ON TYCHO’S ISLAND

TYCHO BRAHE (1546–1601), the premier patron-practitioner of science in sixteenth-century Europe, established a new role of scientist as administrator, active reformer, and natural philosopher. This book explores his wide range of activities, which encompass much more than his reputed role of astronomer. Christianson broadens this singular perspective by portraying him as Platonic philosopher, Paracelsian chemist, Ovidian poet, and devoted family man. From his private island in Denmark, Tycho Brahe used patronage, printing, friendship, and marriage to incorporate men and women skilled in science, technology, and the fine arts into his program of cosmic reform. This pioneering study includes capsule biographies of two dozen individuals, including Johannes Kepler, Willebrord Snel, Willem Blaeu, several artists, two bishops, a rabbi, and various technical specialists, all of whom helped shape the culture of the Scientific Revolution. Under Tycho’s leadership, their teamwork achieved breakthroughs in astronomy, scientific method, and research organization that were essential to the birth of modern science.

JOHN ROBERT CHRISTIANSON is a Research Professor of History at Luther College, where he taught history from 1967 to 1997 and served as Chairman of the History Department during 1987–82. In 1995, he was dubbed Knight of the Royal Norwegian Order of Merit by King Harald V. He was also awarded the Bronze Medal of the League of Finnish-American Societies in 1985 and received the Alf Mjøen Prize in 1989. Christianson is a former Fellow of the American Council of Learned Societies and has held postdoctoral grants from the American Philosophical Society, Danish Bicentennial Foundation of 1976, Danish National Bank, George C. Marshall Fund in Denmark, and the U.S. National Endowment of the Humanities, among others. Christianson has written, edited, and/or translated nine books and more than a hundred articles on Scandinavian and Scandinavian-American topics, including twenty publications on Tycho Brahe in such journals as Scientific American, Isis, Centaurus, Sixteenth Century Journal, Fund og Forskning i Det Kongelige Biblioteks Samlinger, and Personalhistorisk Tidsskrift.
"PORTRAIT OF TYCHO BRAHE OTTESEN THE DANE AT THE AGE OF FIFTY, when after a long period of exile from his native land through divine providence he regained the liberty he had sought after." He is dressed in the black attire of a courtier, with a white lace collar and cuffs, gold jewelry including a signet with the Brahe arms on his index finger, and King Frederick II’s Order of the Elephant on two golden chains. The prosthesis is evident on the bridge of his nose. The emblem at top left shows a cone (which Tycho called a “pyramid”) on a pedestal, protected from the surrounding wind, water, and lightning by a canopy suspended from a hand emerging from the sun. The legend on the cone reads: “Standing on firm ground, I am protected though the wind, fire, and waves do rage.” Honnens de Lichtenberg (1989, 362–3) interpreted this emblem as symbolizing that the changing fortunes of the world could not overthrow Tycho because the four elements of air, fire, water, and earth combined to give him strength as he rose to immortality under the protection of Apollo–Jupiter–Jehovah. (Courtesy Skokloster Castle)
How Apollo, the leader of the Muses, overcame the god Pan in a music competition:

“[Apollo’s] golden head was wreathed with laurel of Parnasus, and his mantle, dipped in Tyrian dye, swept the ground. His lyre, inlaid with gems and Indian ivory, he held in his left hand, while his right hand held the plectrum. His very pose was that of an artist. Then with trained thumb he plucked the strings and, charmed by those sweet strains, Tmolus ordered Pan to lower his reeds before the lyre.”

Ovid, *Metamorphoses*, translated by Frank Justus Miller

The goddess, Pallas Athena, visited the home of the Muses on Mount Helicon to see the spot where the hoof of Pegasus, the winged horse, had struck the ground, causing Hippocrene, the sacred spring, to flow. She was greeted by Urania, the Muse of Astronomy. Athena told why she had come, and Urania replied,

“Whatever cause has brought thee to see our home, O goddess, thou art most welcome to our hearts. But the tale is true, and Pegasus did indeed produce our spring.’ And she led Pallas aside to the sacred waters. She long admired the spring made by the stroke of the horse’s hoof; then looked round on the ancient woods, the grottoes, and the grass, spangled with countless flowers. She declared the daughters of Mnemosyne to be happy alike in their favourite pursuits and in their home. And thus one of the sisters answered her: ‘O thou, [Athena], who wouldst so fitly join our band, had not thy merits raised thee to far greater tasks, thou sayest truth and dost justly praise our arts and our home. We have indeed a happy lot – were we but safe in it.”

