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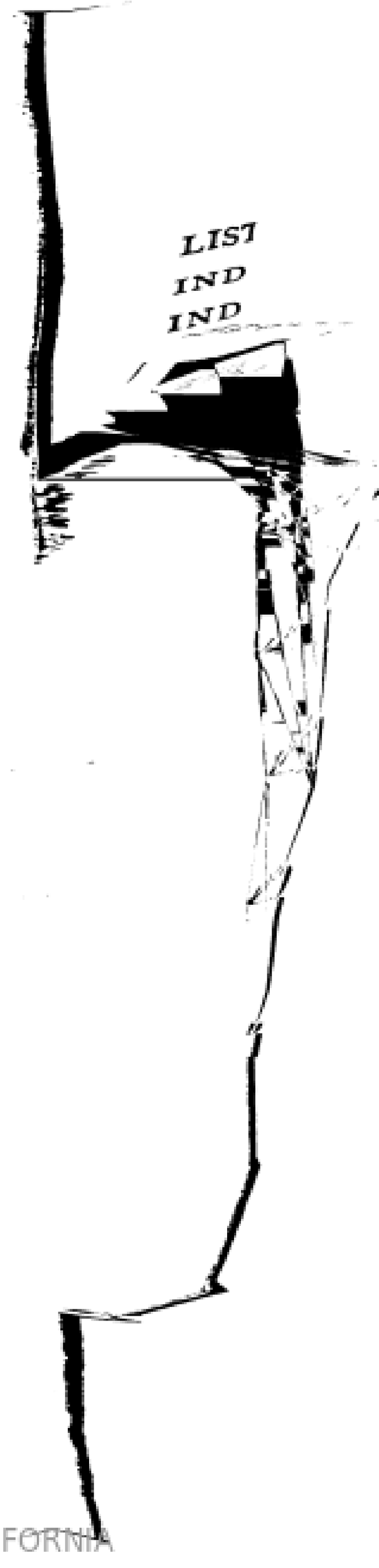

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CONTENTS.

	PAGES
LIST OF ILLUSTRATIONS, MAPS, AND CHARTS	
INDEX TO CONTENTS	v
INDEX TO ADVERTISEMENTS	vii
LIST OF STANDARD BOOKS, GUIDE BOOKS, ETC.	xi
PREFACE	xiii
OFFICIAL GUIDE TO THE ORIENT LINE	xv
LIST OF AGENTS	xix
LIST OF STEAMSHIPS	xxiii
	xxiv

CHAPTERS FOR TRAVELLERS.

PART I.—GENERAL INTRODUCTION.

CHAPTER I.

MEANS OF COMMUNICATION . . . . . 1—21

CHAPTER II.

SEAMANSHIP . . . . . 21—33

CHAPTER III.

NAVIGATION . . . . . 34—58

PART II.—THE ROUTES.

CHAPTER IV.

THE CAPE ROUTE . . . . . 59—69

CHAPTER V.

THE SUEZ ROUTE . . . . . 70—85

CHAPTER VI.

NATURAL HISTORY AT SEA . . . . . 85—99

CHAPTER VII.

UNDER THE SEA . . . . . 99—107

CHAPTER VIII.

UNIVERSAL TIME . . . . . 107—115

CHAPTER IX.

THE WEATHER AT SEA . . . . . 115—121

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PART III.—THE OLD WORLD (*chiefly for Australians*).

CHAPTER X.

PAGES

THE MOTHER COUNTRY . . . . . 127—139

CHAPTER XI.

ITALY . . . . . 140—153

CHAPTER XII.

EUROPEAN CITIES . . . . . 154—178

CHAPTER XIII.

EGYPT . . . . . 179—191

CHAPTER XIV.

SINAI AND THE HOLY LAND . . . . . 191—194

PART IV.—THE AUSTRALIAS (*chiefly for those going out*).

CHAPTER XV.

GENERAL ACCOUNT OF AUSTRALIA . . . . . 195—199

CHAPTER XVI.

NEW SOUTH WALES . . . . . 200—209

CHAPTER XVII.

VICTORIA . . . . . 209—219

CHAPTER XVIII.

SOUTH AUSTRALIA . . . . . 220—225

CHAPTER XIX.

THE OTHER AUSTRALASIAN COLONIES, ETC. . . . . 225—254

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List of Illustrations.

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s.s. POTOSI	(PORTRAIT)	186
s.s. SORATA	(PORTRAIT)	42

VIEWS.

TOWER OF LONDON	134
PLYMOUTH SOUND	60
" HOE, WITH OLD EDDYSTONE LIGHTHOUSE	62
NAPLES BAY	82
ITALY, THE FORUM	142
" THE CAPITOL	146
" AMALFI	148
" FLORENCE	150
" VENICE	152
" LAGO MAGGIORE	154
ROUEN	156
SYDNEY, TOWN HALL	158
MELBOURNE, COLLINS STREET	160
ADELAIDE, KING WILLIAM STREET	162
NEW ZEALAND, MOUNT EGMONT	164
" " MITRE PEAK	166

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA

INDEX TO CONTENTS.

Abyssinia, 75
Adam, tomb of, 106
Adelaide, 220
Aden, 72
Advantages of voyage, 2
Agulhas, Cape, 68
Air, 117
Akaba, 75
Albatross, &c., 89
Alexandria, 81
American Conference on Time, 112
Anchors, 27
Animals, distribution of, 105
Annesley Bay, 74
Appetite, 6, 14
Arezzo, 166
Ascension, island of, 67
Assisi, 164
Atlantis, 103
Atolls, 71, 105
Aurora, 125
Australia, 195
  Bight of, 69
  Discovery of, 196
  Region of, 106
Australia, South, extent, climate, productions, &c., 220
Australia, Western, extent, climate, productions, &c., 232
Azores, the, 63, 103

Baggage, 12
Barometer, 6, 116
Beyrout, 194
Birds, coast, 86
  Egyptian, 183
  Land, 86
  New Zealand, 240
  Ocean, 87
Biscay, Bay of, 62, 102
Bitter Lakes, 77
Bologna, 171
Boolak Museum, 187
Botany Bay, 196
Bronzes, antique, 156
  Prehistoric, 104
Bruno, 151

Cabin accommodation, 10
  Fittings, 11
Canary bird, 65
  Isles, 64
Cairo, 179
Cape Colony, 67
Cape de Verde Islands, 66
Cape route, 59
Captain, authority of, 19
Captain Cook, 196
Cetaceans, 93
Ceylon, 106
Chagos Archipelago, 70, 105
Challenger, voyage of, 102
Channel, Chops of, 62
  English, 60, 101
Charts, 36
Charybdis, 81
Chronometer, 42
Cintra, 84
Climate in the Colonies, 199, 252
  Fiji, 247
  New Guinea, 250
  New South Wales, 202
  New Zealand, 241
  Queensland, 226
  South Australia, 223
  Tasmania, 237
  Victoria, 211
  Western Australia, 235
Clothing, 12, 14, 81
Clouds, 124
Compass, 37
Conference on Time, 112
Convict settlement, 197, 233, 236
Consumption, 8
Corals, 105
Coral islands, 71
Cortona, 166
Critias, of Plato, 103
Cross bearings, 46
Crossing the line, 66
Crustaceans, 96
Currents at sea, 40, 120
Cuttle-fish, 96
Cyclones, 121

Dante, 144
Darwinism, 99
Dead reckoning, 40
Deck chairs, 15
Departure, taking a, 34
Depression and elevation of land, 99
Deptford, 130
Depths of the sea, 102
Diego Garcia, 70, 106
Distances at sea, 47
Divine service, 20

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA

Doldrums, 66
Donatello, 142
Dover, Shakespeare's Cliff, 101
  Straits of, 101

Eddystone lighthouse, 61
Egypt, 179, 183
Electric light, 55
Engines, ship's, 57
Entertainments, 7, 16
Etna, 81
European cities, 154
Evaporation, 6
Evelyn, John, 130
Eyre's journey, 69

Ferrara, 172
Finisterre, Cape, 62, 85, 102
Fish, 89
  Brown trout, 239
  Colonial, 253
  Dolphin, 92
  Flying-fish, 91
  Rays and sharks, 89
  Snock, 92
  Swordfish, 92
Florence, 142, 150, 169
Food on board, 14
Fortunate Islands, 109
Francis, St., of Assisi, 164

Galileo, 151
Garofalo, 81
Genoa, 176
Germany, 177
Gibraltar, 83
  Straits of, 83, 104
Goodwin Sands, 101
Gothard, St., Railway, 178
Gravesend, 59
Greece, 176
Greenwich, 129
  Time, 114
Guide books, 155

Health, 5
  Appetite, 6, 14
  Cheerfulness, 9
  Clothing, 12, 81
  Consumption, 8
  Dyspepsia, 8
  Exercise, 6, 16
  Headache, 8
  Indigestion, 7
  Moonlight, sleeping in, 15
  Neuralgia, 8, 15
  Sea-sickness, 7
  Spinal injury, 9
  Temperature, 6
  Ventilation, 8
  Wakefulness, 6

Helena, St., island of, 67
Herculaneum, 157
Hobart, 198
Holy Land, 191

Ismailia, 78, 181
Israelites, 181
Italy, 140
  Archæology, 143
  Art, 141
  Commerce, 143
  Discoverers, 145
  Music, 143
  Philosophers, 151
  Reformers, 148
  Revival of learning, 145
  Women of, 147

Jaffa, 192
Jebel Teir, 74
Jelly Fish, 97
Jerusalem, 193
Jiddah, 75
Joseph, 181
Jubal, 75

Kantarah, 79
Kerguelen's Island, 69
Kosseir, 75
Knots (nautical miles), 34
  (ropes), 26

Land, making the, 45
Latitude, 34, 108
  By observation, 42
Lead, 45
Leeuwin Cape, 70
Lemuria, 105
Lisbon, 84
Log, 39
London, 128
  Bank of England, 133
  Bridge, 132
  Chiswick, 139
  Companies, 132
  Courts of justice, 135
  Docks, 129
  Edmonton, 138
  Eltham, 137
  Environs, 137
  Great fire of, 133
  Hampton Court, 139
  Population, 131
  Watling Street, 138
  Westminster, 133
Longitude, 35, 107
  By observation, 44
Luminosity of the sea, 97
Lyonesse, 101

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Medula, 75
Madeira, 63
Malayan Archipelago, 106
Malta, 81
Marco Polo, 145
Mails, 23
Medical advice, 5
Mediterranean, 81, 105
Melanese, 97
Messina, Wreck of, 69
Memphis, 187
Meridian, Prime, 108
Messina, 81
Microscope at sea, 95
Milan, 174
Mineral wealth, New Guinea, 245
New South Wales, 204
Queensland, 229
South Australia, 220-223
Tasmania, 239
Victoria, 214
Mocha, 74
Molluscs, 96
Monsoons, 119, 121
Mother Country, 127
Motion of the ship, 23
Murray River, 200

Naples, 82, 156
Natural history at sea, 85
Nautical terms, 21
Nautilus, 96
Navigation, 21, 34
Needles, the, 60
New Guinea, 106, 248
New South Wales, 198, 200
Extent, climate, productions, &c., 200-207
Newspaper Press in the Colonies, 254
Nile, 183
Mouths of the, 81
Nore, the, 60

Occupation on board, 16, 19
Ocean, Southern, 69
Olives, Mount of, 193
Ozone, 6, 14, 126, 202

Padua, 172
Perim, 73
Perugia, 164
Perugino, 166
Phosphorescence, 97
Physalia, 96
Pisa, 168
Plymouth, 61
Pæstum, 158
Pompeii, 157
Population, Fiji, 247
New South Wales, 202, 206
Queensland, 228
South Australia, 222
Tasmania, 237
Victoria, 213
Porpoises, 95
Port Jackson, 197
Port Said, 80
Portland Race, 60
Portuguese men-of-war, 96
Primus meridianus, 108
Pulmonary complaints, 8
Pumps, 58
Pyramids, 185

Queensland, 198

Rain, 124
Rameses II., 181
Red Sea, 73, 76, 105
Refrigerating machines, 57
Renaissance, 146
Rigging, 22, 25
Rome—Churches, excursions, &c., 159
Rudder, 27
Rule of the road at sea, 31

Sailing, 22
Sails, 23
Savonarola, 150
Scylla, 81
Seamanship, 21
Sea-sickness, 7
Sea-weed, 99
Serpent-worship, 104
Sextant, 41
Shepherd kings, 181
Siena, 167
Sierra Nevada, 82
Signals, 31
Sinai, 75, 191
Sky, colours of, 125
Socotra, 70, 105
Somalis, 73
Souakim, 75
South Australia, 198
Extent, climate, productions, &c., 220
Spain, 178
Speed, 1
Sphinx, 187
Sport in Colonies, 252, 253
Squalls, 123
Stars, 47-59, 66
Sturt, Captain, 199
Steamer, description of, 9
Suez, 75, 76, 180
Canal, 77
Route, 70

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Original from UNIVERSITY OF CALIFORNIA

Table Bay, 67
Tasmania, 236
Tel-el-Kebeer, 78, 181
Temperature, 6
Teneriffe, 6
Thames Tunnel, 130
Thermometer, 117
Tilbury docks, 100
  Fort, 59
Time, astronomical, 111
  Equation of, 44
  Marked by bells, 30
  Ordinary, 110
  Reckoning, 35
  Sidereal, 110
  Universal, 107
  Variation in, 114
Timsah, Lake, 78, 80, 181
Tower of London, 131
Trafalgar, 84
Tropics, 65
Turin, 175
Turtles, 98
Van Diemen's Land, 198
  Extent, climate, productions, &c., 236
Venice, 172
Verona, 173
Victoria—Extent, climate, productions, &c., 209
Vincent, Cape St., 66, 109

Waldenses, 151
Watches and clocks, 113
Waves, 59
Weather at sea, 115, 124
Western Australia, 198
  Extent, climate, productions, &c., 232
Whales, 94
Whist, 18
Winds, 118, 124
  Charts, 115
  S.E. Trades, 66
Wines, of Australia, 213
Wren, Sir C., 134

Zagazig, 182
Zemba, 75
Zodiacal light, 124
Zoophytes, 96

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INDEX TO ADVERTISEMENTS.

			Page
Abbott, Page & Co.	London	(Stockbrokers)	264
Amodio, Mr.	Naples	(Statuary, &c.)	286
Anglo-Egyptian Banking Company	Egypt	(Bank)	289
Anglo-New Zealander		(Newspaper)	257
Aplin, Brown, & Co.	Queensland	(Merchants)	301
Argus, &c.	Melbourne	(Newspaper)	268
Army and Navy Hotel	London	(Hotel)	269
Attard & Vella	Port Said	(Lace)	392
Benson & Co., J.	London	(Trunks)	259
Betts & Co., Limited	London	(Capsules)	281
Blyth & Sons	London	(Furniture)	271
Brisbane Newspaper Company		(Newspapers)	299
Broadbent, R.	Port Said	(Ships' Stores)	290
Callaghan & Son	Sydney	(Boots)	296
Central Station Hotel	Glasgow	(Hotel)	258
Chillingworth & Sons, W.	London	(Wines)	265
Clark & Co., Edgar	London	(Furniture)	266
Collard & Collard	London	(Pianos)	255
Colonial Bank of New Zealand		(Bank)	284
Corser & Co.	Maryboro'	(Merchants)	304
Colonies & India	London	(Newspaper)	283
Davies, Brothers & Co.	Wolverhampton	(Iron Works)	278
De Caro, A.	Naples	(Coral, &c.)	286
Dinneford & Co.	London	(Magnesia)	259
Dixson & Sons	Sydney	(Tobacco)	296
Duminy & Co.	London	(Champagne)	Face Title
Eastern Telegraph Company (with Map)		(Telegraph)	280
Edwards & Chapman	Brisbane	(Draperies)	305
European Mail	London	(Newspaper)	282
Forsyth & Co., J.	Brisbane	(Draperies)	303
Foster & Kelk	Brisbane	(Ironmongery)	299
Grand Hotel	Naples	(Hotel)	287
Hotel du Louvre	Port Said	(Hotel)	290
Hotel Grande Bretagne	Naples	(Hotel)	288
Hotel Khedivial	Alexandria	(Hotel)	291
Hotel Royal	Naples	(Hotel)	288
Isotta, Brothers	Italy	(Hotels)	294
Lamplough's Pyretic Saline	London	(Pyretic Saline)	295
Lang & Co., J.	Brisbane	(Decorators)	297

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			PAGE
Liebig's Extract of Meat	London	(*Extract of Meat*)	308
Lincoln & Bennett	London	(*Hats*)	262
London & South Western Railway Company		(*Railway*)	276
Macbrair, Osborn & Co.	Sydney	(*Hardware*)	294
Mackilligin & Co., R. M.	London	(*Wines*)	274
Maclure & Macdonald	London	(*Lithographers*)	Inside Cover
Mercantile Bank of Sydney		(*Bank*)	293
Metzler & Co.	London	(*Organs*)	309
Moore & Hunton	London	(*Furniture*)	306—7
Morehead & Co., B. D.	Brisbane	(*Merchants*)	297
Morse's Hotel	Brisbane	(*Hotel*)	303
Mount Pleasant Hotel	Plymouth	(*Hotel*)	281
Neilson, R. D.	Brisbane	(*Merchant*)	300
New Zealand Government			260
Palace Family Hotel	Brisbane	(*Hotel*)	300
Peters & Co., G. D.	London	(*Furniture*)	273
Port Said & Suez Coal Company	Port Said	(*Coal Company*)	292
Queensland Government			267
Queensland Steam Shipping Company	Queensland	(*Shipping Company*)	298
Reynolds's Gout Specific	London	(*Gout Medicine*)	256
Ross, Munro, & Co.	Port Said	(*Ships' Stores*)	289
Royal Hotel	Plymouth	(*Hotel*)	283
Rylands & Sons, Limited	London	(*Draperies*)	279
Savory & Moore	London	(*Chemists*)	277
Shepheard's Hotel	Cairo	(*Hotel*)	291
Smee, W. & A.	London	(*Furniture*)	272
South Eastern Railway Company		(*Railway*)	275
Thompson & Boult	London	(*Patent Agents*)	252
Tuttle & Co.	Sydney	(*Photographers*)	295
Union Bank of Australia		(*Bank*)	285
United Insurance Company	Sydney	(*Insurance*)	293
Vaughan-Jones, E.	London	(*Whiskey*)	266
Westminster Palace Hotel	London	(*Hotel*)	263
Walsh & Brierley	London	(*Umbrellas, Braces, &c.*)	270

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Eastern Life, by Harriet Martineau. 1875.

