

Contents

Chapter IV 1

- A. The Significance of the Arab Presence in the Mediterranean from the Perspective of the Emergence of Portolan Charts 1
- B. The Surviving Arabic Portolan Charts 20
 - 1. *The Maghrebi Portolan Chart* 21
 - 2. *Aḥmad al-Ṭanjī's Map* 24
 - 3. *Ibrāhīm al-Mursī's Map* 25
 - 4. *Two Ottoman Maps* 26
 - 5. *The Cartographic Representation of the Mediterranean Islands* 27
 - 6. *The Arabic Origin of the Line Network and Wind Rose System on Portolan Charts* 38
- C. Portolan Charts and Mathematical Geography 48
 - 1. *Graduated Maps in Marino Sanuto and Marco Polo* 52
 - 2. *Paolo Toscanelli* 53
 - 3. *Traces of Early Graduations on Spanish-Portuguese World Maps* 57
 - 4. *Traces of the Tables of Abu l-Fidā' among European Cartographers* 60
 - 5. *Wilhelm Schickard's Attempt to Create a Map of the Old World Based on Abu l-Fidā's Tables* 65
- D. The Foundations of the Graticules on European World Maps 68
 - 1. *Giacomo Gastaldi* 82
 - 2. *Nicolas Sanson* 96
 - 3. *Johannes Kepler* 100
 - 4. *The Reduction of the Great Axis of the Mediterranean from Approx. 53° to Approx. 42° in the Second Half of the 17th Century* 107
 - 5. *On the Question of Guillaume Delisle's Contribution to the "Reform of Cartography"* 122

Chapter V 132

- A. Arabic Nautical Science in the Indian Ocean as Evidence of a Highly Developed Mathematical Geography and Cartography 132
 - 1. *An Assessment of Arabic Nautical Science Based on Excerpts from the Kitāb al-Muḥīṭ* 134
 - 2. *Ibn Mājid—Sulaymān al-Mahrī* 140
 - 3. *The Character and Task of Arabic Nautical Science* 144
 - a. The Concept and Principles of Arabic Navigation in the Indian Ocean 146

- b. Astronomy and Navigators 148
 - c. Longitudes and Latitudes 150
 - d. Altitude Measurement 154
 - e. Determination of Distances: Parallel to the Equator and Oblique to the Meridian 164
 - α. *Zām, Plural: azwām* 166
 - β. *The Division of the Horizon Circle in the Nautical Practices of the Indian Ocean* 167
 - γ. *Dīra, Plural diyar* 169
 - δ. *Tiriffā or tiriffā' (Plural tiriffāt or tiriffā'āt)* 169
 - ε. *Distances between Two Locations at the Same Latitude on the Coasts of the Oceans* 172
 - f. Nautical Instruments 185
 - α. *Astrolabe* 186
 - β. *Quadrant* 187
 - γ. *Jacob's Staff* 188
 - δ. *Compass* 192
 - ε. *Maps* 219
 - B. Arabic-Islamic Astronomical Navigation among the Portuguese 221
 - 1. *Determining the Latitude from the Altitude of the Sun* 227
 - 2. *Solar Declination Tables* 228
 - 3. *Determination of Polar Altitude* 230
 - 4. *Latitude Tables* 234
 - 5. *Instructions for Estimating the Distance Travelled by a Vessel* 236
 - 6. *The Issue of Longitude Determination* 244
 - 7. *Navigational Instruments* 245
 - a. *Astrolabe and Quadrant* 246
 - b. *Jacob's Staff* 249
 - c. *Magnetic Needle-Compass* 253
 - 8. *Summary* 254
- Chapter VI 264**
- A. Arabic Cartography of the Indian Ocean according to Non-Arabic Sources 264
 - B. Arabic Cartography of the Indian Ocean among the Portuguese 275
 - 1. *The Peninsular Shape of Africa* 284
 - 2. *Madagascar* 329
 - 3. *The Red Sea* 338
 - 4. *The Indian Subcontinent* 343
 - 5. *Farther India* 346
 - C. Summary 363

Bibliography	375
Index of Proper Names	436
Index of Book Titles	469
Tables of Geographical Coordinates	479
Index of Maps	484
Index of Place Names and Terms	500