The other daughters of Mnemosyne and Zeus, sisters of Urania, Muse of Astronomy, were these: Calliope, Muse of Epic and Heroic Poetry; Clio, Muse of History; Erato, Muse of Love Poetry; Euterpe, Muse of Lyrics and Music; Melpomene, Muse of Tragedy; Polyhymnia, Muse of Sacred Hymns; Terpsichore, Muse of Dance; and Thalia, Muse of Comedy.

Ovid, *Metamorphoses*, translated by Frank Justus Miller
CONTENTS

List of Illustrations viii
Preface xi

PART ONE: ON TYCHO’S ISLAND

Introduction 1
1 In King Frederick’s Service, 1575–1576 3
2 Junker and Peasants, 1576–1581 7
3 Among Friends, 1570–1576 28
4 Founding the Familia, 1576–1584 44
5 Breakthrough, 1584–1587 58
6 The Problem of Continuity, 1580–1591 83
7 The School of Europe, 1591–1593 125
8 Magdalene and Calumny, 1593–1597 150
9 The Tempest, 1597 171
10 Epilogue: In Search of Mæcenas, 1597–1599 195
11 Legacy 207

PART TWO: TYCHO BRAHE’S COWORKERS 237

Biographical Directory 251

Glossary of Technical Terms 311
Notes 315
References 337
Index 351
<table>
<thead>
<tr>
<th>Illustration</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tycho Brahe at age fifty</td>
<td>frontispiece</td>
</tr>
<tr>
<td>2</td>
<td>Knutstorp Castle</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>Peter Oxe, portrait, 1574</td>
<td>11</td>
</tr>
<tr>
<td>4</td>
<td>Queen Sophie of Denmark, oil on paper</td>
<td>15</td>
</tr>
<tr>
<td>5</td>
<td>Influential friends: Philipp Melanchthon, engraving by Albrecht Dürer, 1526; Martin Luther, woodcut by Hans Brosamer, 1530</td>
<td>16</td>
</tr>
<tr>
<td>6</td>
<td>Instruments at Herrevad Abbey: (a) Tycho Brahe’s early sextant, mounted to observe the supernova of 1572; (b) zodiacal armillary made for Tycho Brahe in 1577</td>
<td>19</td>
</tr>
<tr>
<td>7</td>
<td>Bird’s-eye view of Hven ca. 1580</td>
<td>30</td>
</tr>
<tr>
<td>8</td>
<td>Fragment of the Uraniborg cornerstone</td>
<td>37</td>
</tr>
<tr>
<td>9</td>
<td>Anders Sørensen Vedel, painting by Tobias Gemperle, 1578</td>
<td>55</td>
</tr>
<tr>
<td>10</td>
<td>Typus amicitiae (&quot;The picture of friendship&quot;), woodcut designed by Johannes Franciscus Ripensis</td>
<td>56</td>
</tr>
<tr>
<td>11</td>
<td>Kronborg Castle viewed from the direction of Hven</td>
<td>61</td>
</tr>
<tr>
<td>12</td>
<td>The comet of 1577: (a) Tycho Brahe’s first sketch of the comet; (b) mid-sized quadrant of brass used to observe it</td>
<td>65</td>
</tr>
<tr>
<td>13</td>
<td>The axes of Uraniborg staff recruitment</td>
<td>67</td>
</tr>
<tr>
<td>14</td>
<td>Innovations and inventions: (a) transversal dots used to subdivide calibration; (b) sighting device to provide parallel lines of sight; (c) equatorial armillary built ca. 1580</td>
<td>70</td>
</tr>
<tr>
<td>15</td>
<td>Observatory instruments at Uraniborg: (a) greatest azimuth quadrant of steel; (b) bipartite arc; (c) azimuth triquetrum</td>
<td>74</td>
</tr>
<tr>
<td>16</td>
<td>Equatorial armillary of steel, built 1584</td>
<td>84</td>
</tr>
<tr>
<td>17</td>
<td>Tycho Brahe’s portable sextants: (a) measuring interstellar distances; (b) measuring altitudes; (c) steel model</td>
<td>86</td>
</tr>
</tbody>
</table>
ILLUSTRATIONS