ITALY.

Murray's Handbooks—comprising North Italy, Central Italy, Rome and its Environs, South Italy, the Italian Schools of Painting. 5 Vols.
Bædecker's Handbook. 3 Vols.
Ruskin's Stones of Venice.
Grimm's Life of Michael Angelo.
Hare's Walks in Rome. 2 Vols. 1883.
Hare's Cities of Italy. 2 Vols. 1883.
Romola, by George Eliot.
Sismondi's Italian Republics.
Whiteside's Italy in the Nineteenth Century. 1860.
Symonds's History of the Renaissance in Italy. 1881.
Twining's Symbols and Emblems of Early Christian Art, 1885.

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PREFACE TO THE SECOND EDITION.

It was a theory of ancient geographers that continents balanced each other. The search for America was undertaken with this idea; and George Canning alluded to it in a well-known speech, in which he summoned "a new world to redress the balance of the old." But neither he nor those who went before him could have anticipated that within half a century from his day the remote island of New Holland, as they called it, the antipodes, the region which lay as it were beneath their feet, should afford a home to a colony which already numbers three million inhabitants, almost all of them of British birth or descent: nor could they have expected that a time should come, and come so soon, when there would be few among us without a relative or at least a friend dwelling in what was then supposed to be a frightful wilderness, inhabited by the lowest race of savages that had so far been discovered. An idea of what Australia now is can best be attained by a reference to comparative statistics. The revenue annually raised by the Australian colonies alone already equals that of Sweden, Norway, Portugal, Switzerland, Denmark, and Greece, put together. A hundred millions sterling is annually paid for imports, and exports to a like amount are sent to Europe. The railways of Australia have already cost more than forty millions of money. Two thousand tons of gold have been discovered, the value of which cannot be less than three hundred millions. The amount of wool exported to England is twenty-eight times as much as all that we receive from the continent of Europe. Such figures as these demonstrate at once the progress made by Australia in the past few years.

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although it was so far back as January, 1788, that the first English settlers landed at Botany Bay, it was not until the discovery of gold in 1851 that any large number of emigrants were attracted to these colonies.

The changed circumstances of Australia have naturally taxed to the utmost the means of communication with the mother country. The raw material must come home for manufacture. The workshops of England are employed on the productions of her colonies. Besides merchandise, there are passengers to be carried. The demand for labour increases, the call for more settlers becomes louder, thousands of wealthy colonists desire to visit the cradle of their race, the necessity for frequent interchanges of communication is more and more urgent day by day. Twelve thousand miles of ocean have to be traversed. In former ages such a gulf fixed between England and Australia would have rendered commercial intercourse impossible; but enterprise with science as its servant has been able to abridge even this enormous distance. We can reach Australia in a third of the time which even thirty years ago was consumed on the voyage. Ocean steamers are rapidly superseding the clippers, so famous in their day, and instead of the ninety days' "imprisonment with a chance of being drowned," which used to be the lot of the Australian traveller, he has now a month in a floating hotel, which carries him through some of the most beautiful and interesting scenery in the world, and so alters the aspect of a voyage that seldom indeed does he fail to be sorry when it is over.

The special object of the Managers of the Orient Line is to increase the facilities for this interchange of communication, and to promote the speed, safety, and, it may be added, pleasure of the passage. They are under contract with the governments of New South Wales and South Australia to convey the mails fortnightly between England and Australia by way of Suez, and also run occasional steamers by the Cape of Good Hope. These arrangements have been completed while this volume was passing through

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the press. Since the Line was opened in June, 1877, upwards of one hundred thousand passengers have been carried to and fro with an all but total immunity from accident to life or limb. It cannot be doubted that the facilities afforded have encouraged and will continue to encourage the growth of a variety of new industries in Australia, and to bring to England many things which in the old days must have perished by the way. The Managers commissioned the composition of the first edition of this work with the desire of placing before the public particulars of the route of the Orient Line, and of pointing out, as in a Guide Book, such information as to season, voyage, and destination as may prove most useful to the intending passenger.

In this *second edition* I have found it expedient or necessary to make considerable alterations, some passages being condensed and others added, but the volume still contains the chapters for travellers who wish to break the journey. The maps, plans, and views will be found useful, as well as the selected advertisements. A reference to the table of contents will show how varied is the character of the information afforded. I have to thank an eminent medical authority for the Notes on Health at Sea. The contributions of Mr. George Baden Powell, C.M.G., are chiefly to be found in the opening chapters and in the descriptions of the two great routes, namely, that by Suez and that by the Cape. He has also a large share in the compilation of "Natural History at Sea," a chapter in which I have also had the kind assistance of the Rev. C. H. Middleton-Wake, M.A., F.L.S., who is wholly responsible for a new and delightful feature, the pages devoted to "Under the Sea." Mr. Norman Lockyer, F.R.S., has placed me under great obligations by his notes on the longitude and the methods of reckoning time, which, in spite of the abstruse character of the subject, he has treated with a clearness which will bring it within the reach of every reader. The Italian chapter and that on European Cities, both by Mrs. Henry Fawcett, are unaltered, and will be found useful as well as pleasant. Commander Hull, R.N., has compiled

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the star maps, described the processes of seamanship and navigation, and contributed a chapter on "Weather at Sea." Mr. H. E. Watts has revised and enlarged his account of the Australian Colonies, including Tasmania, New Zealand, and the most recent additions to English territory in the South Seas. I have to apologise to some of these contributors for a few changes which I have had to make in order to bring the book up to date, In consequence of such alterations I have thought it best to remove the initials which, in the first edition, marked certain chapters, as I wish to be personally responsible for every page.

W. J. LOFTIE.

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ORIENT LINE

OF

ROYAL MAIL STEAMSHIPS.

Managers: { F. GREEN & CO. / ANDERSON, ANDERSON, & CO. } Fenchurch Avenue, London, E.C.

For Freight or Passage apply to the latter Firm, or to any of the Agents. *See Page* xxiii.

INFORMATION FOR PASSENGERS.

The following information is published as correct at the time of the issue of this Guide, but is not to be assumed to be correct at any future date, unless confirmed by the Managers or any of the Agents of the Line, to whom application should be made for the full particulars of Fares and Regulations before Booking.

The fares between England and the Ports of call of the Line in Australia each way range from about 16 guineas upwards, according to the accommodation required.

Through Tickets are issued to and from all Ports in Australia, Tasmania, and New Zealand; also Single and Tourist Tickets between London and Naples, Port Said, and Suez.

RETURN TICKETS are from time to time issued at reduced rates.

THROUGH TICKETS FOR COLONIAL PORTS, AT WHICH THE STEAMERS OF THE LINE DO NOT CALL.—Passengers booked through for ports other than those at which the Steamers of the Line call, shall proceed from one of these ports as may be arranged, and may remain on board the Orient Steamer without extra charge until the departure of the first branch Steamer, should the Orient Steamer remain in port so long; but the Orient Line will not be answerable for any hotel expenses or railway fares, &c., if incurred. Passengers proceeding by the first Intercolonial Steamer for their destination can have their luggage transferred free of charge, at owner's risk, but no warehousing charges will be paid.

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BOOKING.—A deposit of half the passage money must be paid at the time of securing a berth, and the balance at least three days before embarkation. The deposit will be forfeited in the event of the Passenger not joining the ship.

The full name, age, occupation, and destination of the Passenger should be forwarded when application is made for a ticket.

EMBARKATION.—OUTWARD VOYAGE.—GRAVESEND.—Passengers joining at Gravesend are conveyed from London to the Ship free of charge, by Special Train, and Steam Tender from Tilbury Pier, leaving Fenchurch Street Station, of the London, Tilbury, and Southend Railway, on the day of embarkation at Gravesend.

PLYMOUTH.—Passengers are embarked at this port by Steam Tender from Millbay Pier. Vouchers for travelling at reduced fares from Paddington or Waterloo Stations to Plymouth are issued by ANDERSON, ANDERSON, & Co., on application. The Agents at Plymouth are Messrs. J. T. WRIGHT & Co., Duke of Cornwall Buildings.

NAPLES.—Passengers by Vessels taking this route can join the Steamer at Naples nine days later than in London. Railway Tickets from London to Naples can be purchased with the Ocean Ticket if desired.

HOMEWARD VOYAGE.—Steam Tenders are provided for the convenience of Passengers on the day of Embarkation at Sydney, Melbourne, and Adelaide.

NAPLES.—Passengers deciding to land here should give notice to the Purser of their intention to do so before leaving Suez.

PLYMOUTH.—A Steam Tender meets each Steamer on arrival, and Railway Tickets to London at reduced rates are issued to Passengers by the Great Western Railway Company, or these can be purchased in Australia of the Orient Line Agents at time of securing passage.

When the number of Passengers landing at Plymouth is sufficiently large, a Special Train will be put on for the convenience of Passengers to London.

LUGGAGE.—First Class Passengers to or from Australia will be allowed 40 cubic feet each adult; Second Class 20 feet; Third Class 15 feet. Freight will be charged for excess. Every package must have the Passenger's name and destination distinctly painted, or otherwise permanently marked on it, with the words "*Wanted on the Voyage*," or "*Not Wanted on the Voyage.*" Boxes for the Cabin should be marked "*Cabin*," and should not exceed 2 feet 8 inches long, 1 foot 6 inches broad, and 1 foot 2 inches high. One Package of this size can be taken in the Cabin by each Adult Passenger. Only the personal baggage of the Passenger will be carried as Luggage, not other property. Merchandise cannot be shipped as Luggage.

The ship will not be responsible for loss, damage, or detention of Luggage under any circumstances whatever. Passengers should therefore look after its shipment here, and landing on arrival.

LETTERS AND TELEGRAMS.

Letters posted in England, to reach Passengers at ports of call, should be addressed to the care of the Orient Line Agents at the respective ports.

It is recommended that an address be written on flap of Envelope, notifying where the Letter may be forwarded if it misses the steamer.

Passengers by payment of 20s., at the time of booking, can have their safe arrival at port of

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debarkation in Australia or New Zealand communicated by telegraph to their friends in England. The full address, both of the Passenger and of the person to whom the arrival is to be announced, must be registered when booking passage. A Ticket will then be given to the Passenger, which, on arrival, he must present to the Agent of Reuter's Telegram Co., in order that the earliest information of his arrival may be given to his friends. The Passenger when thus telegraphing should record his Australian address in the books of Reuter's Telegram Company there, and the charge for telegraphing address in any reply which his friends here may send him will thus be saved.

Telegrams from Naples to England cost only 6*d.* per word, and from Egypt 1*s.* 10*d.* per word, including in both cases the address.

CAUTION TO PASSENGERS.—GOODS OF A DANGEROUS NATURE.

Persons concerned in sending or bringing on board the Steamers any goods of a dangerous or damaging nature incur the penalties imposed by statute, besides being liable for all damages sustained.

Passengers are specially cautioned against bringing Matches or other dangerous articles in their baggage.

REGULATIONS.

The object of all regulations adopted on board the Steamers is to ensure the general safety and comfort, and Passengers are requested to conform to them, and to support the authority of the Captain in carrying them out.

EXPRESS FOR PARCELS AND SMALL PACKAGES.

Conditions and rates can be obtained from the Head Office, or from any of the Agencies.

Contents and Value, also name of Shipper and Consignee, must be declared at the time of Booking. A wrong description of contents or false declaration of value shall release the Owners of the Steamers from all responsibility in case of loss, seizure, or detention, and the Goods shall be charged double freight, which freight shall be paid previous to delivery. [*See Caution at foot.*]

The Owners reserve to themselves the right of charging by weight, measurement, or value, and will not be accountable for any damage arising through insufficiency of address or packing.

Jewellery, Watches, and other valuables must be sealed over tape in counter-sunk holes.

All charges must be paid at time of shipment, for which Parcel Tickets will be given specifying particulars of risk. Parcels are to be applied for to the Owners' Agents at the Port of Delivery, and no Package will be delivered to the Consignee without the production of the Parcel Receipt.

All Parcels and small Packages must be distinctly addressed and marked "per Orient Express," and are carried subject to the terms and conditions set forth in the form of Bills of Lading used by this Line.

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N.B.—Shippers are specially cautioned against forwarding by the Orient Express or Late Express any letters or other matter which ought by Law to go through H.M. Post Office only.

Caution to Shippers—Goods of a Dangerous Nature.—Notice is hereby given, that the Owners of the Steamers will not receive on board their vessels any Goods of a dangerous or damaging nature. Shippers will be required to sign a Declaration for Parcels, Merchandise, Specie, &c. (form of which can be obtained of the agents), that the packages they may offer for shipment do not contain liquids, oils, spirits, or any articles of a dangerous or damaging character; and the attention of shippers and passengers is specially directed to the following clauses in the "Merchant Shipping Act, 1873," relative to articles of this description:—

"If any person sends or attempts to send by, or not being the master or owner of the "vessel carries or attempts to carry in any vessel, British or foreign, any dangerous goods: "(that is to say) aquafortis, vitriol, naphtha, benzine, gunpowder, lucifer matches, nitro-glycerine, "petroleum, or any other goods of a dangerous nature, without distinctly marking their nature "on the outside of the package containing the same, and giving written notice of the nature of "such goods, and the name and address of the sender or carrier thereof to the master or owner "of the vessel at or before the time of sending the same to be shipped or taking the same on "board the vessel, he shall for every such offence incur a penalty not exceeding £100.

"If any person knowingly sends or attempts to send by, or carries or attempts to carry in "any vessel, British or foreign, any dangerous goods or goods of a dangerous nature, under a "false description, or falsely describes the sender or carrier thereof, he shall incur a penalty not "exceeding £500.

"The master or owner of any vessel, British or foreign, may refuse to take on board any "package or parcel which he suspects to contain goods of a dangerous nature, and may require "it to be opened to ascertain the fact."

ORIENT

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ADELAIDE
ADEN .
ALEXANDI
BORDEAU:
BRINDISI
BRISBANE
CAIRO
CAPE TOW
COLOMBO
DIEGO GA
FLORENCI
GALLE
GENOA
GIBRALTA
HOBART
KING GEO
LEGHORN
LISBON
MADEIRA
MALTA
MAURITIU
MELBOUR
MESSINA
NAPLES
NEW ZEAI

PALERMO
PARIS
PLYMOUT
PORT SAI
ROCKHAM
ROME .
ST. HELE
ST. VINCI
SUEZ .
SYDNEY
TENERIFI
TRIESTE
VENICE

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Office only.

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ORIENT LINE HEAD OFFICE IN LONDON:

Fenchurch Avenue, E.C.

WEST END AGENCY, GRINDLAY AND CO.:

55, *Parliament Street, S.W.*

AGENTS.

ADELAIDE	J. Stilling & Co.
ADEN	Luke Thomas & Co., Limited
ALEXANDRIA	R. J. Moss & Co.
BORDEAUX	H. Davis.
BRINDISI	Fratelli Nevegna.
BRISBANE	B. D. Morehead & Co.
CAIRO	Thos. Cook & Son.
CAPE TOWN	W. Anderson & Co.
COLOMBO	Whittall & Co.
DIEGO GARCIA	James Spurr — Capt. O. Hilkirk
FLORENCE	Wm. Miller.
GALLE	Delmége, Reid, & Co.
GENOA	Granet, Brown, & Co.
GIBRALTAR	Smith, Imossi, & Co.
HOBART	Macfarlane Bros. & Co.
KING GEORGE'S SOUND	J. McKail & Co.
LEGHORN	Wm. Miller.
LISBON	E. Pinto Basto & Co.
MADEIRA	Blandy Brothers & Co.
MALTA	O. F. Göllcher.
MAURITIUS	Blyth Bros. & Co.
MELBOURNE	Gibbs, Bright, & Co.
MESSINA	G. Oates & Co.
NAPLES	Holme & Co.
NEW ZEALAND	Union Steamship Co. of New Zealand, Limited, (Head Office, Dunedin), and their Agents throughout the Colony.
PALERMO	Thomas Brothers.
PARIS	H. Laurette & Co.
PLYMOUTH	T. Wright & Co.
PORT SAID	W. Stapledon.
ROCKHAMPTON	Union Mortgage & Agency Co., Limited.
ROME	A. Macbean & Co.
ST. HELENA	Solomon, Moss, Gideon & Co.
ST. VINCENT (C. de Verd Is.)	Cory Bros. & Co., & Millers & Nephew.
SUEZ	W. Stapledon.
SYDNEY	G. S. Yuill, General Manager in Australia.
TENERIFFE	Hamilton & Co.
TRIESTE	Schroder & Co.
VENICE	S. & A. Blumenthal & Co.

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LIST OF

ORIENT LINE STEAM SHIPS.

	Tons.	H.P.
s.s. AUSTRAL	5,588	7,000
s.s. CHIMBORAZO	3,847	3,000
s.s. CUZCO	3,845	3,000
s.s. GARONNE	3,876	3,000
s.s. IBERIA	4,702	4,200
s.s. JOHN ELDER	4,182	3,000
s.s. LIGURIA	4,688	4,200
s.s. LUSITANIA	3,825	3,000
s.s. ORIENT	5,386	6 000
s.s. POTOSI	4,267	3,500
s.s. SORATA	4,059	3,500

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S.

