
Contents

Foreword	ix
Preface	xiii
Chapter 1. Background and Challenges of Submarine Exploration in the 19th Century	1
1.1. Submarine exploration	2
1.2. Means of communication in the 19th Century: birth of the telegraph	7
1.2.1. Aerial optical telegraph.	8
1.2.2. Electric telegraph	10
1.3. Establishment of the first international telecommunications network	18
1.3.1. National links, overhead cables	18
1.3.2. International links and submarine cables	19
1.3.3. Expansion of the global telegraph network.	36
1.4. Economic and political contexts of England in the 1870s	38
Chapter 2. Sailors and Scientists of the H.M.S. Challenger	43
2.1. Introduction	44
2.2. Biographies of the Royal Navy officers	55
2.2.1. George Henry Richards.	55
2.2.2. George Strong Nares	56
2.2.3. Frank Tourle Thomson	58
2.2.4. John Fiot Lee Pearse Maclear	59
2.2.5. Thomas Henry Tizard	60
2.2.6. Pelham Aldrich	61

2.3. Biographies of the scientific team	62
2.3.1. William Benjamin Carpenter	62
2.3.2. Charles Wyville Thomson	64
2.3.3. John Murray	65
2.3.4. Henry Nottidge Moseley	66
2.3.5. Rudolf von Willemoës-Suhm	68
2.3.6. John Young Buchanan	69
2.3.7. John James Wild	70
2.4. List of officers, scientists and members of the technical, medical and administrative bodies of the <i>Challenger</i> expedition when departing from Portsmouth, on December 21, 1872	72
Chapter 3. Narrative Summary of the H.M.S. <i>Challenger</i> Cruise	77
3.1. Introduction	78
3.2. Explorations in 1873.	81
3.2.1. North Atlantic Ocean	83
3.2.2. South Atlantic Ocean	91
3.2.3. Indian Ocean	97
3.3. Explorations in 1874.	98
3.3.1. Indian Ocean	98
3.3.2. South Pacific Ocean – Tasman Sea	105
3.3.3. Central Pacific Ocean.	109
3.3.4. North Pacific Ocean	119
3.4. Explorations in 1875.	121
3.4.1. Central Pacific Ocean.	121
3.4.2. North Pacific Ocean	125
3.4.3. Central Pacific Ocean (Tahiti)	131
3.4.4. South Pacific Ocean	134
3.5. Explorations in 1876.	137
3.5.1. South Pacific Ocean	137
3.5.2. South Atlantic Ocean.	143
3.5.3. North Atlantic Ocean.	145
3.6. Epilogue of the cruise	145
Chapter 4. Scientific Equipment and Observations of the H.M.S. <i>Challenger</i>.	147
4.1. Introduction	148
4.2. The H.M.S. <i>Challenger</i> and its scientific facilities	148
4.2.1. Refurbishment of the upper deck	149
4.2.2. Refurbishments of the main deck	150
4.2.3. Refurbishment of the lower deck and the hold	154

4.3. Dredging and sounding instruments	155
4.3.1. Dredges and trawls	156
4.3.2. Accumulators	156
4.3.3. <i>Hydra</i> Sounding Machine	159
4.4. Dredging, trawling and sounding methods	160
4.4.1. Dredging and trawling methods	160
4.4.2. Method of sounding	160
4.4.3. Precision and uncertainty in depth measurement.	164
4.5. Immersion speed of a sounding apparatus	165
4.5.1. Free fall of the <i>Hydra</i> Sounding Machine	166
4.5.2. Fall of the <i>Hydra</i> Sounding Machine connected to the line, under constant external tensile strength	169
4.5.3. Observation of the entrance of the line in water	172
4.6. Contribution of the H.M.S. <i>Challenger</i> 's expedition to knowledge of seabed relief	185
4.6.1. Summary of current knowledge relating to the Earth and the geomorphology of the seabed	185
4.6.2. Examples of bathymetric surveys illustrating the different types of seabed relief	188
4.7. Observation of the ocean waters during the expedition of the H.M.S. <i>Challenger</i>	197
4.7.1. Methods and instruments of measurement	197
4.7.2. Examples of measurements	199
Conclusion	209
References	215
Index	221