

Contents

1	Introduction	1
2	Carl Størmer's Origins	9
2.1	High School	14
2.2	University Education and First Mathematics Papers	15
2.3	Covert Photography	18
2.4	Postgraduate Research in France and Germany	21
2.4.1	Jules Henri Poincaré (1854–1912)	22
2.4.2	Marie-Ennemond Camille Jordan (1836–1922)	24
2.5	Associate Professor Elling Bolt Holst (1849–1915)	28
3	Størmer's Auroral Studies	29
3.1	Auroral Science at Nineteenth Century's End	29
3.2	The Størmer–Krogness Camera	34
3.2.1	Ole Andreas Krogness (1886–1934)	39
3.3	Auroral Observations: 1909–1957	39
3.4	The First Auroral Atlas	48
3.5	Spatial and Temporal Distributions of Aurorae	57
3.5.1	Auroral Phases	63
3.5.2	Colors of Aurorae	65
3.5.3	Orientations of Auroral Forms	67
3.6	Auroral Height Measurements	68
3.6.1	Statistical Analysis of Størmer's Auroral Database	74
3.6.2	Local-Time Variability of Lower Borders	77
3.6.3	Størmer's Colleagues	82
3.7	Sunlit Aurorae	86
3.8	Auroral Particle Trajectories	88
3.8.1	Critical Comments on Størmer's Auroral Theory	96
3.8.2	Cosmic Rays and Radiation Belts	97

3.8.3	The Ring Current	98
3.8.4	Long-Delay Radio Echoes	102
3.8.5	Radio-Aurorae	104
3.9	Aurorae Accompanied by Sound: A Mystery	105
4	Mother-of-Pearl and Noctilucent Clouds, Comets and Meteors . . .	109
4.1	Mother-of-Pearl Clouds	109
4.2	Noctilucent Clouds	110
4.3	Comets and Meteors	113
5	Botanical Interests	115
5.1	Professor Axel Blytt (1843–1898)	117
6	Mathematical Contributions	119
6.1	Størmer's Colleagues in Mathematics	123
6.1.1	Carl Anton Bjerknes (1825–1903)	123
6.1.2	Cato Maximillian Gullberg (1836–1902)	124
6.1.3	Peter Ludvig Mejdell Sylow (1832–1918)	125
6.1.4	Viggo Brun (1885–1978)	125
6.1.5	Niels Henrik Abel (1802–1829)	126
6.1.6	Sophus Lie (1842–1899)	127
7	Cooperation and Conflict with Kristian Birkeland	129
8	Størmer the Man	135
8.1	University Professor, Researcher and Administrator	135
8.1.1	Størmer as a Research Administrator	141
8.2	Honors and Memberships	143
8.2.1	Nominations for the Nobel prize in physics	144
8.2.2	Vilhelm Carlheim-Gyllensköld	144
9	The Størmer Family	147
9.1	Family Life	147
9.2	Ada Størmer's Speech on Her 90th Birthday: February 27, 1967 . .	155
10	Størmer's Accomplishments: In Retrospect	159
10.1	Størmer's Theoretical Work	159
10.2	Størmer's Experimental Auroral Work	161
10.3	Contemporary Perceptions of Størmer	161
11	Carl Størmer's Publications, Biographies, and Other Sources . . .	165
11.1	Auroral Observations and Height Calculations	165
11.2	Theoretical Papers on Aurorae and Trajectories	168
11.3	Sunlit Aurorae	170
11.4	Clouds in the Atmosphere	171
11.5	Størmer's Pure Mathematical Papers	172
11.6	Popular Contributions	173
11.7	Printed Sources, Letters, Notes and Biographies	174

Appendixes 175

Appendix A: Størmer’s Trajectory Analyses 177

Appendix B: Auroral Heights, Positions and Orientations 183

Bibliography 189

Index 193