Tons.	H.P.
5,588	7,000
3,847	3,000
3,845	3,000
3,876	3,000
4,702	4,200
4,182	3,000
4,688	4,200
3,825	3,000
5,386	6 000
4,267	3,500
4,059	3,500

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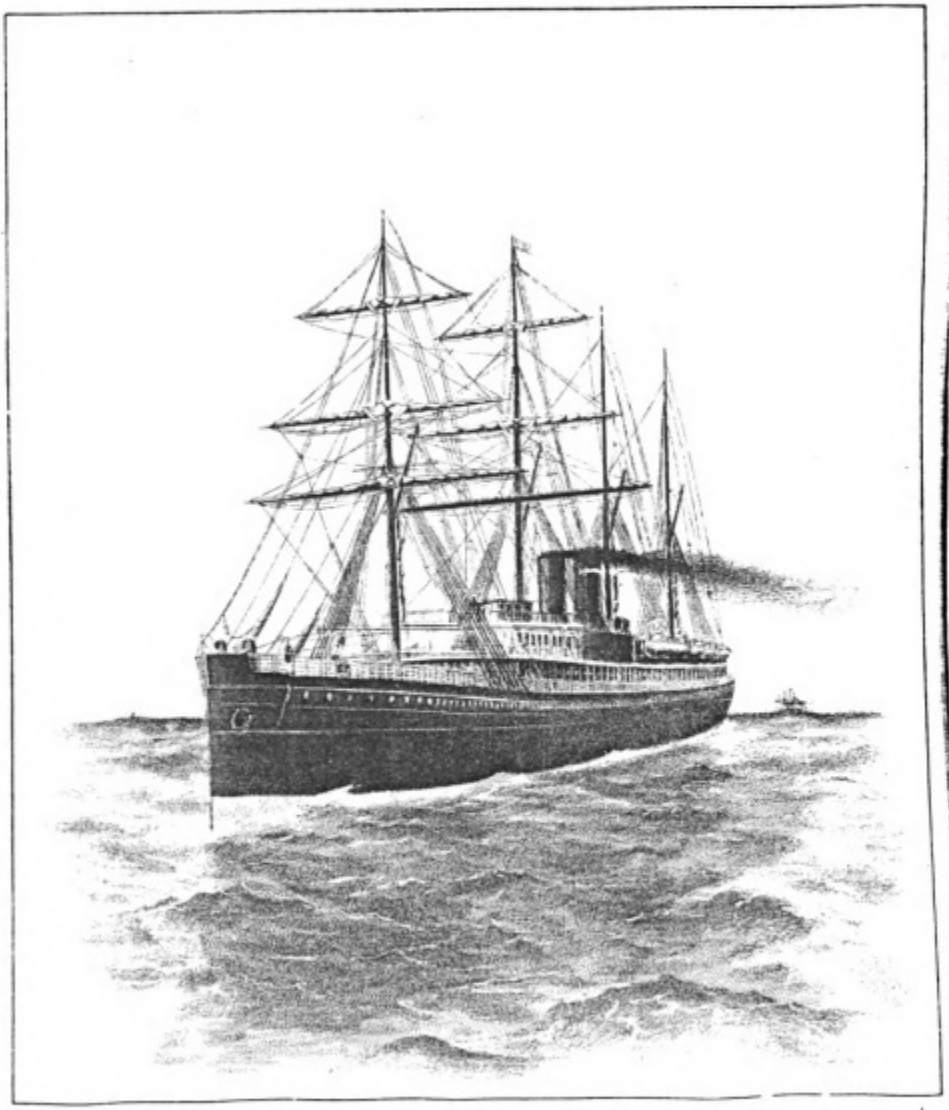

S.S. "AUSTRAL."

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PART I.

CHAPTER I.—Means of Communication.

The voyager of to-day enjoys advantages unthought of before in the world's history. Since the beginning of the present century, the changes that have come over the art of navigation are little less than astounding. It used to be nothing extraordinary for a ship to be four, five, or even six months on the passage to or from Australia. When the gold-digging mania broke out, in the year before the Great Exhibition in Hyde Park, which so many of us can perfectly well remember, an emigrant thought himself fortunate if he saw the Heads at Port Phillip in ninety days. Some fast sailing ships did the passage in a shorter time, and it was long prophesied that steamers could never be available for so protracted a voyage. But now all the circumstances of the case are altered. The Orient and other lines run steamers regularly to Australia, and since the Suez Canal was opened, it is no unusual thing for travellers proceeding overland to Egypt to traverse the whole twelve thousand miles, half the circumference of the earth, in thirty days.

The speed of the voyage is hardly more surprising than the amount of the traffic. Our trade with Australia is larger than that with any one nation of the continent of Europe. We send to her more manufactured goods than we send to France. We receive from her more produce than we receive from Germany. Moreover, this trade increases almost daily, and is constantly opening fresh channels. A little further on will be found an account of the wonderful machinery which makes the frozen meat trade so important an item in our list of imports. Such a contrivance, and such a cargo, was unthought of even a few years ago. The passenger traffic, too, has enormously developed, and people now make as light of going to the Antipodes, as, fifty years ago, they did of going to Ireland.

Early in 1877 the London firm of Messrs. Anderson, Anderson, & Co., perceiving that the time was come for founding a first-class steam line to

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Australia direct, commenced running with chartered steamers, and on the 7th March, 1878, the *Garonne* left London flying the new flag of the ORIENT STEAM NAVIGATION CO., LIMITED, which had been formed by the united efforts of the firm above named, and of Messrs. GREEN & CO., also of London, who had joined them for the purpose. At first only a monthly service was intended, but very soon it became plain that the traffic demanded fortnightly sailings. Four steamers, the *Chimborazo*, the *Lusitania*, the *Cusco*, and the *Garonne*, already belonged to the company by purchase, and the *Orient* was built by the company specially for the trade. When in the beginning of 1880, the fortnightly service was determined upon, the Company were fortunate in obtaining the co-operation of the Pacific Steam Navigation Company, whose fine fleet of steamers was in full working order and admirably adapted for the Australian voyage. Troubles at that time breaking out in South America, left the Pacific Company at liberty to devote to the Orient Line the services of a portion of their fleet, and the Orient Company's fleet has been still further reinforced by the launch of the *Austral*, a ship which closely resembles the *Orient*, but is of even greater size and power. Like the *Orient*, too, the *Austral* is built in accordance with the requirements of the Admiralty for ships which in case of war may be turned into cruisers. The *Orient* was selected by government to take out some of the principal officers of the Army despatched to Egypt in 1882, among them being H.R.H. the Duke of Connaught, and his *suite*.

People who never go to sea are unaware of the advantages that great steamer lines afford. But the misconception and prejudice that has prevailed among the inexperienced in regard to long sea-voyages is now being rapidly dissipated. Those who have made such a voyage look back to days spent at sea as some of the merriest they have ever enjoyed. Such experiences are leavening the whole lump of public opinion. The one central point is, that the life on the ship is, in many senses, the very opposite of life ashore. This, which does such an immensity of good to all who do go, must be appreciated betimes by all who would go. What auctioneers might term a "miscellaneous lot" of human beings are associated within a small space for days or weeks, holding only occasional communication with others of their species. In this close companionship they traverse portions of the earth in nowise resembling the land they are most accustomed to, and they visit a succession of places and people differing wholly one from another. There

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is thus a radical but altogether enjoyable change in their manner of existence. To the untravelled the prospect of a sea-voyage is clouded over with melancholy forebodings, based on the traditions of the evil past, and on wild imaginings from a limited experience of "Channel crossings" and sea-sickness, darkly coloured by the more conscientious qualms of five weeks of valuable time wasted. But these forebodings are only possible under the influence of culpable ignorance. For all classes—not only for those who must, but for those who choose—a sea-voyage opens a vista of entertainment and attainment such as no other mode of travelling offers. And to be ignorant of these is to be ignorant of a mode of travelling which is happily now rapidly approaching perfection.

Voyagers, whether consciously or unconsciously, will discover much to occupy their attention and feed their best powers of observation both inside and outside the ship herself. Inquirers will never find more favourable opportunities for their "most proper study" than the long sea voyage which throws them into intimacy with that thoroughly representative human collection to be found in every big Liner. An Orient steamer will provide a a perfect microcosm of human society. Different grades of society will associate together and develop hitherto unsuspected sympathies; first, second, and third classes forming one great family. And the community from the highest to the lowliest has its executive in the captain and the crew. As the voyage proceeds, not only will each individual be probably compelled to congruous and incongruous intimacies, unknown in the hard and fast demarcations of life ashore; but there will be revealed in the clear minuteness of this lesser world the same human ambition and failings and powers that it is so difficult to separate from the confused complexity of their multitudinous surroundings in the great world. The great ship herself, all her belongings, and all her machinery, present a problem which may be most profitably analysed and solved during the voyage; and he who lets slip the occasion lets slip a valuable opportunity.

Outside the ship nature herself invites study and admiration. For the artist, the naturalist, the meteorologist, she offers, out of sight of land, phenomena and objects to which the stay-on-shore observer is altogether a stranger. Of all this we shall speak in sufficient detail elsewhere. And in other chapters, too, we shall tell of the many places of great and useful interest.

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touched at or stayed at along the Orient routes. For there is not only this New World, that in human as in natural surroundings, is to be enjoyed out of sight of land, but the great steamer is perpetually entering new ports and new climes; conducting the traveller in untroubled ease through a perfect panorama of scenes and sights and experiences altogether impossible in land travel of equal cost and duration. A word may be added in regard to those who travel for recreation pure and simple, and their number increases daily as the many advantages the sea voyage has over similar expenditure on shore travel come to be known. If those on pleasure bent look back to a tour on the Continent, or in Scotland, they remember only a chronic state of packing and of unpacking, of catching trains and missing trains, of a general rush and skurry. And if there has been a hasty glance at objects of interest or peculiarly striking scenery, it has been guiltily snatched from the more urgent and solemn duties of looking out routes, choosing hotels, paying away money in quantities—small or great, but never ending—and puzzling for hours over calculations in pounds, marks, francs, and lire. Had the train whisked the worried tourist to the deck of an Orient steamer at Tilbury, instead of to the Boulogne packet, everything would have been different. With the signing of the cheque for the passage all thought of money ceases. Board, lodging, and journey for so many weeks or months are once for all arranged and paid for, saving further anxiety or trouble. The tourist has nothing in hand but to enjoy himself, and make the most of his surroundings. There is no thought for the morrow, or even for the day, as to destination, food, or lodging—"sufficient unto the day is the evil thereof"—and the morrow, so far as the passenger is concerned, is sufficient thought for itself. This is of unique and invaluable advantage to those who seek at sea a sure respite from overwork, or recovery from sickness. Such a class of passengers is destined largely to increase. The rush and worry of modern life has promoted the creation of luxurious floating hotels on the sea. And in so doing, it has in a great measure supplied an antidote to new ills to which the flesh becomes heir under its influence. A voyage to Australia and back completely resting and refreshing the overwrought brain, will come to be a recognised specific in cases where this modern life hurries and worries a man out of all condition. The over-taxed lawyer, statesman, or business man, by taking passage finds his luxurious

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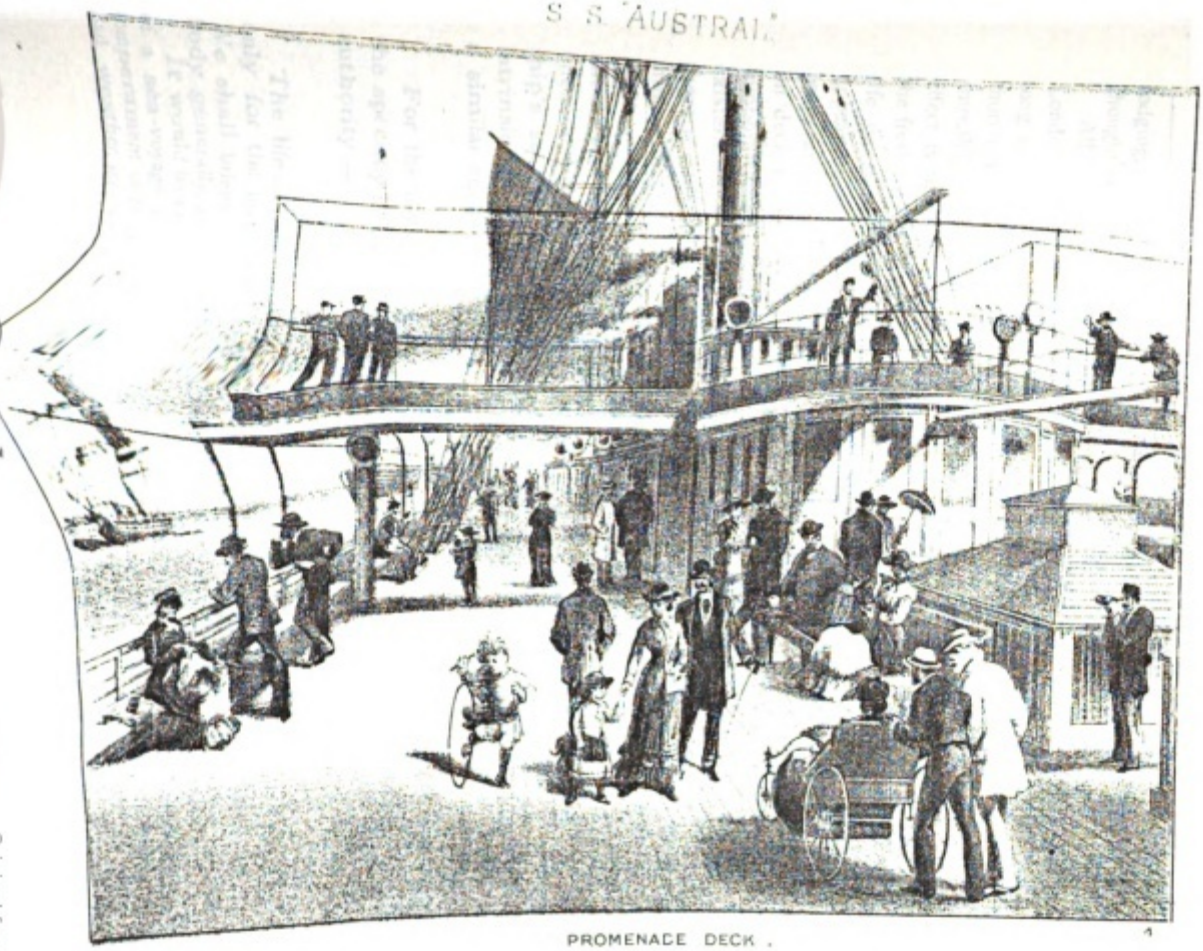
S. S. "AUSTRAL."



PROMENADE DECK.

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lodging, ample board, and personal safety ensured to him without further thought on his part, day by day, for the four months.

All these advantages apply with yet greater purpose to the actual invalid. London doctors have for some time recognised the beneficial effects of a long sea-voyage. They appreciate and understand the invaluable effects of thorough change of life. Everything proceeds regularly, leisurely, and smoothly; there is positively nothing to be troubled about. The whole effect is thus powerfully soothing. It is virtually impossible to keep out of the fresh air; this is perhaps the leading difference between life at sea and life on shore. Naturally and inevitably all, except the incorrigibly lazy, appear on deck before breakfast; no sooner is that meal over, than they reappear, and the livelong day until bedtime, every one sits and works or walks on deck in the pure sea-breeze, diving below at frequent intervals to staunch temporarily an insatiable appetite. Above all, drains are positively non-existent. When we remember that the sole alternative for the invalid on shore is either to become the centre of a troubled and upset household, or the inmate of one of those "paying wards" that are coming into vogue in the leading hospitals—and when we remember that in either case the mental effect, the most vital of all effects, is the reverse of exhilarating, we shall at once acknowledge that at sea the invalid, under the charge of the able ship's surgeon, can enjoy surroundings of far greater promise, and far more intrinsic value than those that can be obtained on shore at anything like a similar outlay.

For the benefit both of medical men and of invalids we embody here the specially prepared scientific opinion on the subject by a competent medical authority:—

The life on board ship has an interest, from the medical point of view, not only for the invalid, but for the passenger who enjoys average good health. We shall briefly consider, in the first place, the effects of a sea-voyage on the body generally, and secondly the particular advantages of it to invalids.

It would be a mistake to suppose that the physiological or medicinal effects of a sea-voyage are always the same. Much depends on the constitution or temperament of the individual, much on the route, and much on the ship. Bad weather, sea-sickness, worse or monotonous food, and deficient ventilation

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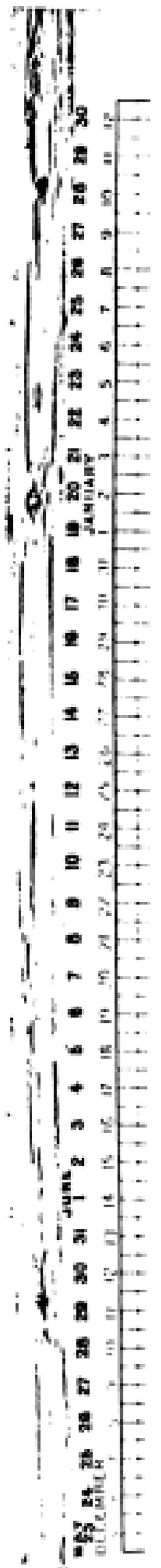
should enter into our calculations, although the two last may be obviated. But there are certain general effects of the ocean climate and the life on board ship that come into operation more or less in every long voyage. They are the proper effects of the sea-air, and of the sea-exercise. The air at sea is different in several respects from that on land. It contains more ozone and less carbonic acid, it is practically free from dust or particles of organic matter, and it has among its proper constituents, a certain amount of sea-salts which are distilled into the atmosphere by the constant evaporation from the surface of the water. The same ceaseless evaporation makes it more uniformly moist, and on the whole less clear than the land air; but in the trade winds it has a remarkable transparency, which makes the sky seem higher, and the stars more remote and lustrous, and sometimes gives rise to the most brilliant colours and delicate tints. The log of the *S.S. Lusitania*, outward bound by the Cape has an entry that the Peak of Teneriffe was sighted 130 miles distant. The steadiness of the thermometer and barometer are not the least striking and valuable distinctions of the oceanic atmosphere. An examination of the log-books of various steamships of the Orient Line on the voyage outwards and homewards by the Canal, goes to show that the average range of the temperature within the twenty-four hours was remarkably little, and that, generally speaking, the transitions were of the most gradual and imperceptible kind. The day and night fluctuations are greatest near to the land, and least in the Indian Ocean, where the diurnal range is often as little as three or four degrees. It is this steadiness of the day and night temperature that takes away the risk of chill; but it should not be forgotten that there may be a considerable fall of dew in sub-tropical latitudes, and a sharp piercing breeze setting in about half-an-hour before sunset. The steadiness of the barometer is even more remarkable; the readings on two outward voyages by the Cape show that there was hardly a quarter of an inch of fluctuation for four weeks after passing Madeira, the almost uniform level of 30 to 30·2 inches continuing until it was broken in the South Atlantic, by a gradual ascent followed by a rapid fall and stormy weather.