18 Route of Morsing’s expedition 87
19 Tycho Brahe’s emblems: (a) Astronomy, (b) Chemistry; design ascribed to Johan Gregor van der Schardt 93
20 Detail of the monogram “J. A. M.” 93
21 Map of Hven, engraving from the Braunius atlas, 1588 94
22 Apotheosis of the Sound (Øresund), engraving from the Braunius atlas, 1588 96
23 The Museum of Uraniborg and its celestial globe: (a) plan of Uraniborg; (b) Tycho Brahe’s great celestial globe, constructed 1570–9 by Christopher Schissler 101
24 Stjerneborg: (a) projection, (b) plan 108
25 Instruments at Stjerneborg: (a) large azimuth quadrant; (b) great equatorial armillary 109
26 The Uraniborg complex: bird’s-eye perspective ca. 1586 111
27 Tycho Brahe, woodcut, 1586 114
28 Tycho Brahe, engraving by Jacques de Gheyn 115
29 Tycho Brahe, sketch attributed to Tobias Gemperle 116
30 Tycho Brahe, second engraving by Jacques de Gheyn 117
31 Mural quadrant: the instrument and the mural painting 119
32 Celestial orbits: (a) Tychonic system; (b) comet of 1577 among the planets 123
33 King Frederick II, polychrome terra-cotta bust by Johan Gregor van der Schardt, 1577–8 128
34 Portable azimuth quadrant of brass 134
35 Triangulation: (a) Tycho Brahe’s triangulation of the Sound, as reconstructed by Haasbroek; (b) resultant map of Hven, woodcut attributed to Willem Janszoon Blaeu 136
36 Tycho Brahe’s millhouse, reconstructed by Møller Nicolaisen: (a) elevation; (b) cross section 138
37 Private printings: (a) sketches of Hven watermarks; (b) bookbinding from the bindery; (c) detail of the ex libris 139
38 Two pages from the German student’s notebook on Hven 146
39 Reorganization: (a) greatest azimuth quadrant in Stjerneborg, replaced at Uraniborg by (b) large azimuth semicircle 148
40 Renovations: (a) Uraniborg ca. 1591; (b) east facade of gleaming white Uraniborg 154
Family ties: (a) The family of Otte Brahe and Beate Bille, memorial painting in Kägeröd Church, artist unknown; (b) Eriksholm Castle (now Trolleholm)

Young King Christian IV, engraving by Crispin de Pas, 1595

Calumnia, from Peter Hegelund, Susanna, 1579

Viceroy Heinrich Rantzau, portrait, 1598

Wandsburg, woodcut, 1590

Prague, detail of an engraving by Egidius Sadeler, 1606

Emperor Rudolf II, oil portrait by Hans von Aachen, ca. 1603–4

Tycho's China legacy: (a) Beijing Observatory; (b) Tychonic equatorial armillary

The Round Tower, or "Royal Stjerneborg of Copenhagen," with the rebus composed by King Christian IV

Willem Janszoon Blaeu, engraving

Tycho Brahe's gilt brass quadrant, probably built ca. 1568–9 with Blotius in Basel

Sophie Brahe, oil portrait in Gavnø Castle

Flemlose's self-portrait in Roman garb, showing the steel sextant in use

Odometer by Peter Jachenow, 1582

Johannes Kepler, oil portrait by Hans von Aachen, ca. 1603–4

Labenwolf’s Kronborg fountain, engraving, 1730

Live Larsdatter, oil painting by Pieter van der Hult, 1691

Christian Longomontanus, engraving by Simon de Pas, 1644

Simon Marius, woodcut, 1614

Johannes Isaksen Pontanus, engraving by J. van der Velde, 1630, after a painting by Isaac Isaacsz

