al-Ṭūsī's  
*Memoir on Astronomy*

(al-Tadhkira fī ʿilm al-hay'a)

Volume I  
Introduction, Edition, and Translation

With 96 Illustrations



Springer Science+Business Media, LLC

F.J. Ragep  
Department of the History of Science  
University of Oklahoma  
601 Elm Street #622  
Norman, OK 73019 USA

Library of Congress Cataloging-in-Publication Data

Ṭūsī, Naṣīr al-Dīn Muḥammad ibn Muḥammad, 1201-1274.

[Tadhkirah fī ʿilm al-hay 'ah. English]

Naṣīr al-Dīn al-Ṭūsī's Memoir on astronomy = al-tadhkira fī ʿilm  
al-hay 'a / [commentary by] F.J. Ragep

p. cm. — (Sources in the history of mathematics and physical  
sciences ; v. 12)

Includes bibliographical references and index.

ISBN 978-1-4757-2243-7

1. Astronomy, Arab — Early works to 1800. 2. Ṭūsī, Naṣīr al-Dīn  
Muḥammad ibn Muḥammad, 1201-1274. 3. Astronomers — Iran — Biography.

I. Ragep, F.J. II. Title. III. Title: Tadhkira fī ʿilm al-hay 'a.

IV. Series.

QB23.T87 1993

520—dc20

93-10445

Printed on acid-free paper.

© Springer Science+Business Media New York  
Originally published by Springer-Verlag New York, Inc. in 1993  
Softcover reprint of the hardcover 1st edition 1993

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Production managed by Hal Henglein; manufacturing supervised by Vincent R. Scelta.  
Camera-ready copy prepared by the author.

ISBN 978-1-4757-2243-7

ISBN 978-1-4757-2241-3 (eBook)

DOI 10.1007/978-1-4757-2241-3

to Anwar      to Lina  
who endured  
this most recalcitrant  
of siblings

كم كتاب كتبه بيدي  
سوف تبلا يدي ويبقى الكتاب  
كانت الدنيا لقوم غيرنا رحلوا منها وخلوها لنا  
سوف نسكنها ونرحل بعدهم  
ونخليها كما خليت لنا

How many books have I written with my hand!  
My hand shall wither but the book will remain.  
Once the world was to another people  
But they have since departed  
Leaving it with us.  
We too shall dwell in it  
But we also shall follow them  
Leaving it as it was left for us.

Anon., Damascus, Zāhiriyya MS 4871, f. 36a

## Preface

I was introduced to Ṭūsī and his *Tadhkira* some 19 years ago. That first meeting was neither happy nor auspicious. My graduate student notes from the time indicate a certain level of confusion and frustration; I seem to have had trouble with such words as *tadwīr* (epicycle), which was not to be found in my standard dictionary, and with the concept of solid-sphere astronomy, which, when found, was pooh-pooed in the standard sources. I had another, even more decisive reaction: boredom. Only the end of the term brought relief, and I was grateful to be on to other, more exciting aspects of the history of science.

A few years later, I found myself, thanks to fellowships from Fulbright-Hays and the American Research Center in Egypt, happily immersed in the manuscript collections of Damascus, Aleppo, and Cairo. Though I had intended to work on a topic in the history of mathematics, I was drawn, perhaps inevitably, to a certain type of astronomical writing falling under the rubric of *hay'a*. At first this fascination was based on sheer numbers; that so many medieval scientists could have written on such a subject must mean something, I told myself. (I was in a sociological mode at the time.) As I began to read, or rather try to read, these manuscripts, some of daunting size, I became more and more engaged in a world of mostly forgotten scientists, many from a period that modern scholarship had deemed, with the hubris that only modernism can muster, both invisible *and* unworthy. But these late medieval astronomers of “decline” seemed to me to be saying interesting things, and significantly they themselves thought they were saying interesting things as they spoke to one another over geographical and chronological distance. And two names kept recurring with astonishing frequency in these works: Naṣīr al-Dīn al-Ṭūsī and his *Tadhkira fī ʿilm al-hay'a*. I had come full circle.

To write this book, I have incurred enormous debts to both institutions and individuals, and it gives me great pleasure to be able at long last to express my gratitude in print. They are, of course, neither responsible for the opinions expressed nor for the remaining shortcomings. The National Endowment for the Humanities generously awarded me a research grant (RL-20578-84) that allowed me to work without interruption on the edition and translation. Another grant, this one from the National Science Foundation (SES-8618656), was for research on trepidation, and I have incorporated some of the results in the com-

mentary. The Department of the History of Science at Harvard University appointed me a postdoctoral fellow on two occasions and provided me with the necessary facilities to take full advantage of those grants. A year at the Society for the Humanities at Cornell was enormously stimulating and gave me the opportunity both to learn and to test my ideas with a very talented group of non-historians of science. Travel funds from the Department of the History of Science at the University of Oklahoma allowed me to check and recheck countless details and footnotes during preparation of the final copy.

During the many years of research and writing, I have benefited from my acquaintance and friendship with a number of extraordinary individuals, far more than I had ever expected to meet in a lifetime. In Cairo, I had the great fortune to have Edward S. Kennedy and David King as next-door neighbors (*ya<sup>c</sup>nī*), and they were, despite some scepticism concerning my project, always ready and able to provide advice and guidance on matters great and small. Also in Cairo, Aḥmad Haridī was unceasingly patient in teaching this *khwāja* about the beauty and intricacy of Arabic and Arabic paleography. Back home, Aron Zysow, my next-carrel neighbor at Widener Library, shared his very considerable knowledge of Islam and Islamic history, Wheeler Thackston offered advice and assistance on all things Persian, and Marina Tolmacheva graciously looked over the maps and made several helpful suggestions. Over many long, sometimes difficult years, Raine Daston, Mollie Palchik, and Noel Swerdlow provided inspiration and encouragement and were always there when needed most.

A. I. Sabra, *shaykhunā al-ra'īs*, was the one who introduced me to the *Tadhkira* those many years ago and, for reasons known only to himself, thought that I could be entrusted with its study. His teachings, methodology, and inspiration are such an integral part of this work that it would be less than elegant to provide a list; let me simply say that it was he who made *hay'a* such an important part of my intellectual vocabulary.

D. E. Pingree, *ḥakīm extraordinaire*, has been unceasing in his efforts to help me broaden my horizons and use what he calls common sense, which, in his version, is quite uncommon. I very much benefited from his critique and suggestions on an earlier draft of a chapter concerning the tradition of the *Tadhkira*, and his "common sense" led me to uncover the relationship between the various versions of the text.

G. J. Toomer, φιλόπνοος τε ὁμοῦ καὶ φιλαλήθης, bestowed upon this book a degree of attention that went far beyond what the designation editor normally calls for. He saved me from innumerable blunders of detail and interpretation, and his stern kindness made me feel that I should and could meet his soaring standards.

S. P. Ragep, friend and co-worker of some twenty years, drafted and photographed the figures and collated them with those in the manuscripts, prepared the concordance of manuscripts, typed the Arabic text and apparatuses (in multiple versions), offered advice on both style and substance, much of which was adopted, helped prepare the index, and somehow managed in addition to have a career and the dedicatees. But above all, she helped me find words and meaning where once there was only a cacophony of silence.



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*Volume One*

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