The combined effects of sea-air and sea-exercise—the kind of exercise that comes without effort to every one on board ship, should always be supplemented by exercise of the deliberate kind, such as pacing the deck, dumb-bells, or the like—are to stimulate powerfully the physiological renewal of the tissues, or that process of waste and repair which goes on incessantly, and is always most healthy when it is least sluggish. This heightened activity of the nutritive functions is shown in an increased appetite, and in a decided gain in the body-weight. There are exceptional cases in which persons who are good sleepers when at home, become peculiarly wakeful when at sea; but for the most part the sleep is sound and refreshing. Along with this state of rude health, there will be a certain tendency to inactivity of the mind, and perhaps even to *ennui*. Those who take a voyage for the sake of change should see to it that they are not passing from one state of boredom into another. Many passengers have resources within themselves, and those who



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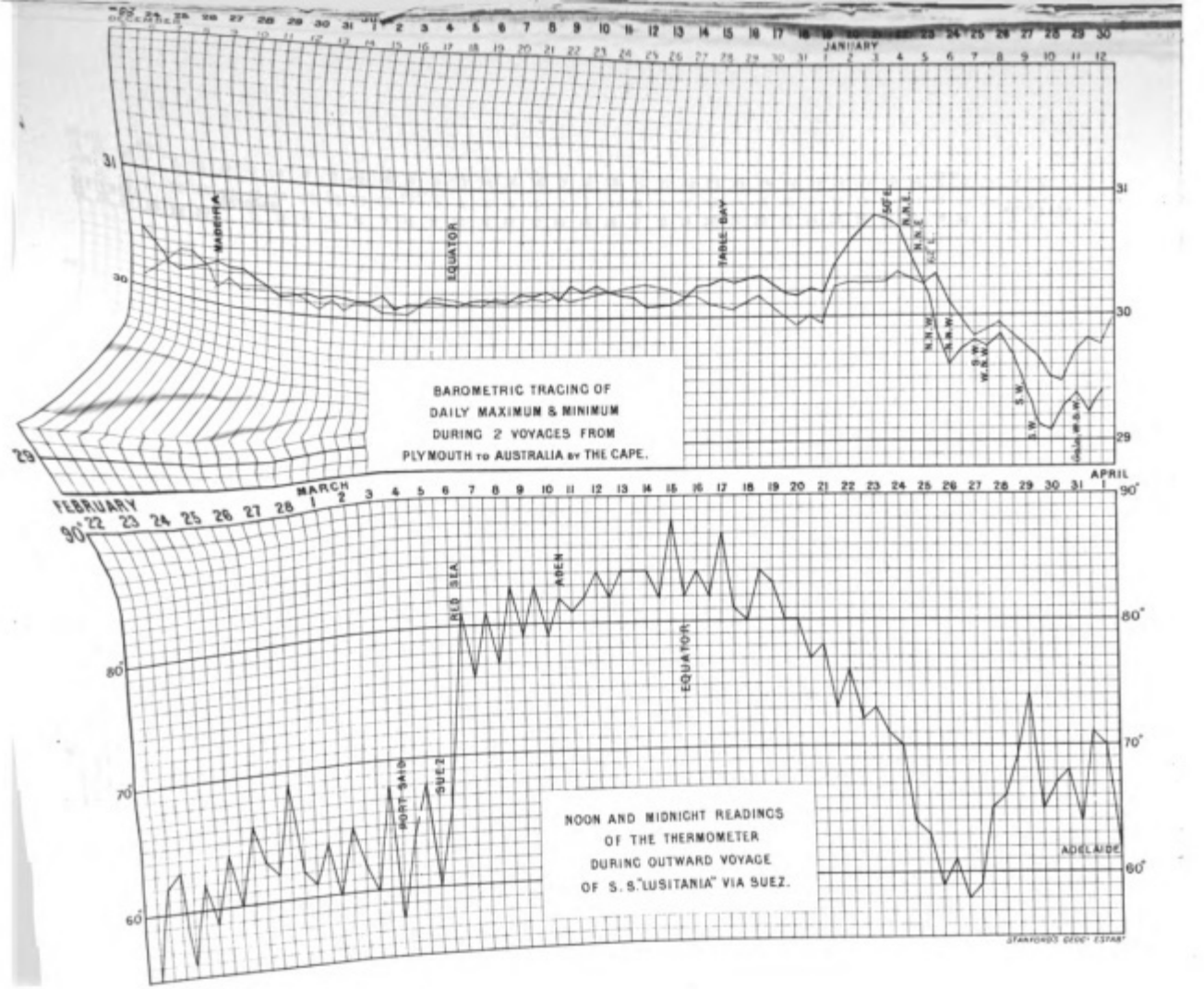

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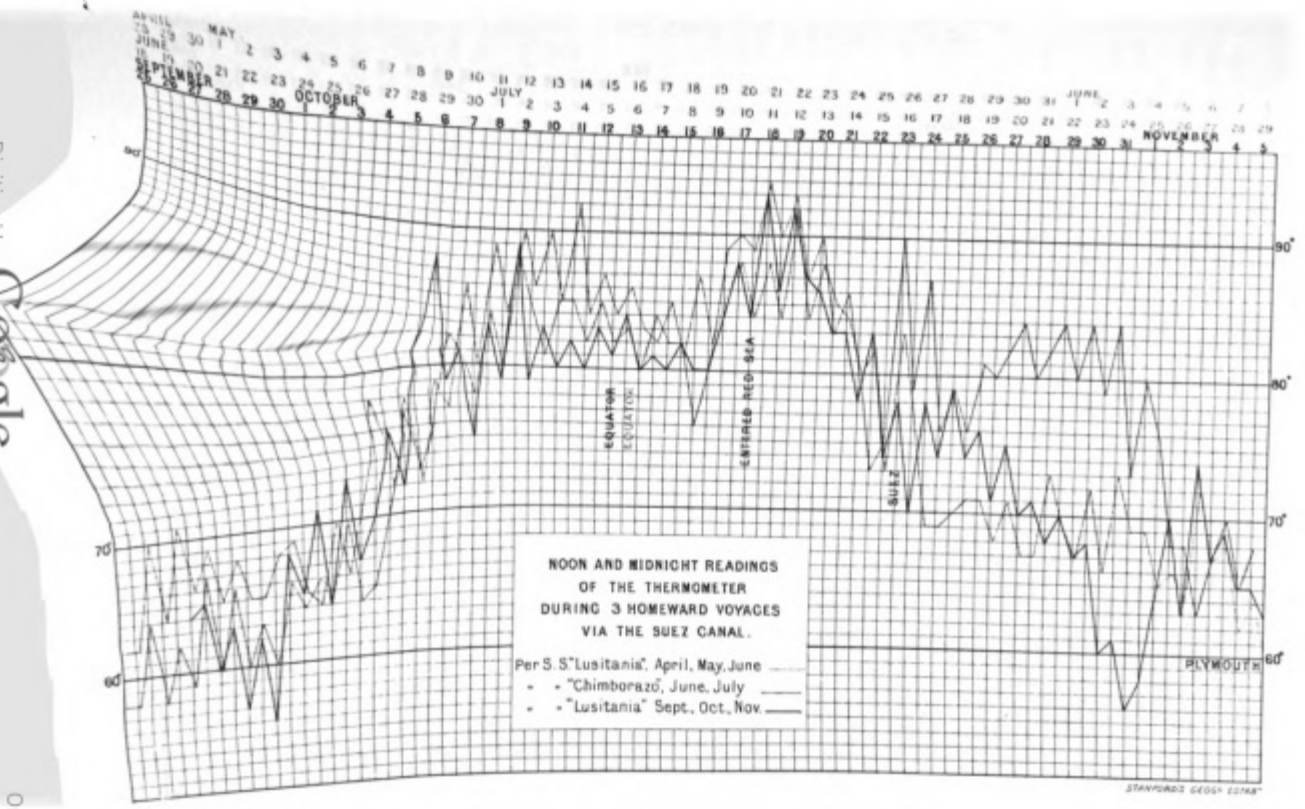

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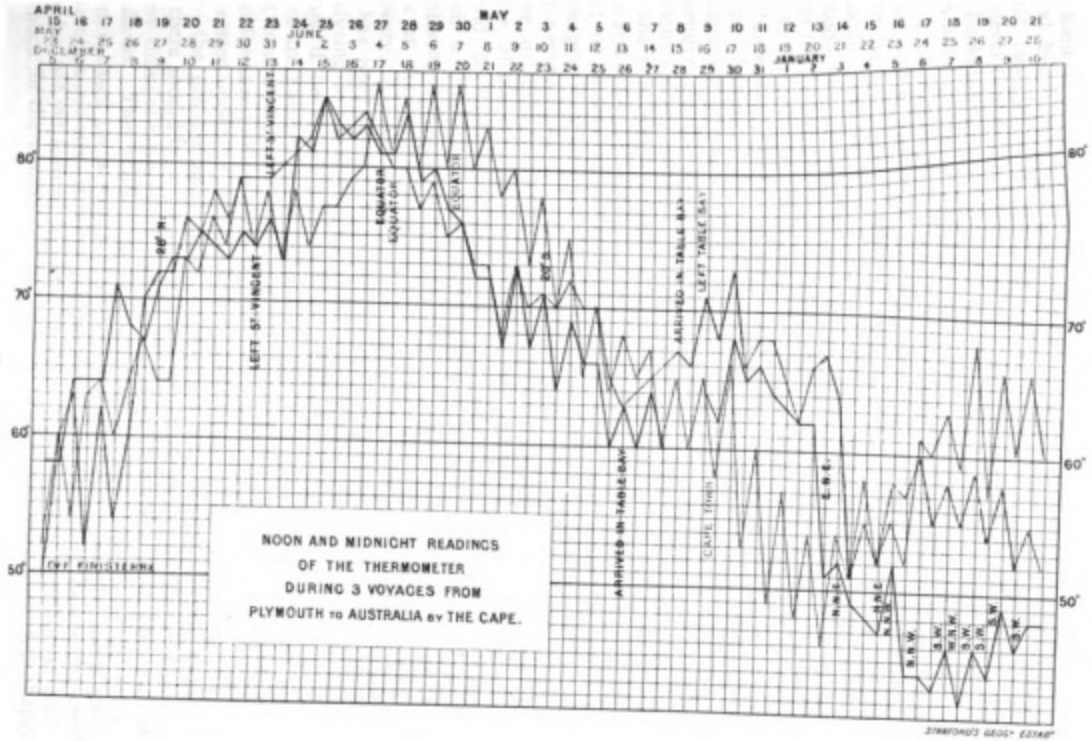

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have some knowledge of, or interest in the working of the ship, or a taste for natural history or astronomy, will find opportunities of beguiling the time. A not too cumbrous microscope will prove useful. There are some people who never tire of watching the minute creatures which may be filtered off from any bucketful of salt-water.

A more general kind of interest which should be diligently and systematically encouraged by all on board, will be found in various kinds of entertainments, and in preparing for the same. Even the best tempered people are apt to be bored by one another on a long voyage. Good bodily health will probably come of itself, but those who desire to enjoy an even mind will have to study the art of it. Charles Kingsley's advice, based on an experience of his fellow-passengers during the voyage to the West Indies and back, was :— "Be to their faults a little blind." Another good working rule for a sea-voyage is—"Love me little, love me long."

The change to the life on board ship produces certain effects that require medicinal treatment. Most people suffer from constipation, against which the passenger should provide himself with some convenient preparation of an aperient saline medicine. Indigestion is an exceedingly common complaint at sea, and it is best counteracted by eating less and pacing the deck more. Toothache and relaxed throat are more occasional troubles. The standing discouragement of a sea-voyage at its commencement is of course sea-sickness. The passenger may at once dismiss the idea of finding a remedy in drugs. The best preventive is a purge taken the night before embarking, followed by a saline draught in the morning, together with extreme moderation in (or still better, abstinence from) tobacco and drink, more particularly beer. The body should be kept warm, especially the hands and feet, and the loins, around which a broad sash may be wrapped with advantage. If sea-sickness is imminent, it is well to encourage it. A firm resolution to get into the air on deck at the earliest possible moment, will often prove the first step towards recovery. Courage to sit down at table, even before the nausea has quite passed off, has been rewarded in like manner. Sea-sickness is depressing and even paralysing to the will and purpose, and the sick person will get over it all the sooner if he is taken in hand and ordered about by a friendly neighbour. There are, however, some persons who cannot brave it out, and who require the most considerate attention. A piece of ice (which should be procurable without difficulty at any time) helps to allay the retching if sucked slowly. Food should be pressed upon the more helpless, notwithstanding their loathing of it ; arrow-root—the genuine article and not potato-starch—is a good thing to begin with, and there should be some simple means of getting boiling water to prepare it with at any time ; afterwards dry toast and beef tea flavoured with cayenne pepper may be offered. The well-known rule to lie on the back quite still, with the head down, is based on a sound principle. Whatever may be the more particular cause of sea-sickness, it is in a general way due to the kind of movement which the body has not yet learned to adapt itself to. The rolling and pitching of a ship are too much for the equilibrium of some of the internal mechanisms, probably the

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nervous system in the first instance. Those incessant shocks and jars cease after a time to affect anything but the muscular system, and when a passenger has got his "sea legs" they may not affect even that. Whoever can adapt himself most closely to the mobile element on which he has embarked will be least liable to sea-sickness. To lie quite still in one's berth is one way; when on deck it is an invaluable steadier to keep the eye fixed on a distant object, or on the horizon if there be nothing in sight.

The ancient writers considered that sea-sickness was highly beneficial to the health, and there can be no doubt that most persons are none the worse for it, notwithstanding the extreme discomfort and suffering that it causes. But, in some cases, it leaves a good deal of irritability of the stomach behind it, for which cayenne pepper, or other hot condiment may be taken at meals, or a dose of bismuth.

The voyage to Australia and back, if made under favourable circumstances, is calculated to do good in several forms of ill-health. Consumptives are so often sent to Australia, that it is necessary rather to put in a word of caution on that point, than to add to the chorus of recommendation. No one who has symptoms of that malady should embark without the advice of a physician, and of a physician who knows, not only the state of his patient's lungs, but something of the route, and of the life on board ship. Many consumptive patients have been permitted to start on a long ocean voyage, who were unfit to undertake more than a carriage drive on a fine day. There can be nothing more cruel to the unhappy patient, more upsetting to his fellow-passengers, or more injurious to the legitimate interests of shipping companies, than to send off a person in an advanced stage of consumption on the voyage to Australia. The physician's advice may very well be bold and prompt, provided it be discriminating. Whenever the intending passenger is a good deal of an invalid, he should be strongly advised to secure for himself a whole state-room; seclusion to that extent is due not only to himself, but also to his fellow-passengers. The benefits of the Australian voyage in well-chosen pulmonary cases are too well known to occupy space here. The grand rule for such persons is to live on deck as much as the weather will permit. The sea-air is a better restorative to the disordered lungs than any medicated vapour, and it may under most circumstances be inhaled all day without risk of chill. It should never be forgotten, however, that the air in a ship below deck may be as close and unwholesome as it ever is on shore. Good ventilation is the primary requirement in a state-room, and the point is one that engages the serious attention of naval architects.

Other forms of ill-health likely to benefit from the voyage, are chronic rheumatism, especially in young persons, habitual dyspepsia with a tendency to melancholy, neuralgia, periodical headaches, and such like obstinate or recurrent habits of body. Those who have got into a state of worry by too sustained brain-work or by anxiety, derive great and instant benefit from going to sea, whether the soothing effects of the voyage be due, as some have supposed, to the steadiness of the barometer and thermometer or to more

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general causes. Convalescents from a severe illness are another large class likely to benefit. Lastly, the exercise and fresh air that may be got on board ship without effort are peculiarly suited to those persons who have had the misfortune to suffer an injury to the spine in a railway accident, or in the hunting field. What the surgeon aims at in those difficult and often distressing cases is a paradoxical combination of rest and exercise, and it does not appear that the combination is attainable anywhere except on the sea.

We may now proceed to give some description of one of the ships of the line, reserving an account of the engines, with those two marvellous modern improvements, the electric light, and the freezing chamber, for a future chapter. The passenger who goes on board an Orient liner will find everything arranged to conduce as much as possible to his comfort ; those who travel second class will enjoy accommodation which a few years ago would have been unattainable in the first. Nevertheless, grumblers are sometimes encountered ; but, in the absence of the postman's knock, in the perfection and punctuality of the routine of the daily life, in the temporary cessation of care, even a grumbler should sooner or later yield to the fascination of the voyage. It would be well, however, for the intending voyager to make up his mind to take a cheerful view of things from the first, and if a few rose leaves are crumpled under him, to endure them for a time and trust that soon even these sources of slight discomfort will disappear. Another recommendation may be made. It is well not to be wholly unemployed during a voyage. Some people find a difficulty in writing on board ship, but almost all can read, and no better opportunity can be imagined than that afforded by a month at sea for the study of some special subject.

