

Contents

1. Introduction	
G. RHEINHEIMER	1
References	4
2. The Kiel Bight as Research Area	
G. RHEINHEIMER (With 3 Figures)	5
References	11
3. Hydrographic Conditions	
J. LENZ (With 2 Figures)	12
3.1 The Baltic Sea as an Estuary	12
3.2 'General Hydrographical Features of the Baltic	14
3.3 The Kiel Bight	17
3.4 The Kiel Fjord	19
3.5 Study Period 1974/75	20
References	24
4. Oxygen and Some Inorganic Nutrients	
G. RHEINHEIMER (With 2 Figures)	26
4.1 Material and Methods	26
4.2 Oxygen	26
4.3 Inorganic Nutrients	28
4.3.1 Ammonia	28
4.3.2 Nitrite	30
4.3.3 Nitrate	30
4.3.4 Orthophosphate	33
4.4 The Annual Cycle of Nutrients	36
References	36
5. Seston and Its Main Components	
J. LENZ (With 3 Figures)	37
5.1 Seston	39
5.2 Chlorophyll a	41
5.3 Particulate Carbon and Nitrogen	45
5.4 Protein	48

5.5	Carbohydrates	50
5.6	Lipids	52
5.7	Adenosine Triphosphate (ATP)	53
5.8	Organic and Inorganic Matter	54
5.9	Fraction of Plankton and Detritus in Organic Matter	56
5.10	Percentual Composition of Seston	57
	References	59
6.	Determination of Organic Substances and Respiration Potential	
	K. GÖCKE and I.-G. HOPPE (With 3 Figures)	61
6.1	Description and Application of the Chemical Oxygen Demand (COD) Method	61
6.2	Description and Application of the Biochemical Oxygen Demand (BOD) Method	64
6.3	Description and Application of Dehydrogenase Activity (DHA) Determination as a Measure for Potential Respiration	67
	References	69
7.	Primary Production	
	B. PROBST (With 5 Figures)	71
7.1	Material and Methods	71
7.2	Primary Production in the Kiel Fjord and Different Areas of the Kiel Bight	72
	References	77
8.	Plankton Populations	
	J. LENZ (With 1 Figure)	79
8.1	Plankton Populations of the Kiel Bight	80
8.2	Phytoplankton Populations During the Study Period 1974/75	81
	References	88
9.	Fungi	
	J. SCHNEIDER (With 1 Figure)	90
9.1	Lower Fungi (Mastigomycotina)	91
9.2	Yeasts	94
9.3	Lignicolous Fungi (Ascomycotina, Deuteromycotina)	99
	References	100
10.	Estimation of Bacterial Number and Biomass by Epifluorescence Microscopy and Scanning Electron Microscopy	
	R. ZIMMERMANN (With 11 Figures)	103
10.1	Staining Technique for the Epifluorescence Microscopic Count	104
10.2	Preparation of Specimens for Scanning Electron Microscopy	106
10.3	Preliminary Examinations	107

10.4 Examination of the Kiel Fjord and Kiel Bight 1974/75	110
10.4.1 Regional and Seasonal Distribution of Bacteria	110
10.4.2 Estimation of Bacterial Cell Sizes and Biomass	113
10.4.3 Bacteria Attached to Detritus	116
References	118
11. Regional and Seasonal Distribution of Saprophytic and Coliform Bacteria	
G. RHEINHEIMER (With 2 Figures)	121
11.1 Material and Methods	121
11.2 Distribution of Marine, Brackish Water and Fresh Water Bacteria in the Water	123
11.3 Distribution of Marine, Brackish Water and Fresh Water Bacteria in the Sediments	135
References	137
12. Distribution of Special Physiological Bacteria Groups	
M. BÖLTER (With 2 Figures)	138
12.1 Material and Methods	138
12.2 Results and Discussion	139
References	146
13. Numerical Taxonomy and Character Analysis of Saprophytic Bacteria Isolated from the Kiel Fjord and the Kiel Bight	
M. BÖLTER (With 9 Figures)	148
13.1 Material and Methods	149
13.1.1 Isolation of the Bacteria Strains	149
13.1.2 Morphological, Physiological and Biochemical Tests	149
13.1.3 Numerical Taxonomy	149
13.1.4 Classifying by Key Diagnostics	154
13.2 Results	154
13.2.1 Numerical Taxonomy of the HMOs	160
13.2.2 Comparison of the Median Strains and Ungrouped Strains by Numerical Taxonomy	162
13.2.3 Classifying of Bacterial Strains by Using Determination Schemes	167
13.2.4 Analysis of the Frequency of Characters	171
13.3 Discussion	174
References	176
14. Analysis of Actively Metabolizing Bacterial Populations with the Auto- radiographic Method	
H.-G. HOPPE (With 5 Figures)	179
14.1 Material and Methods	180
14.1.1 Micro-Autoradiographic Method for the Determination of Active Bacteria Cells	180

