Contents

List of illustrations xi
Acknowledgements xiii
List of abbreviations xvii

1 Introduction 1
  1.1 The retrospective narrative 3
  1.2 Chapter summaries 5
  1.3 A note on the unpublished sources 8

2 ‘The astronomer … must come to the chemist’ 11
  2.1 Astronomy in nineteenth-century Britain to 1860 12
  2.2 The spectroscope 15
  2.3 The puzzle of Fraunhofer’s lines 20
  2.4 ‘… something like Qualitative Analysis!’ 21
  2.5 ‘… the astronomer … must come to the chemist’ 22

3 The young observer 28
  3.1 Early life and education 28
  3.2 Interest in science 31
  3.3 Interest in astronomy 32
  3.4 Tulse Hill 33
  3.5 An observatory notebook 34
  3.6 Developing a research agenda 38

4 ‘A sudden impulse …’ 46
  4.1 The Pharmaceutical Society soirée 47
  4.2 William Allen Miller 47
  4.3 Chemical spectrum analysis 48
  4.4 Collaboration 50
  4.5 ‘Mr. Huggins … on the “Stellar Spectrum”’ 52
  4.6 Spectra of terrestrial metals 54
  4.7 ‘On the spectra of some of the fixed stars’ 57
5 The riddle of the nebulae
  5.1 Astronomical questions: summer 1864
  5.2 Variable nebulae
  5.3 The ‘interminable wilderness of nebulae’
  5.4 ‘No spectra such as I expected!’
  5.5 A paper of ‘interest & importance’
  5.6 Fellowship

6 Moving in the inner circle
  6.1 Cultivating advantageous alliances
  6.2 Opportunism and eclecticism
  6.3 The ‘willow leaves’ controversy
  6.4 The nova in Corona Borealis
  6.5 The spectra of variable stars
  6.6 A new star
  6.7 The red flames
  6.8 Fireworks and shooting stars
  6.9 Crater Linné
  6.10 Thermometric research
  6.11 Achieving ‘a mark of approval and confidence’

7 Stellar motion along the line of sight
  7.1 The colours of stars
  7.2 26 May 1864
  7.3 Stellar motion in the line of sight
  7.4 Observations
  7.5 Publication
  7.6 Response

8 A new telescope
  8.1 ‘… discussing the size & plumage of the chicken’
  8.2 The strains of diversity
  8.3 The ‘insufficiency of national observatories’
  8.4 The Devonshire Commission
  8.5 Dissension in the ranks
  8.6 The Lockyer factor

9 Solar observations
  9.1 The ‘Great Indian Eclipse’
  9.2 Viewing the red flames without an eclipse
  9.3 The eclipse expedition to Oran
  9.4 Planning the expedition
  9.5 A registering spectroscope
  9.6 22 December 1870
Contents

10 An able assistant 170
  10.1 The solitary observer 171
  10.2 An able assistant 174
  10.3 Margaret Lindsay Murray 176
  10.4 Interest in astronomy 176
  10.5 The ‘two star-gazers’ 178
  10.6 Celestial photography 179
  10.7 Photography at Tulse Hill 182

11 Photographing the solar corona 192
  11.1 The Egyptian eclipse 192
  11.2 Photographing the corona 193
  11.3 The Caroline Island eclipse 197
  11.4 The Riffel expedition 199
  11.5 The Bakerian lecture 204
  11.6 The Cape Observatory 208

12 A scientific lady 221
  12.1 ‘… zeal and perseverance …’ 221
  12.2 The Henry Draper Memorial 224
  12.3 The ‘meteoritic hypothesis’ 226
  12.4 The ‘chief nebula line’ 229
  12.5 ‘I have added the name of Mrs. Huggins …’ 232
  12.6 A scientific lady 235

13 Foes and allies 240
  13.1 Controversy 240
  13.2 American allies 242
  13.3 Irreconcilable differences 244
  13.4 President of the BAAS 246
  13.5 George Ellery Hale 247
  13.6 The President’s address 249
  13.7 Nova Aurigae 251
  13.8 The Yerkes telescope 255
  13.9 Photographing the corona without an eclipse 256
  13.10 The Astrophysical Journal 258
  13.11 The Yerkes Observatory 260

14 The new astronomy 267
  14.1 Helium 268
  14.2 Accolades and achievements 271
  14.3 Radium 275

15 ‘One true mistress’ 291
  15.1 Passing the baton 292
  15.2 The Great Grubb telescope 296
# Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.3 Scientific Papers</td>
<td>298</td>
</tr>
<tr>
<td>15.4 ‘Life is work, and work is life’</td>
<td>300</td>
</tr>
<tr>
<td>15.5 ‘… guardian of my Dearest’s reputation’</td>
<td>301</td>
</tr>
<tr>
<td>15.6 ‘I now withdraw …’</td>
<td>309</td>
</tr>
<tr>
<td>15.7 The new Huggins Observatory</td>
<td>312</td>
</tr>
<tr>
<td>15.8 Wellesley College</td>
<td>313</td>
</tr>
<tr>
<td><strong>16 Conclusion</strong></td>
<td>322</td>
</tr>
<tr>
<td>Appendix: ‘The new astronomy: A personal retrospective’</td>
<td>328</td>
</tr>
<tr>
<td>Bibliography</td>
<td>347</td>
</tr>
<tr>
<td>Index</td>
<td>375</td>
</tr>
</tbody>
</table>