The following description of one of the latest built steamers is extracted from a public print :—The promenade deck is over 200 feet long and about 24 feet above the load water line. This space is reserved for the use of the saloon passengers, and is approached from the saloon space by a handsome staircase. On the promenade deck are the chart room, captain's room, &c., on the top of this the navigating bridge is fitted, whence there is communication to the engine room, look-out bridge, forecastle, and to the after wheel, by telegraphs (mechanical) and voice pipes. At the part where the funnels come up through the promenade deck, the fidley or casing is carried up 7 feet high. This, besides carrying up the heat, dust, &c., forms an excellent "lee" on one side or the other at all times.

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Descending to the upper deck the entrance to the drawing-room is reached. This is a most beautiful apartment, 32 feet by 16 feet, and about 9 feet high, finished in white enamel and gold. Round its fore end and sides are arranged settees or sofas, while about the room are handsome tables and chairs, and at the after end between the doors stands a most excellent piano, and under the ceiling are several electric lights in opal globes. The deck or floor is covered by handsome Indian carpets, and the curtains to the windows are also of Indian manufacture, of silk and gold thread.

Passing aft to the head of the saloon stair to the main deck, the saloon smoking-room can be entered on either side. It is a most comfortable apartment, lighted and ventilated from above, and the sides and ends are finished in solid oak and mahogany with ebony mouldings. The room is in direct communication, by means of a lift, with the bar, which also is lighted with the electric light.

Descending to the main deck the saloon dining room is entered. This is an irregularly sided apartment about 40 feet by 40 feet, and arranged to accommodate about 120 persons at dinner. The ends are in walnut, with panels holding richly-carved and coloured coats of arms of the great countries of the world, including the colonies. Here are seen the arms of the Orient Company with the lion and the kangaroo as supporters, emblematical of England and Australia. Here too is the motto of the Orient Company, "*Par non leonina societas*," indicating the belief of the Company that the advantages of the connection between the Mother Country and the colonies is and ought to be mutual and not one-sided.

The saloon is furnished with small tables to accommodate quartettes, as well as larger companies. Hospitals are fitted up for passengers of all classes, and even the third-class passengers have a bath-room specially provided for them.

It is necessary to give some thought for one moment to the somewhat important question of the cabin proper or bedroom. First and foremost, the intending passenger must bear in mind he is going to sea, and he must no more expect the familiar hotel bedroom than he would expect the same in an express train. In the first place, space has to be economised; in the second, the "up and down" ocean has to be traversed. The cabin to the

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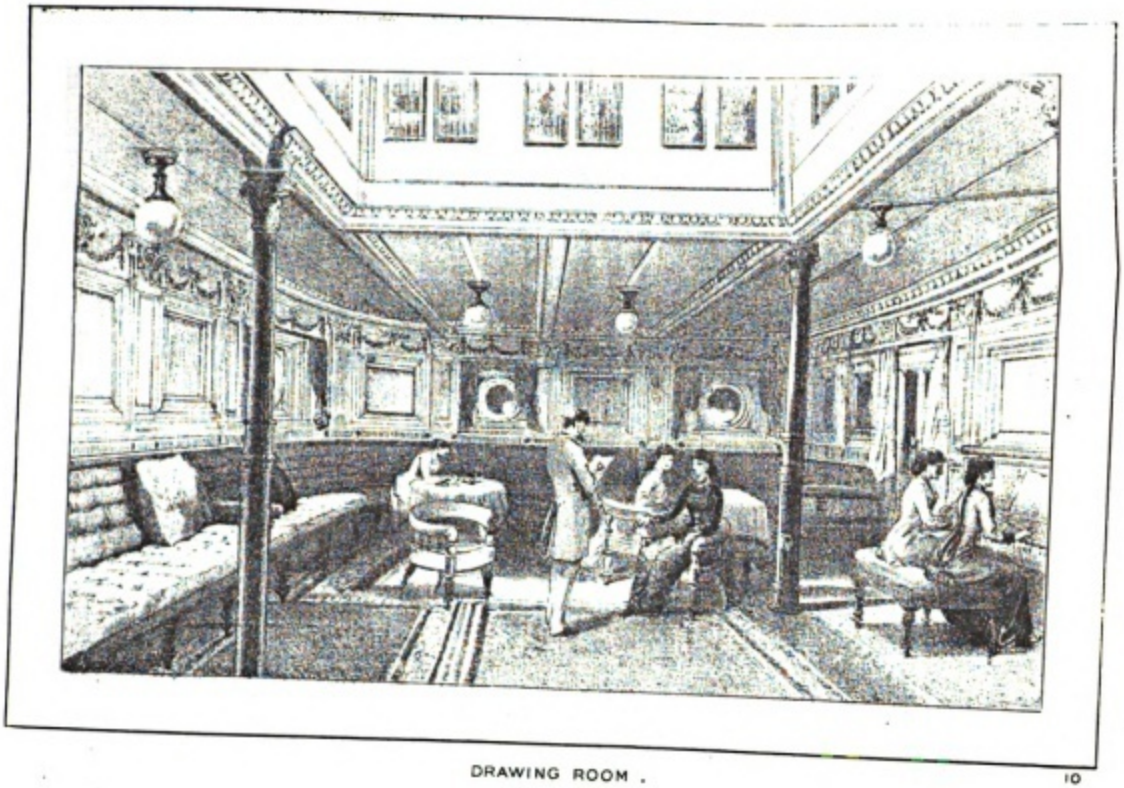

DRAWING ROOM .

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inexperienced may seem at the first "cribbed and confined," but, as every passenger knows, these attributes resolve themselves early in the voyage into cozy and comfortable.

Cabins are provided to accommodate, according to their size, one, two, three, or four passengers each. It is well, if possible, before the start to find out who your companions are to be. Any passenger who values his comfort should engage a cabin, large or small, for his sole use, and for this purpose the Orient Line offers most reasonable facilities. The newly-built vessels of the Line have cabins specially fitted to "make up" during the day into sitting-rooms. They are further supplied with suites of cabins in every variety. The advantage of a place reserved for oneself adds immensely to the enjoyment of the voyage. But it is perhaps to the invalid that such privacy yields the best return for the increased cost. When he decides on a sea voyage, it is probably because of the urgency of his case; and if ways and means warrant the expenditure, it is well that he should not be cabined with unknown companions, who may possibly be given to cheery fun, most insupportable in a sick room. To grudge a few extra pounds in such cases is to grudge what may, after all, prove an important factor in the desired cure. Little need be said of the obvious duty of the invalid towards his fellow-passengers. Cabin mates are assumed to be in average health; and to say nothing of the chances of infection, it is not fair for a passenger suffering, for instance, from a distressing and perpetual cough, to impose himself on a hale man. It becomes a duty for such a person, towards his fellow-passengers, to avoid inflicting his ailment on them. Alike for his own sake and for theirs it is his advantage and his duty to secure a cabin for himself.

Fittings.—The cabins are fitted with bed and bedding, washstand, seat, clothes hooks and rack for small parcels and wardrobes in use. It may be said by the inexperienced voyager that nothing then remains for the passenger but to supply some handy type of portmanteau. Without entering upon the question of ornamentation, and the hanging up reminiscences of shore life, there is one essential without which he who travels at sea travels in avoidable discomfort. This *sine qua non* is simply a series of pockets, large and small, attached to a canvas backing, to be fixed on the bulkhead or "wooden wall" of the cabin, and to be purchased in sufficient variety at any outfitter's.

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Some of the pockets may be large enough for brushes and books, and some small enough for trinkets and knives. Six or eight such pockets hold, where they can be found, and where they are safe through the mightiest rolling, that *olla podrida* of comfort that is made up of hair brushes, field glasses, tooth powder, a pack of cards, handkerchiefs, and other personal knick-knacks in daily use. The old traveller will put the various ingredients of comfort into his bags before he leaves his house; and thus on board it will take him but two seconds to hang up that which makes him thoroughly unpacked at once.

There is the further point of the actual packages of baggage. It is usual to stow most of these under the bed or bunk. The wise passenger will see to it that the underside of his trunk or box is provided with wooden battens to raise it an inch or more off the deck. At sea one is in the midst of waters, and dampness, usually but temporary, is not unknown on the floor boards, or on the deck, boat, and landing stages at start and arrival. By this little timely expedient, the soddening of one's property is avoided.

Heavy baggage is carried to the baggage-room, to which periodical access is given. Much depends on a wise choice of clothing. As the Australian voyage extends from temperate regions, through the tropics, and ends in temperate regions again, it is obvious that at the beginning and end, cold weather clothes, and in the middle the lightest of summer dress, is essential to health and comfort. For the beginning and the end, all is suggested by the remark that an ulster is a necessity on deck going down the English Channel, as it also is approaching and leaving Australia. It must be remembered, too, that the cold is felt more severely on coming out of the steamy tropics than before entering them. It is in the tropics that the change in clothing is desirable, though the steamers of the Orient Line steer a course as short as possible through that tropical heat, which, once dispossessed of its novelty, affords but little pleasure. Thin flannel suits will be found on experience the best for this weather; cool in the sun they nevertheless effectually prevent chills that arise from dew or perspiration—and they are not so readily soiled as duck and white clothing.

The great question of shirts and underclothing generally is regulated by the facilities for washing on board. Starching, ironing, and the getting up of fine linen are seldom practicable; but for the rougher washing some

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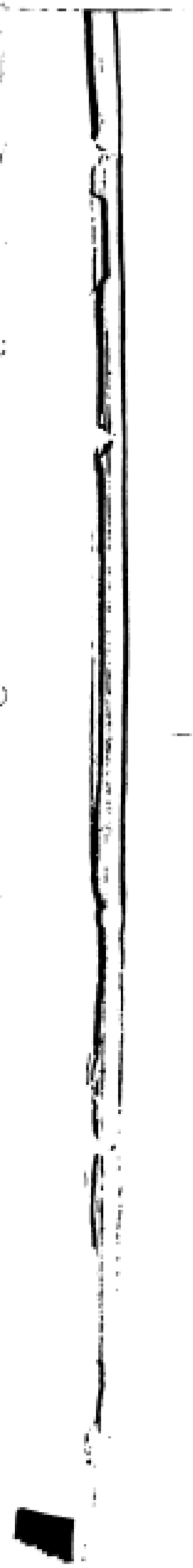

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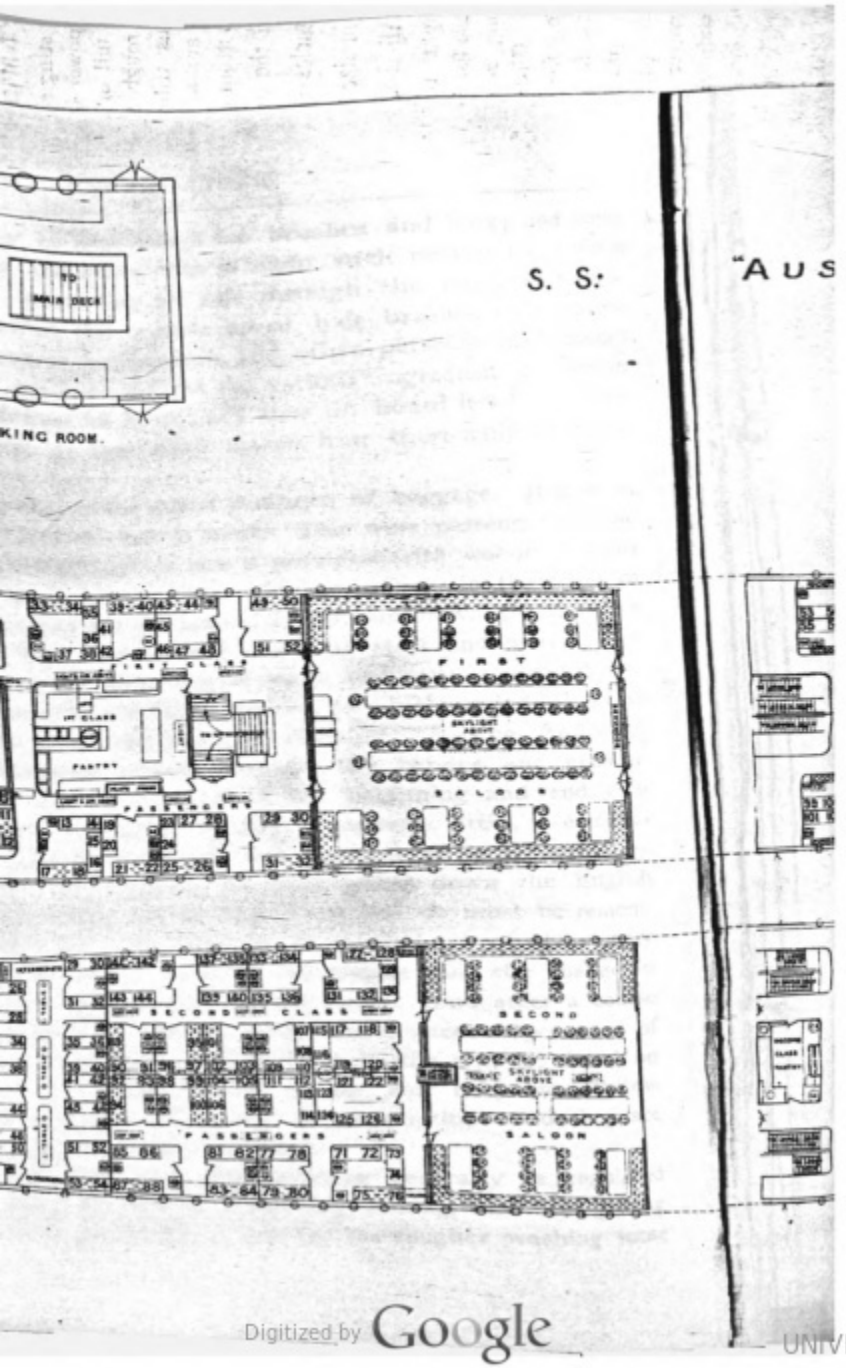

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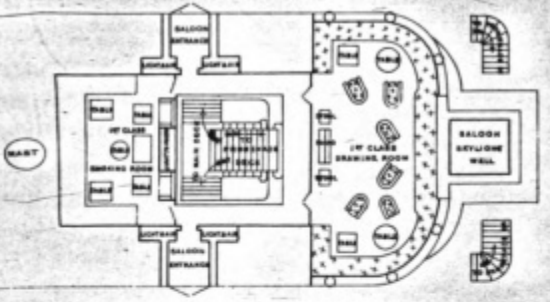
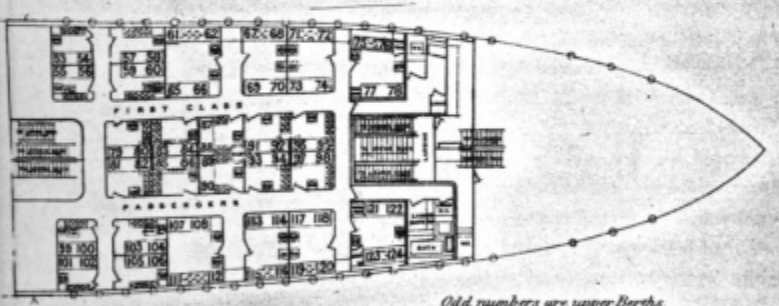
"AUSTRAL."



1ST CLASS SMOKING AND DRAWING ROOMS
AND SALOON. ENTRANCE ON UPPER DECK.



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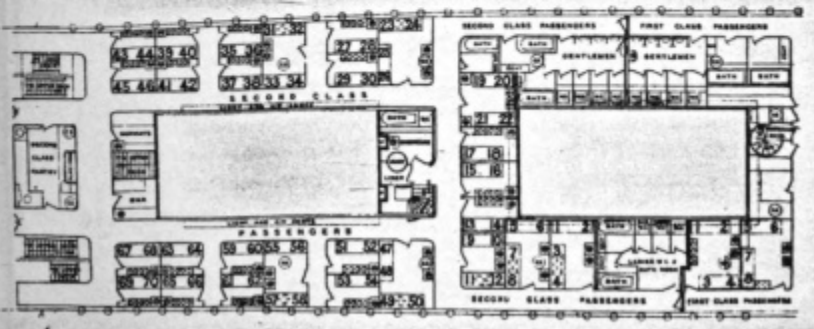

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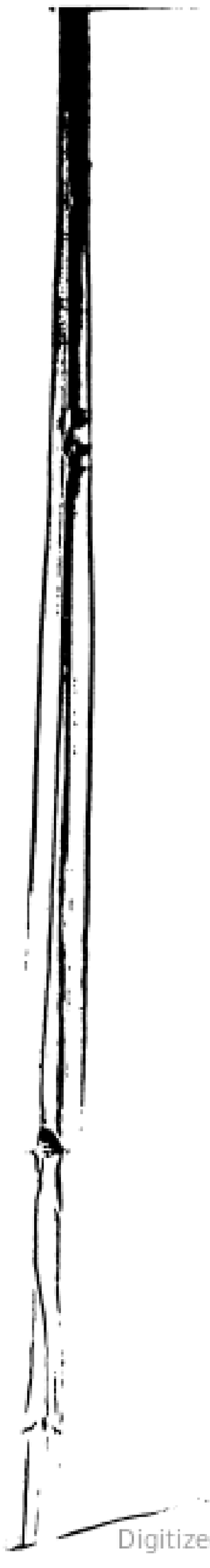

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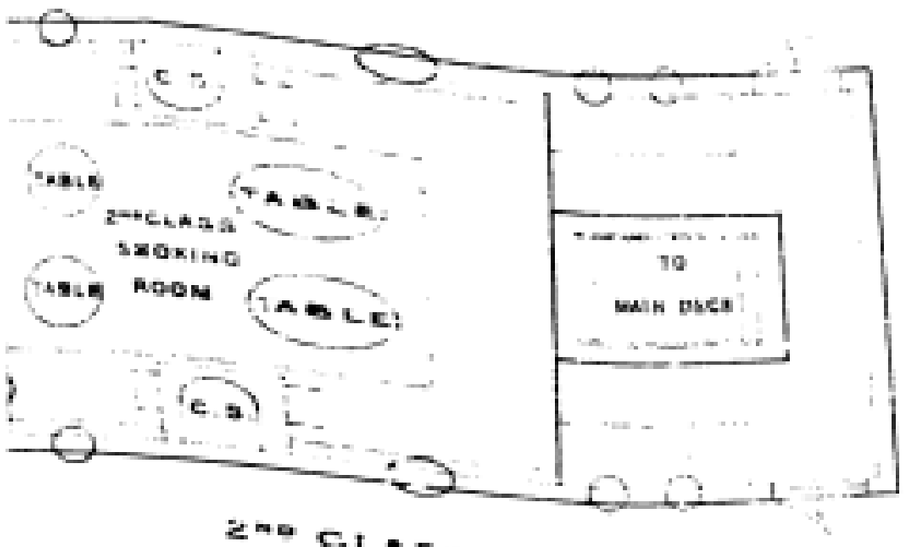

2ND CLASS SMOKING ROOM.