14.1.2	Description of a Macro-Autoradiographic Method to Determine Physiological Groups of Active Bacteria Colonies . . .	182
14.2	Results	184
14.2.1	Annual Cycle of the Actively Metabolizing Heterotrophic Bacteria in the Kiel Fjord and the Kiel Bight	184
14.2.2	Distribution of Some Physiological Bacteria Groups in Different Brackish Water Biotopes	190
14.3	Discussion on the Role of Actively Metabolizing Bacteria in Brackish Water Areas	194
	References	196
15.	Heterotrophic Activity	
	K. GOCKE (With 12 Figures)	198
15.1	Material and Methods	202
15.1.1	Determination of V_{\max} , T_t , and $(K_t + S_n)$	202
15.1.2	Determination of the Turnover Time of an Amino Acid Mixture	204
15.2	Horizontal and Vertical Distribution of the Heterotrophic Activity	204
15.2.1	Spatial Distribution of the Maximum Uptake Velocity	204
15.2.2	Spatial Distribution of the Sum of Transport "Constant" and Natural Substrate Concentration $(K_t + S_n)$	208
15.2.3	Spatial Distribution of the Turnover Time	209
15.3	Seasonal Distribution of Heterotrophic Activity	210
15.3.1	Seasonal Distribution of Maximum Uptake Velocity	210
15.3.2	Seasonal Distribution of the Turnover Time	215
15.3.3	Seasonal Distribution of the Sum of Transport "Constant" and Natural Substrate Concentration $(K_t + S_n)$	219
	References	221
16.	Bacterial Growth Rates and Biomass Production	
	L.-A. MEYER-REIL (With 7 Figures)	223
16.1	Material and Methods	224
16.1.1	Sampling Procedure and Processing the Samples	224
16.1.2	Assay Analysis	224
16.2	Growth Activity and Biomass Production	225
16.3	Generation Time and Influence of Temperature on Growth Activity	228
16.4	Influence of Quality of Water on Growth Activity	228
16.5	Discussion	231
	References	234
17.	Nitrification	
	H. SZWERINSKI (With 2 Figures)	237
17.1	Material and Methods	238
17.2	Potential Activity for Nitrite Oxidation in the Kiel Fjord and the Kiel Bight	238

17.3 Discussion of the Results	241
References	242
18. Desulfurication and Sulfur Oxidation	
J. SCHNEIDER	244
References	248
19. Comparative Analysis of Data Measured in the Brackish Water of the Kiel Fjord and the Kiel Bight	
M. BÖLTERL.-A. MEYER-REIL, and B. PROBST (With 7 Figures).	249
19.1 Methods Applied for the Comparative Analysis of the Results	250
19.1.1 Two-State Correlation Analysis	250
19.1.2 Series Comparison	250
19.1.3 Time-Series Analysis	251
19.1.4 Arrangement of the Parameters Measured	253
19.1.5 Representation of the Results	253
19.2 Results	253
19.3 Discussion	256
References	278
20. Conclusion	
G. RHEINHEIMER	281
References	287
Subject Index	289