Holger Rosenkrantz and Sophie Axelsdatter Brahe, funerary portrait in Hornslet Church

Johan Gregor van der Schardt, polychrome terra-cotta self-portrait

Willebrord Snel in 1617

Frans Gansneb genaamd Tengnagel van de Camp, funerary monument in the Church of Our Lady under the Chain, Prague, with sketches of the four coats of arms
In the course of my research, whenever I ran across the name of a coworker of Tycho Brahe, I made a notecard and put it in the shoebox. Then I tried to find out who they all were and what they did. As years passed, the shoebox filled up, its contents became a data base, and I decided it was time to write a book about Tycho Brahe and his associates. So here we are.

Some scholar, deep into the lore of the late sixteenth century, may ask why I did not include this or that figure, a Petrus Severinus, Duncan Liddel, Bartolomæus Scultetus, or any number of others. The answer is that I had spent more than twenty-five years compiling names, trying to track down each one of them and make sense of the cultural, intellectual, and material networks that connected them, and the task could easily have gone on for another quarter-century, but the time had come to publish what I had found. I encourage others to carry on the work and can only advise, by way of incitement: Seek and you will find!

I owe profound thanks to those who have supported my research on Tycho Brahe and Tycho’s island. At the beginning of my academic career, a Danish government grant (42.Dan.5/3.b) in 1962, together with two United States Office of Education Title VI Foreign Language Fellowships in 1962–3 and 1963–4, allowed me to research and write my dissertation on Tycho Brahe. A research associateship and travel grant from the University of South Dakota in 1966 let me continue my Tychonic research and writing, as did summer stipends from the National Endowment for the Humanities in 1968 and 1980. A summer grant from the Penrose Fund (no. 5865) of the American Philosophical Society in 1971 allowed me to focus specifically on Tycho Brahe and the patronage of science. In 1973–4, my work on Tycho Brahe was supported by a fellowship of the American Council of Learned Societies and a grant from the George C. Marshall
Fund in Denmark. In 1989, the National Bank of Denmark fostered my research by arranging the use of an apartment at Nyhavn 18 in Copenhagen. Luther College has generously encouraged my Tychonic research through sabbatical leaves in 1973–4, 1980, and 1988–9, a Paideia Endowment Sabbatical Support grant in 1988–9, and smaller grants from various research funds.

Václav Babicka, Bartlett R. Butler, Richard G. Cole, Lesley B. Cormack, Jesper Düring Jørgensen, Noah Efron, Elizabeth Eisenstein, Hanne Honnens de Lichtenberg, W. A. Huijsmans, Erik Iversen, Kjell Lundquist, Bent Kæmpe, Peter Kristiansen, Kristian Peder Moesgaard, the late Wilhelm Norlind, Sarah Tyacke, Dieter Veldtrup, Alex Wittendorff, Peter Zeeberg, and many other scholars, archivists, and librarians have kindly responded to my inquiries over the years, and I thank them for it. The late Victor E. Thoren, a sensitive and generous scholar, discovered many things about the astronomy of Tycho Brahe that had evaded his great predecessors, Gassendi and Dreyer, and I benefited from discussing Tycho with him. J. C. Baron Bille Brahe did a great deal to encourage my work. Four individuals read the manuscript of this book in its entirety in one version or another, and I value their comments: Paul Christianson, Owen Gingerich, Jole Shackelford, and James R. Voelkel. Michael Gnat sensitively polished the manuscript and “packaged” the book. Alex Holzman was the acquisitions editor for Cambridge University Press. Finally, I owe more thanks than I can express here to my wife, Birgitte Christianson, who read the manuscript, discussed it frequently, suggested the title, and supported my work and well-being in untold ways from 1962 until the present day. Any errors remaining in the book are my own.