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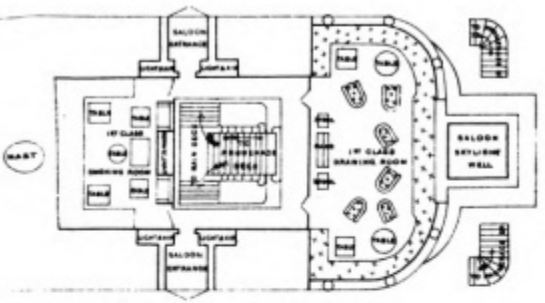
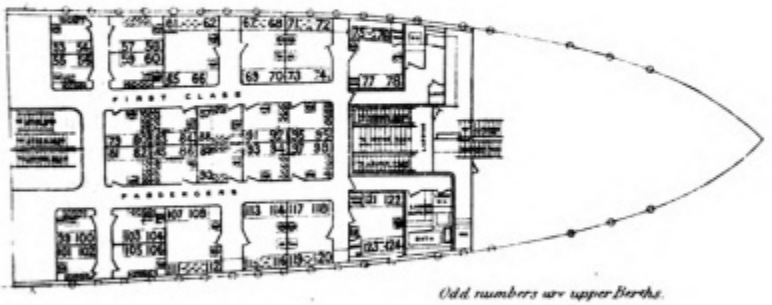


1ST CLASS SMOKING AND DRAWING ROOMS
AND SALOON. ENTRANCE ON UPPER DECK.



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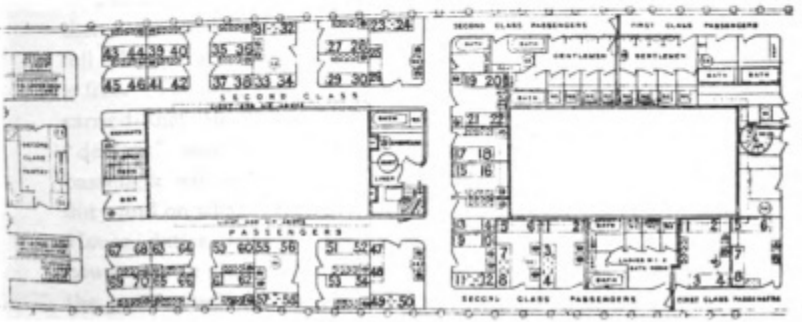

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efficient substitute for the land laundry-maid is generally to be found in a ship. But after all, the trip is short from port to port; and it is usual to provide a sufficient stock of old and new to last the period—while a capacious canvas bag gapes in the cabin to receive all that is past present wear (all that is damp having been first dried in the ship's drying room); and the sea receives such as is incapable of future wear.

Head gear is an important point. But the variety is infinite. Comfort is the main object. A sun helmet will be found useful in the tropics and a special boon when landing in such hot corners as St. Vincent, Port Said, or Diego Garcia. Something that the wind will not blow off is equally welcome when there is life on the ocean wave.

The shoeing of the feet is matter for serious thought. The decks are often temporarily damp—rain, dew, heavy sea, or the washing of the decks are all matters of daily occurrence. On such occasions india-rubber soles, well corrugated, keep the wet out and the wearer on his legs. For those who entertain no pious dread of the heating of their soles there is comfort in the homely golosh. Blacked boots are at a discount on board ship; the pervading dampness makes them leave their blacking in many undesirable ways and places. Moreover, as they are liable to become mouldy, crude leather unblacked or canvas are the best materials. It is not often that rain is persistent, but a waterproof or macintosh will often enable the passenger to enjoy grand scenes of breaking seas or harbour entrances undeterred by spray or tropical downpours.

Passengers will do well to remember that at both ends of the voyage there are such things as Custom Houses. Each colony in Australia has full liberty to arrange its own Customs duties. Everything in personal use is free. Tobacco, silver plate, and spirits are the other articles most commonly carried that are liable to duty; and the simplest golden rule is always to "declare" and show to the Custom House officials all such articles. The passenger will thus learn at once and authoritatively on what he has to pay duty and on what not. Above all, the passenger should remember that Custom House duties, however vexatious they may seem, and however foolish or however wise they may be in principle, are none the less duties imposed by the public itself for its own purposes of government. They are not, as they used to be in the middle ages, and still may be in benighted countries, mere

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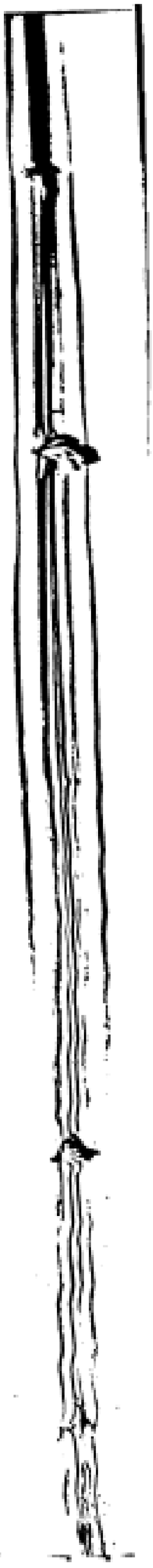

black-mail levied on all for the benefit of some one individual or class of individuals. To object to paying them then shows not only want of honesty, but lack of sense.

Philosophers in all ages have agreed that happiness has some subtle connexion with the stomach. Thus the intending voyager will gladly learn something about the food to be expected. The table kept on board the Orient Liners will compare favourably in quality and cuisine with that of a first-class club.

The daily routine opens in the first saloon with coffee or tea and biscuits from 6 to 7 A.M. At nine follows a breakfast that for substantial variety is only to be equalled in Scotland. Porridge, chops and steaks vie with curries and fricassees to provide ballast for the omelettes and jam that are to follow. At noon the table is again spread for tiffen, with its cold meats and garnishings. From 5 to 7 comes dinner, the great event of the day at sea. A series of soups, fish, meats, entrées, curries, puddings, pies, and dessert helps to sustain the famishing passenger until two hours later he sits down to tea and toast. Later in the evening arrives the sea meal, "grog," at which solids yield precedency to liquids; and while in the tropics aërated waters are common, in cold weather hot water and lemons are not altogether unknown.

It is obvious that at sea there is a feast of something more than reason, and it is this abundance of good things which is so large a factor in the production of that high standard of health usually associated with a sea voyage. In fact, unless one pays royally for accommodation at the very best of hotels, there is no such living to be had ashore. The invalid and the traveller will alike make a note of this. It is well known to those who have been many voyages, that any passenger who begins to quarrel with the food will turn out on closer acquaintance to belong to a class that has never known at home what good feeding was. There is no doubt but that in every human being, once he or she loses sight of land, there is developed an insatiable and inordinate appetite. There is a chronic state of hunger pervading every ship; and the intervals between meals are filled with yearnings for the next. Chemists attribute these yearnings to the greater percentage of ozone in the sea air; physicists, as they are termed across the Atlantic, incline rather to the opinion that while on the ever-dancing wave the human body is perpetually struggling and straining to preserve its upset equilibrium, and that thus the

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livelong day, walking, standing, sitting, and even lying in bed, there is proceeding a never-ceasing waste of tissue, which calls for never-ceasing replenishments. But there is danger from this in the tropics. The heat alters the conditions of existence. It is true the period is cut short by the Orient Line route, and every facility of ice and punkahs and awnings is provided; still the passenger will find it conduce greatly to his own comfort no less than to his health, if for that brief space he abjure all the stronger kinds of meat and drinks. Light wines, weak spirits, and the flesh of birds rather than of beasts will render the trip through the tropics all the more enjoyable.

The passenger at sea spends much of his life in the open air. Thus, his first appearance in the morning is for an airing on deck. For these purposes he will have judiciously supplied himself with a pair of slippers and also of pyjamas. These latter, thin flannel trousers (and jacket), are invaluable both for these daily purposes and in the tropics for that sleeping on deck which is often so pleasant and so health-giving. It is well to adopt the precaution of always sleeping in *flannel* garments. This is an absolute necessity if one would avoid cholera and other tropical illnesses. It is advisable to avoid sleeping in the direct rays of the moon. Neuralgia with various unpleasant results, such as contortions of the features, are often popularly attributed to the action of the moon's rays upon the sleeper's face. To this we would add the explanation of the sceptics, that the moon is brightest when the sky is clear, and that when the sky is clear the dew is heaviest. Thus, whether it be the mischievous moon or the wicked dew, the wise will always pick a berth with something between them and the bare heavens. The awning supplies this. All will notice that the dews are heavy when in the neighbourhood of land, and often scarcely appreciable when out in the open sea.

The passenger should, before embarking, provide himself with a deck chair. The fixed seats are all very well in their way, but that way is not always the way of the moment; the sun, and the shade and the breeze shift, moreover there are varieties of comfort in position. The experienced voyager will prefer a chair that can be readily carried about on shore, and that is not liable to become wet on board. Deck chairs it must be remembered are always left on deck. The ordinary folding up batten chair is

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good, but better is the wooden framework that supports a *removable* canvas seat. In the event of a sudden shower the seat may thus be kept properly dry by being taken below, and this can be done every night. Then is there not only no danger of the chair being found wet from rain, spray, dew, or the deck-washing, but the chair will be found unoccupied.

The popular idea with the inexperienced is, that a sea voyage represents a blank in one's life, a period when all are helping each other to do nothing or hindering each other from doing nothing. The novel sensations of living cooped up with a "miscellaneous lot" of human beings cut off from all the world with nothing but sea and sky to look upon are a three days' wonder, but after that the everlasting sea horizon loses its charms, and then attention is turned to the little world within the ship. After the first two or three days passengers brighten up; more attention is paid to dress; the old hands begin to settle down; and the first great business of the voyage commences, the finding out all one can about everybody else. The well of public information on this point is soon pumped dry, and the important question remains how are the remaining five weeks to be passed.

The very first point that will strike the "new chum" is the sudden melting of the first excessive civility and politeness—not into rudeness—but into childlike familiarity. Sailors are frequently compared to children—and whether it be the ozone, or the severance from the busy world, or what not, there is a purity and childlike freshness out on the ocean which seems from the first to infect the whole ship's company. This is specially visible in the relaxations that gradually become fashionable—nay, universal. Old men and giddy girls, staid matrons and young men, suddenly find themselves enjoying with infinite zest pastimes that on shore have long been relegated to the schoolroom and the nursery. The exalted colonial governor enters with boyish spirit into makeshift theatricals; the dignified young lady, to her own surprise, revives her childish delight in "port;" the young clerk finds an evening's amusement in "sling the monkey;" and the stately matron is beside herself in the preparation of the necessary materials and "properties."

The *pièce de resistance* in exercise, is pacing the deck. Every one is destined sooner or later to fall into the habit. The relative sea experience of the passengers may be accurately gauged by noting at the outset of the

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voyage their readiness to fall into this inevitable form of sea exercise. But its monotony is soon relieved. Cricket, and even lawn tennis, of a cautious kind, are readily improvised; circles of rope introduce all the combined excitement of quoits, bowls, and curling, with the added interest of the rolling of the ship. "Dumps," sometimes called "Bull," the pitching of lumps of lead on a figured board, yields an inconceivable amount of excitement. It admits of more skilled play than any other game of the kind which can be learned at sea, and affords exercise for both sexes.

Of the most boisterous games hop-scotch is an invariable warmer in cold weather. "Sling the monkey" is more essentially a sea game. A stout rope with a loop at the lower end is made fast to the "rigging" so as to hang over the deck clear of the side rail. In this the "monkey" takes his seat—he and the players are armed alike either with knotted handkerchiefs or bâtons of canvas stuffed with straw. The monkey is set swinging, and the players and he endeavour to strike one another. The player touched by the monkey succeeds to the seat of honour. It is a mirth-provoking spectacle, and greatly relished by the actors themselves.

Gymnastic efforts of various kinds are at times popular—chalking the mark is a special favourite, when there is much motion. With his two feet tiphung in a loop of rope, the player starting from behind a line endeavours to chalk his farthest from it, and return again behind it, being allowed the while to touch the deck with the palms of his hands only. Many and amusing are the catastrophes. High cockalorum, and even cock-fighting have been known to afford the much desired exercise. Much may be done for all concerned, for actors as well as spectators, if two or three who possess requisite experience constitute themselves a committee to organise a regular athletic meeting. Hopping races, walking backwards, races for girls, for boys, for crawling babies, handicaps of every conceivable description —in short, any and every trial of strength and skill for passengers, married, single, old, young, and for the crew, may be arranged into a most attractive (and duly advertised) two days' Athletic Sports. The making up and presenting of appropriate prizes are not the least elements in the enjoyment and success of the recreations.

Last, but not least among the exercises, dancing holds high rank. the

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calm moonlight nights of the tropics, and the spacious deck lending themselves to this truly enjoyable pastime.

A most popular method of relaxation on board is the getting up of set entertainments. Chief of these, theatricals soon make all idle hands busy, and create for the time a most vigorous *entente cordiale* among the whole ship's company. Given a few short plays, with a passenger or two cunning in such matters, and the thing is as good as done. If there be available musical talent, burlesques should be attempted, inasmuch as good and not harm arises from the parts being overacted or underacted. Moreover, the dresses are, from their very outlandishness, easy to make up. This dress-making business will be greedily undertaken by the lady portion of the passengers. The attempt is usually made to turn such an entertainment to good account on behalf of some desirable institution connected with sailors. The best means to this end is the getting up of programmes in the best style and colour by the aid of the artistic talent and the colour-boxes to be found among the passengers. Flaming posters, and well-got-up sandwich-men, add to the general stir; stage and scenery with footlights are readily arranged in consultation with the ship's authorities.

One of the most lively of amusements is the organising of a set fancy dress ball, a heavy tax being levied, for the benefit of some charity, on all who fail to appear in costume. Concerts and Christy Minstrel entertainments depend for success on the presence of appropriate talent.

Among the more sober efforts of relaxation, games are of course at a premium, especially in the cooler portions of the voyage. There is usually very good whist-playing on board. To discover who are "scientific," it is not unusual for some old hand, in the early days of the voyage, to propose a whist tournament. Four or five simple conditions are written out; names are invited, with a small entrance fee. All who enter then draw lots for partnerships, and this coupling remains permanent through the tournament. Matches are played off in heats by the best of three rubbers, the winning pairs in each heat drawing lots for the next heat. Such tournaments become very popular. Similar matches are organised in chess, draughts, backgammon, and so forth.

It is not unusual for literary spirits on board to break out in a news-

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paper—an "Editor's Box" is the sign—and then comes a run on all stores of foolscap. The various phases of the little world on board find themselves mirrored with due journalistic accuracy and virus. If personalities are not scrupulously avoided, the paper soon comes to a bad end.

There is abundant occupation, too, of a far more intellectual kind. Indeed, for those who will, the sea voyage is an opportunity for becoming acquainted with a new world of work and nature. There is the *ship* herself—a perfect study—leading on the one hand into abstruse mechanics and mathematical problems, and on the other away into the vastnesses of astronomy, and always full of interest on the score of the more practical seamanship. There are the *air* and *sky*, the great playground of that important force—the weather; a force that can be studied at sea in its natural simplicity, free of all those irregularities of surface and local peculiarities which give to it on shore its protean character. There is the *sea* itself, teeming with a marvellous animal world of its own; for the most part of a special and distinct character when once land is out of sight. For the artist there are effects that can only be witnessed away from the disturbing land, although Mr. Oscar Wilde has pronounced the Atlantic "disappointing." The "navy blue" of the deep sea must be seen to be conceived; the cloud-effects due to the presence of an all-round horizon are unique; and no one has scudded before a gale over a mountainous sea without noting these strange resemblances to the swelling downs of the dry land. For him who would study *man*, the little world of the ship offers ample opportunity. During the voyage, the many interesting places sighted, or touched at, will impress the great lessons of history with a vividness unknown to mere book-learning; of great assistance in all these matters is the appropriately selected library to be found on all the Orient steamers.

It may be well that we should here remind the passenger that under the totally distinct conditions of life at sea, the subject of conduct has special force. In the captain resides autocratic power for the time being; the law has always upheld the captain, in taking action necessary to the safety and good discipline of the ship, even to the extent of holding that "conduct unbecoming a gentleman" is sufficient to justify the exclusion of a passenger from the saloon. The captain can legally take sufficient measures to prevent a passenger from interfering with the discipline and superintendence of the ship, or the

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comfort of any one on board. That this authority is seldom called into exercise is due to the fact that the ship's company, crew as well as passengers, are altogether determined to fall in with, and to maintain a state of affairs most suited to all on board. Purposely and expressly the captain curbs all demonstrations that run to excess, whether in politics, in religion, or, in its larger sense, immorality. Regulations have been devised, and are strictly enforced, providing for the health, comfort, and safety of those on board. Unnecessary noise during sleeping hours, impeding the crew in any way, usurping public accommodation for private purposes, are instances of what might occur, were not such regulations in active force. The passengers will of themselves seek to preserve the amenities of social intercourse; if only from the strictly selfish standpoint of their own personal enjoyment. And there has always been a wise tendency to remember that available accommodation on a steamer is physically limited; that the number of servants, for instance, is restricted by this condition; and that except they were allotted specified duties, and specified times, from which there can be no departure, the domestic service of the ship must fall hopelessly and disastrously out of gear. Fun and frolic will always find their favoured home at sea; and this pleasant ebullition of good nature for the time develops the kindlier instincts, and more genial sympathies of social intercourse, and promotes a spirit of compromise and a readiness to respect the sentiments and rights of others.

Divine service is held on board regularly on Sundays. Passengers having the requisite musical gifts can contribute a valuable and much appreciated support by forming a volunteer church choir. The necessary practising for this purpose helps also to pass the time pleasantly.

A few words may be added on the not unimportant item of the relationship of passengers and crew. The brains of the ship are the captain and his officers, and these, it is well to remember, are a group of men long trained in their profession, and who owe their position to the rule of the survival of the fittest. The competition is keen, and the Board of Trade examinations severe. But the work is of serious responsibility, and on various occasions of much intricacy and difficulty. Indeed, among other evil prophecies that harbingered the opening of the Suez Canal, most prominent were those which told of the fatal difficulties of navigation in the Red Sea. But the

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rarity of accidents in that most intricate of waters speaks volumes for the seamanship and skill in navigation of the officers belonging to the British Mercantile Marine Service.

The muscles of the ship are the "hands," ranging from the boatswain and his A.B.'s, to the firemen and enginemen, known as the "black gang," and the busy hard-working members of the steward's department. It is of interest to note that a successful movement is on foot to develop what may be called a seagoing militia. Officers and men of the mercantile marine now join the Royal Naval Reserve, and are called out for drill periodically. These men will, in time of war, form an invaluable addition to the regular forces of the country, and it is to be hoped the number will increase. The right to fly the blue ensign is granted to ships whose captains, with a definite proportion of their crew, belong to this R.N.R.

We have attempted in this chapter briefly to point out that he who contemplates a trip by the Orient Line will find the six weeks' voyage more than occupied with the various novel forms of relaxation, and with the new stores of knowledge and methods of acquisition that open out before him. It is one purpose of this Guide to provide introductory epitomes, each written by an acknowledged authority, to the various entertaining, interesting, or useful fields of inquiry which the voyage between Europe and Australia affords. We thus present to the passenger a variety of methods of making the most of his few weeks at sea according to his special bent and inclination.

CHAPTER II.—SEAMANSHIP.

THE average landsman regards as convertible the two terms Navigation and Seamanship, and yet there is all the difference in the world between their significations. Navigation tells us where we are, and in which direction to go to get to somewhere else. Seamanship is the art of conducting the ship according to the direction shown by navigation, and of properly handling her under all circumstances which may arise.

The term "aft" means towards the stern; "forward," towards the bow;

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and port and starboard side mean respectively the left and the right hand sides of the ship looking forward. Poops, or raised quarter-decks aft, have disappeared altogether in ocean passenger steamers; and the topgallant forecastle, which in the old days balanced in the bows the poop in the stern, has gone with it. The officers pace the navigating bridge now instead of the quarterdeck as of old. *On deck* and *below* become the substitutes of up stairs and down stairs; and the light is admitted below by skylights, ports, and scuttles, the two latter being situated in the ship's sides.

The masts and rigging stretch away skywards, ready to spread sail should the wind be favourable or the engine need a little attention. The uninitiated are puzzled by the network they see above them of ropes and spars, and yet there is a strange simplicity reigning aloft, and it is no long lesson to learn the use and name of each rope. There is the standing rigging, *i.e.*, the *shrouds* and *stays*, which are the fixed supports of the masts, and there is the "running rigging" by which sails are hoisted and lowered and trimmed. All this "top-hamper" of rigging is a direct drawback when steaming against the wind; but public opinion is not yet prepared for the mastless steamers for which engineers already contend.

Sailing is an art that will long be necessary at sea. It depends on combining two natural forces. The ship floating in the water has above her hull planes of canvas stretched so that the wind presses on them. Now if the keel is in the same line as the direction of the wind, and the plane of the sails be placed at right angles to the line of the keel, it is obvious the ship will be driven through the water at a less speed than the wind blows, because of the resistance of the water. But this is not the fastest sailing. Suppose the wind to blow at right angles to the line of keel, and the plane of the sails be placed obliquely to the line of the keel, and in the direction of the wind; then the wind pressing the vessel's side against the resisting water the lateral resistance greatly exceeds the direct resistance; between these forces the long wedge-shaped hull of the vessel is driven in the line of least resistance, *i.e.*, in the line of the keel at a great speed. It is thus possible for a vessel to sail faster than the wind travels. A steamer, with sail set, steaming nine knots an hour before a wind which moves at the rate of ten miles an hour will experience very little wind, but if the wind comes on her side, the breeze will have a more sensible effect. The ship will then

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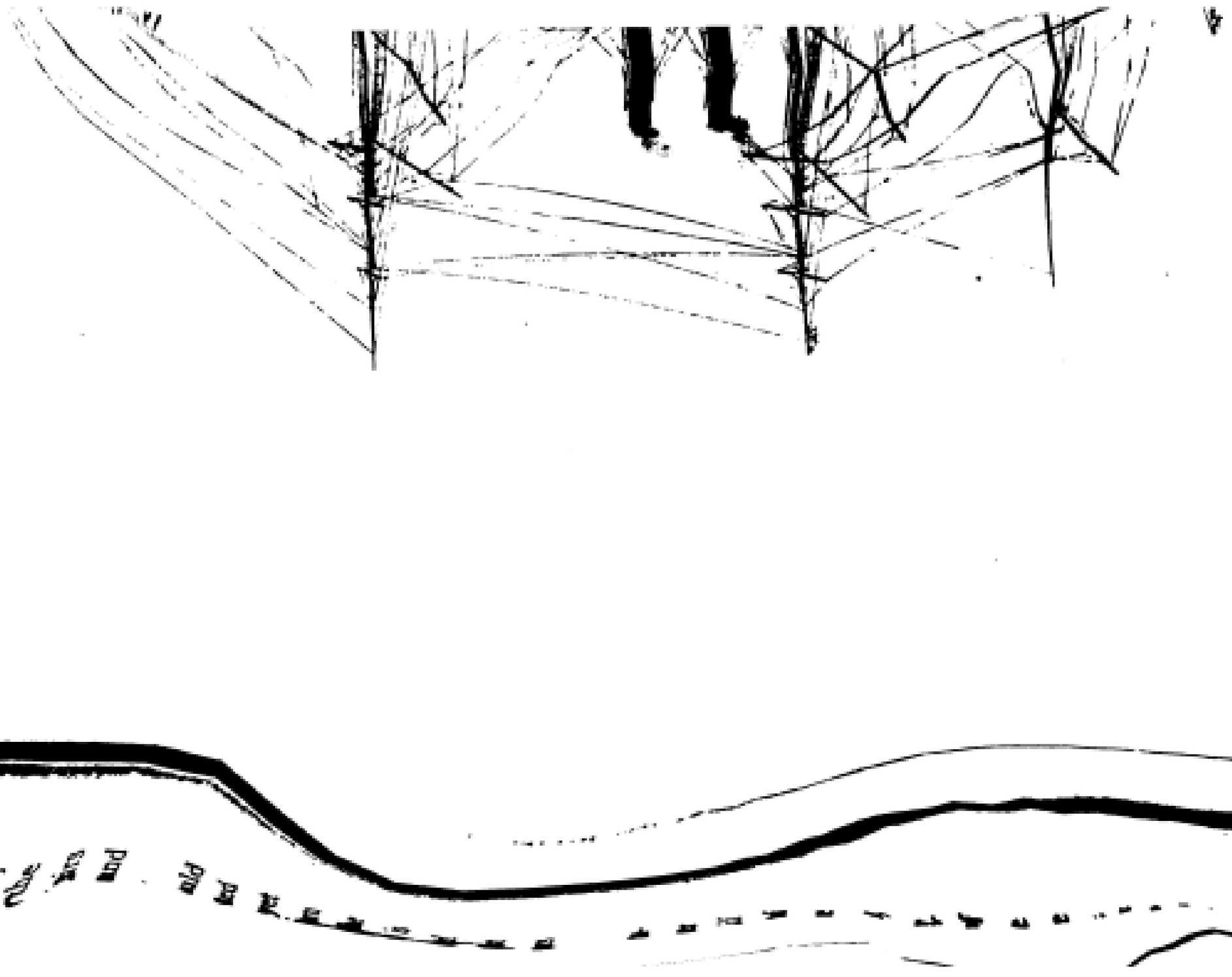

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go perhaps eleven or twelve knots an hour, though the wind is still only travelling at a rate of ten knots.

If the vessel is travelling in the same direction as the wind, she is said to be "running." But when the wind blows on her side, she is said to be "reaching." When the wind blows from the direction in which the ship is bound, a sailing ship can nevertheless make her way towards her destination by what is called "plying to windward." This is effected by "beating" or "tacking," that is to say, by following a zig-zag course, with the wind first on one side then on the other. The side on which the wind blows is the "weather" side, and the other the "lee." The "scuppers" or deck gutters, on the lee side become receptacles for all that is dropped or upset, animate or inanimate.

A word or two may be well on the *motions* of the ship—such as "rolling," "pitching," and "scending." *Rolling* occurs when the two sides of the ship play see-saw; steamers roll more than sailing vessels, for sails are a great steadying power. *Pitching* occurs when the two ends of the vessel play see-saw. *Scending* is a modification of pitching, and occurs when the vessel is bodily taken up by a huge "sea," which carries or "scends" the vessel along down its declivity with a sort of cornerwise motion which gives the idea of great speed. It is obvious that all these motions diminish in intensity with the size of the vessel, and are comparatively little felt, even in heavy gales, on large steamers.

It is perhaps hardly necessary to say much of the sails on a steamer, save to explain briefly the chief terms applicable to them. Of sails there are two main classes, the "square" and the "fore and aft" sails. The square are those that are stretched on yards that are placed across the masts. They take their names from the mast they are on and their height from the deck combined. The lowest are the "courses," the next above "top-sails," and above them "top-gallant-sails," and so to "royals" and "sky-sails," with the prefix of fore, main, or mizen according to the mast they are on. A three-masted vessel, with square sails on all three masts, is technically known as "ship rigged;" if on only two of the three she is "barque rigged;" if on only the foremast she is "schooner rigged;" while if there be square sails on the foremast, with only a square topsail on the mainmast, she is a "barquantine." Then if she have only two masts

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she is "brig rigged" if there be square sails on both, and "brigantine" if these exist only on the foremast, and a "topsail schooner" if there be a topsail on the foremast. These technical names belong to all vessels, whether steamers or not, because all vessels are described by their rig.

Many vessels, however, only carry "fore and aft" sails, or sails attached up and down the mast and spread in a fore and aft direction. Such a vessel with three masts is a "three-masted schooner," with two a "schooner." If with only one mast she is a "cutter," if there be two "head" sails, or sails before the mast; and a "sloop" if there be only one of these sails. The Lateen rig, so often seen in the Mediterranean, is formed by a stumpy mast bearing forward and supporting a yard of enormous length with a triangular sail. It is a picturesque rig but not good in stormy latitudes.

Some of the latest built Orient steamers have four masts, the aftermost of which is called the "jigger mast."

The passenger will notice the fore and aft sail on the lower mast, stretched out on a "gaff" above and sometimes on a "boom" below. On masts that may be "square-rigged," *i.e.* having yards across them, these sails become the trysails; fore, main, or mizen according to mast. If the masts are not "square-rigged" they become simply the "mainsail," &c. Other fore and aft sails are called "stay-sails." These, as their name implies, are set on the "stays," *i.e.* strong ropes extending from the upper end of the masts towards the bow of the ship. These stays take their name from the mast to which they are attached—as the "main stay," the "foretopmast stay," and so forth; and the "stay-sails" are named from the "stay" on which they may be set. These sails are triangular in shape; those of their kind that are set on to the bowsprit, if bowsprit there be, may at times be called "jibs."

There are other sails that the steamer passenger may see, not on his own ship but on others which he will fall in with on the voyage. Such as "studding sails" set at the side of the square sails in fine light winds; and he may see at the same time "water sails" hung under the booms, and "moonscrapers" sent up "all flying," *i.e.* yard, and sail hoisted right away from the deck to the truck, and there set to catch light airs aloft when it is calm below. But these picturesque devices are becoming things of the past, giving way before the advance of steam.

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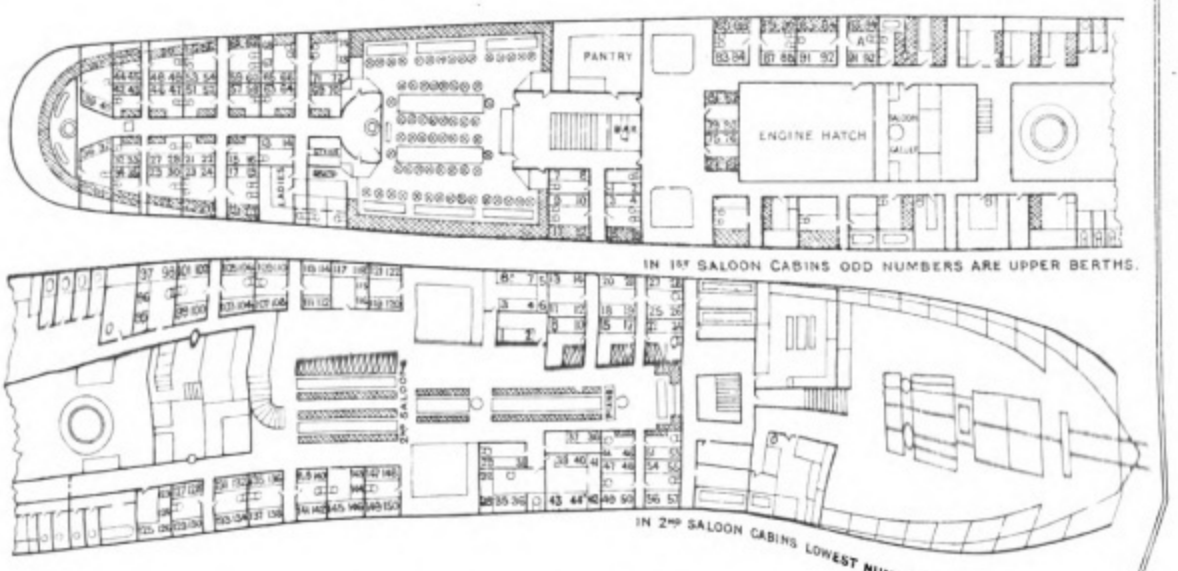
S.S "IBERIA" & S.S. "LIGURIA."



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From sails we turn naturally to *ropes*. The uninitiated will like to classify them according to the material of which they are manufactured. There are Coir, Manilla, and Hemp ropes. "Coir" (pronounced *kye-ar*) is made from the fibrous husks of the cocoa-nut; "Manilla" from the leaf stalks of the plantain; "Hemp" is ordinary rope dressed with tar, sometimes called "Europe." Each kind is used in the work for which it may be best adapted. "Coir" is strong, stiff and elastic; "Manilla" weaker but pliable when dry; "Europe" stronger but not so pliable as "Manilla." There is also wire rope, used for standing rigging and warps.

The saving of labour, so essential in all the *pulling and hauling*, is effected by the aid of blocks (on shore known as *pulleys*). The simplest method, called a "whip," is a single rope rove through a single block to lift or move light articles. More complicated arrangements of blocks and ropes are called tackles (pronounced *taykles*), and power is gained in proportion to the number of blocks used in connection with the rope.

Every rope in a ship is named. The sails are hoisted and lowered by "halyards;" they are spread out by ropes termed "sheets;" they are gathered in by "clew lines," "bunt lines," and "leach lines," ropes fastened to the lower corners, bottoms, and sides of the sails. Sail is "taken in" by hauling upon these various "lines" or ropes. It is then, if need be, "furled" or "stowed" by being rolled up neatly and closely, and bound by "gaskets" or ties. "Shortening sail" is the reduction of the area exposed to the wind. This is done by "clewing up," "furling," or "stowing" some of the sails, and by "reefing" or lessening the size of others; an operation performed by rolling or folding up part of the sail, and keeping it so by means of "reef points," short ropes fixed to the sail for the purpose. "Trimming sail" is keeping the plane of the sails at the requisite angle to the wind. This is accomplished with the square sails by the means of "braces" or ropes from the ends of the yards to the ship's side; and with fore and aft sails by the aid of the "sheets" that connect either the "boom," or the lower corner of the sail with the deck.

It is obvious that as nearly all the ropes lead to the deck the seaman should have a familiar knowledge of the exact position of each rope, without being obliged to look aloft and trace the particular rope to its "belaying-pin" or fastening place, on deck, for usually there is no time to trace it, and more

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often than not he has to work in the dark night; the whole arrangement is, however, simple; and a landsman may easily learn the name and use of every rope in sight without the need of a glance aloft.

There is another important item in regard to the ropes, and that is the coiling of them. They have lengths that must be kept on deck, at once out of the way, and in a form ready for use, that is for running out without entanglement. For these purposes they are coiled down. But as with all other things, there is a wrong and a right way of "coiling;" and the wrong leads to kinks, loss of temper, and may be, to disaster. Nearly all ropes are laid up "right-handed," and, to avoid kinks, must be coiled down "with the hands of the clock." Any one may detect the amateur coiler by observing him miss any one of the following precautions. The first thing is to see the rope well fast on its "belaying pin;" next, the whole of its length is shaken out over the deck; then the sailor begins to coil as near the pin as possible, continuing his work until the end comes to hand. The coil is then upside down, and must be taken by the side furthest from the pin and overturned. The rope will then be ready for use.

On Sundays and other holidays, when weather permits, it is customary to lay the ropes on the deck in flat discs of various elegant devices; this is termed "*flemishing down.*"

A word or two may be acceptable on *knots*. Many a man and woman has found the high practical value ashore, and especially in the bush, of a familiarity with knots. A trip at sea affords capital opportunity for acquiring this useful knowledge. Burglars have been secured, and spirit mediums exposed, animals captured, and endless traces, stirrups, and breakdowns generally, temporarily but efficiently and immediately repaired by the aid of such knowledge. The sailor uses some half dozen hitches and their simplicity makes them at once handy, easy of making, and reliable. The most useful hitches are the "clove," "timber," and "rolling" hitches; invaluable for making fast the ends of ropes to anything. The "figure of eight" and the "bowline" respectively make a knot and a loop at the end of ropes. The "reef-knot," the "fisherman's bend," the "sheet bend" (perhaps the least known but the most useful of all) and the "hawser bend," are all that necessary to make one rope's end fast to another. The length of a rope is ably reduced by the "Sheepshanks." None of the

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above mentioned knots will jam no matter what the strain upon them, i.e. they can be readily undone,) and they can, with practice, be quickly tied. We mention their names, that the passenger may before the voyage is over become acquainted with them.

Of ornamental knots and plaits and so forth there is no end, and idle fingers may find many less useful occupations than practising them. Occasion may be taken also of the opportunity to learn the simple and useful accomplishment of splicing or joining ropes together so that the join hardly shows.

There is much interest in watching the manœuvring of a vessel. The course or direction of a ship in motion is speedily affected by the movement of the rudder. Small and of apparent insignificance it nevertheless holds almost absolute sway over the action of a vessel that is moving through the water.

"Like a thought it has control
O'er the movement of the whole."

Although a steamer of 455 feet length has a rudder only 7 feet 6 inches wide, yet that small width alters immediately the direction taken by that great length.

The rudder itself is "hung" or hinged upon the sternpost, and its "head" penetrates through the decks to where the "tiller" or "helm" can be conveniently attached as a handle to turn the rudder. When a vessel moves swiftly through the water great pressure bears upon the rudder, therefore mechanical appliances must be adopted to move it with the required ease. If the tiller of such a large steamer as above instanced were worked by hand, as it is in small boats and yachts, it would take the united efforts of some twenty men to keep command over it. But by the aid of steam, or hydraulic machinery, the largest ships can be steered by one man.

It is necessary to remember that the terms applied to steering are used as though the helm or tiller itself were worked without any of these appliances. Indeed, by the words starboard and larboard, we are carried back to the old Norse days when the steering was done by a large oar; and the "helm's-man" stood on a raised platform. On his right as he looked forward was the "starboard," and to his left was the "larboard." But etymologists are at variance as to whether "star" means "this," or

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"standing" or "steering" side; and there is yet greater antagonism over the syllable "lar." As the two words are similar in sound, but directly opposite in meaning, it is not surprising that this was found confusing. It was not, however, till the year 1845 that the English Admiralty took the lead in disestablishing "larboard" altogether, and setting up "port" in its stead. The French authorities followed suit in 1881, and issued an order that *bord-tri* and *bord-bas* should be substituted for *tribord* and *babord*. When the steersman receives the order "Port," he pushes the tiller towards the port, or left-hand, side of the ship and so causes the head of the ship to move to starboard, or towards the right. If the order be "Starboard," the tiller is pushed towards the starboard, or right-hand side, of the ship and her head turns to port or to the left.

Port and starboard are the usual terms in steering, but we also hear of "up with the helm," "down with the helm," and "steady." When the wind blows strongly against the side of a ship it makes her heel over, so that one side is higher above the water than the other. This high side is termed the "weather," and the low the "lee," side of the vessel. To put the helm up is to thrust the tiller "up hill," or to the weather side of the ship, and to put the helm down is to thrust the tiller "down hill," or to the lee side; to "steady" the helm is to bring it again to the middle of the vessel, and so relieve the vessel of the effect of the action of the rudder. When the tiller or helm is as far over as it can go, it is said to be "hard over;" "hard-a-port," or "hard-a-starboard," as the case may be. By putting the helm down, the vessel's head is brought up towards the wind or "luffed," while by putting the helm up, the vessel is made to "bear up," or "pay off," from the wind.

It is evident that something may happen to the tiller or rudder-head and so render the rudder uncontrollable. It is therefore usual to fasten to the aft side of the rudder itself two chains by which, should need arise, the rudder could be moved in the absence of the tiller. Moreover, in the event of accident to the rudder, it is always possible to rig a substitute. A spar is towed astern. From the farther end of this spar lines are led to both sides of the ship's stern, she may then be steered by pulling on either line requisite.

In steering with a wheel, the mechanism is generally so arranged that

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the spokes of the wheel must be pulled down towards the side to which it is wished to turn the head of the vessel. In good steering the helm is altered frequently, but very little each time, the good steersman being always on the watch, and noticing every little tendency to deviate from the course. The passenger will not forget that the rudder is there to govern the direction in which the ship *goes*; and that it is powerless unless the ship be moving through the water, or the water moving past the ship. The landsman has an idea the rudder can turn a ship at any time; and in boats one frequently sees the uninitiated working the tiller when the boat is lying in still water. Finally, it must be remembered that, in turning, a ship does not pivot on her stern post, but somewhere nearer her head. Her bow seems to "come up," because her stern "falls away."

There are various manœuvres performed by steering, among which "tacking" or "going about" does not apply to steamers. Another manœuvre, that of "heaving to," has, however, still to be performed by steamers in heavy gales, or should the engines break down. The easiest position for a vessel when the sea is very heavy is to keep nearly bows on to it, but not to go ahead more than three or four knots—thus keeping the vessel under command without forcing her into a conflict with the waves. If the gale be too furious to be faced, sails are set, and by turning the steamer's head a little from the wind, the sails are kept what is termed "full"; she thus forges slowly ahead and rides easily over the seas.

We will next consider the steamer's anchors. Sea-going vessels, as a rule, have five anchors ready for use. The "stream" anchor is for light work and emergencies. The "kedge" is still lighter than the stream, and is used for warping, &c. The "sheet" anchor is for times of special urgency or danger. The remaining two are the working or "bower" anchors which are kept at the bows of the ship, ready for immediate use; attached to the bower anchors are the cables, which pass out from the lockers in which they are stowed, through the "hawse-holes" in the bow of the ship and are shackled on to the bower anchors.

Cables, at one time made of hemp, are now made of chain; the weight of this chain in the water gives to the cable a certain elasticity proportionate to the length used.

The anchors at sea are "stowed" or carried lashed on the bows till the

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time approaches when they are likely to be wanted. The cables are then "bent" or shackled to the anchors. The anchors are next "unstowed" and hung out over the side from the projecting "catheads" from which they are "let go" at the right moment. The requisite amount having been allowed to run out, the cable is then fastened securely or "stoppered" on board.

When the vessel is to be got under way, the cable is wound in by means of a capstan worked by steam until the anchor be right under the vessel's forefoot, and may be easily broken out of the ground. The anchor is now said to be "a-peak." Then comes the order, "start the anchor," when the anchor, is broken out of the ground, and wound up out of the water; the anchor is next brought to its place at the bow, by means of large tackles called the "cat and fish."

The term "moored" applies when two anchors are used at the same time, or when the vessel is "made fast" to buoys or anchors permanently fixed in the harbour.

The day begins with washing the decks—every morning the decks undergo their scrubbing. They are then dried with "swabs" made of ropeyarns and "squeejees," or india-rubber scrapers.

The twenty-four hours are divided off at sea into "watches" of four hours each. But in order that the same set of men should not always be at work the same hours a daily shift is created by dividing one watch, that from 4h to 8h, in the afternoon into two, termed the "dog" watches. Etymologically the word is probably a corruption of "docked;" although Theodore Hook found its derivation in the fact that these watches are "cur-tailed." They are termed the first and second dog-watches, and are followed by the "first watch," terminating at midnight; the "middle watch," from 12h to 4h a.m.; the "morning watch," from 4h till 8h a.m.

On the Orient Line, as in all other leading passenger lines, special precautions are taken in regard to "lookouts." Two men are always stationed, one on each side of the forecastle, or on the lookout bridge, for the purpose of reporting anything that comes into sight. As this necessary duty requires the greatest vigilance, these men are relieved every hour.

Time on board ship is marked by "bells"; the bell is struck in single and double strokes. From the beginning of each watch one stroke is struck

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PROMENADE DECK.

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for the first half-hour, two for the second, and so on until "eight bells," or "four bells" in the first dog watch, marks the change of watch.

"Sail ho!" is a cry which always rouses interest on board, and a desire is felt to pass within hail of the strange ship, and exchange greetings.

Speaking at sea is much resorted to—chiefly for purposes of giving and telling ships' names, with a view of reporting on arrival in port; occasionally the longitude is asked, and not unfrequently important news given. It is seldom that the vessels approach near enough to one another for the use of the speaking trumpet. The more usual method is by means of flags working a code which is registered in a book. The code now in universal use is that known as "the Commercial Code," which has been adopted by all the leading nations: the flags representing the consonants of the alphabet.

There are certain occasions at sea when signs are necessary which tell their own tale at once, without reference to any code. Not long ago, a signal made at sea might mean anything. Rocket, gun, blue-light, or flare-up might mean that a ship was in distress, or wanted a pilot, or was amusing herself. But the Board of Trade has now, by the 18th and 19th Sections of the Merchant Shipping Act, directed that these signs should have a definite meaning. According to these new rules, a blue light every fifteen minutes, or a white light flashed at short or frequent intervals for about a minute each time, are signals for a pilot. A gun at minute intervals, "flare-ups," or rockets and shells, fired *one* at a time, at short intervals, are all signals of distress: and there are heavy penalties enjoined against those who use these signals unnecessarily.

All the large steam lines have night signals peculiar to themselves, registered with the Board of Trade. The night signal of the Orient Line is red and blue lights burned alternately.

To prevent collisions legislation has established the well-known "Rule of the road at sea." And it is matter for marvel that considering the large number of vessels traversing narrow seas in every direction night and day collisions are so few and far between. There are two classes of vessels moving across the sea: steamers and sailing vessels; and the cardinal rule of the road is that steamers keep out of the way of sailing vessels, no matter how they are meeting or coming near each other.

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There are three ways by which vessels approaching each other at sea may come into collision, *viz.* by meeting "end on," by crossing, and by overtaking.

1. Vessels *meeting "end on,"* pass to the right of each other; go to starboard or to the right by "porting" the helm; doing exactly the opposite to what a driver in a London street would do.

2. Vessels *crossing each other* require more complex rules. If they are both steamers that one which has the other on its right hand or starboard side must keep out of the way. If they are both sailing vessels and both "close hauled," *i.e.*, beating to windward, then the one with the wind on her left side, that is the one on "the port tack," must keep out of the way of the other on "the starboard tack." But if one sailing vessel is "going free" and the other is "close hauled," the one "going free" must keep out of the way.

3. With vessels *overtaking* one another, the overtaking vessel has to keep clear of the other; but the overtaken ship must show from her stern a white light, or a flare-up light.

We add a few well-known applications of these rules which are worded for night work, as vessels are then legally bound to carry lights. On each bow is carried a bright light, showing the light on its side of the bow only, and round an arc of a little more than a right angle. The light on the starboard bow is green; that on the port bow is red. (These colours may be remembered by the fact that the light on the *port* side is the same colour as *port* wine.) Steamers in *addition* carry a bright white light at their masthead; and steamers towing other vessels carry two white lights at the masthead.

1. In regard to vessels *meeting end on* we have such rules as the following, known to all sailors:—

"*Green* to *Green*, or red to red,
Perfect safety, go a-head."

or again,—

"When *both* lights you see ahead,
Port your helm, and show your RED."

2. In the case of *vessels crossing* we have a fertile cause of collisions too many cases they follow the rule which reason of the fact that in

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only applies to vessels meeting end on. Hence it is said that *the reckless use of Port Helm leads to collision.*

There is a short rule for vessels crossing:—

"If to your starboard RED appear,
It is your duty to keep clear,
With GREEN to port you've nought to do,
For GREEN to port keeps clear of you."

3. In regard to "overtaking vessels" the overtaken ship (inasmuch as she can see the bow lights of the overtaking vessel, whereas the overtaking vessel may see nothing of her), must take care to let the other vessel know that she is to keep out of the way, by showing a white light or burning a flare-up over the stern.

Among the International Regulations for preventing collisions at sea, are the following rules for signals in fog or mist:—

i. Steamers under way make a prolonged blast at intervals of not more than two minutes on their steam whistles or horns.

ii. Sailing vessels under way shall make with their fog-horns, at intervals of not more than two minutes, when on the starboard tack, one blast; if on port tack, two blasts in succession; and three blasts in succession if with the wind abaft the beam. The more you hear of a sailing vessel the less you have to keep out of her way.

iii. All vessels at anchor to ring a bell at two minutes' interval.

Such are the various classes of rules; but in all cases safety depends on a good look-out being kept. Nor is this necessary only ahead, for in these days of steamers vessels come up abeam with startling rapidity, and if just abaft the beam they may not see the side-lights. Careful "look-out," both by officers and men, is a point insisted upon in the Orient Line.

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CHAPTER III.—NAVIGATION.

NAVIGATION, or the art of Piloting, was divided by the early mariners into two parts: common and proper. Common Piloting is that knowledge which teaches how to coast along shore, or to sail or steam within sight of land. Proper Piloting is that knowledge which teaches how to sail or steam across the ocean out of sight of land, and to navigate by aid of celestial instead of by terrestrial bodies.

On the Orient steamers, passengers will notice with what perpetual care the navigation is conducted. The "taking of observations" by captain and officers about the time of waiting for the breakfast bell, and at noon-day; the frequent manipulation of the azimuth compass that stands conspicuous on the navigating bridge; are every day phenomena of which the industrious passenger will inevitably desire some intelligible explanation. An acquaintance with the first principles of navigation can be acquired by a little application during the voyage; such knowledge might prove of practical value to men who may find exploring or travelling duties before them.

The Navigator is always required to know his position on the surface of the globe, or the latitude and longitude in which the ship under his care may be situated.

Taking a Departure.—The local pilot having left the ship, the navigator's first care is to take a departure, that is, to carefully fix the vessel's position on the chart by means of the land in sight. This forms the initial position for the voyage. From the latitude and longitude thus obtained, the first course is steered, and first distance reckoned. By taking a careful *departure* at the beginning, the sailor gives fair promise of making a good *landfall* at the end of the voyage.

Latitude is the distance the ship may be north or south of the Equator, or the great circle on the earth that is equidistant from the north and south Poles. Latitude is measured in degrees that are all equal to each other, and of which there are ninety between the Pole and the Equator.

Nautical miles, or knots.—All direct distances in navigation are measured nautical miles, or knots. A nautical mile is the sixtieth part of a degree

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DIRECT DISTANCES.

PORTS.	By St. Vincent and the Cape of Good Hope.	By Suez Canal.	By Cape Horn.
LBERT DOCK to ADELAIDE ...	12,207	10,806	13,868
" MELBOURNE .	12,507	11,111	13,266
" SYDNEY ...	12,999	11,608	13,175
" WELLINGTON	13,977	12,581	11,975

APLES, add [illegible] miles; if calling at NAPLES and ADELAIDE, add [illegible] miles to this distance

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21	4,044	Cape Recife.				
61	5,064	4,20	Table Bay.			
91	9,014	4,370	3,160	St. Vincent.		
43	11,256	6,622	6,902	2,25[illegible]	Plymouth.	
68	11,571	6,987	6,807	2,357	305	ROYAL ALBERT DOCK.

DEIRA, NOT AT ST. VINCENT.

50	9,763	5,119	4,699	1,042	Dublin.	
50	10,973	6,820	5,909	2,252	1,210	Plymouth.
45	11,278	6,634	6,314	2 357	1,515	305 ROYAL ALBERT DOCK.

	175	Kingston.	C. Spartivento.						
	450	875							
	168	988	718	Tarifa.					
	817	1,162	887	174	Cape St. Vincent.				
	847	1,279	997	884	110	Cape Roca.			
	597	1,588	1,247	584	360	850	C. Finisterre.		
	197	2,088	1,747	1,084	860	750	600	Plymouth.	
	508	2,887	2,048	1,889	1,165	1,055	805	804	ROYAL ALBERT DOCK.

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of latitude, and being 267 yards longer than the statute mile, great care must be taken not to confound the nautical mile with the statute mile, the sea mile with the shore mile. To convert knots into statute miles, multiply the number of knots by 1·15, or roughly, add one-sixth of the number of knots —six knots being equal to nearly seven statute miles.

Longitude is the distance a ship may be east or west of the meridian of Greenwich, or the great circle upon the earth that passes through Greenwich Observatory and the north and south Poles. Longitude is measured in degrees which, unlike the degrees of latitude, are not all equal to each other, but vary in size according to the latitude in which the longitude is reckoned. The cause of this inequality in the degrees of longitude will readily be seen by looking at a terrestrial globe. On this practically true representation of the earth, it is evident, that although the degrees of latitude are all equal to each other, yet there must be a great difference, in different parts of the world, in the length of the degrees of longitude. At the equator they are certainly like those of latitude, each equal to sixty nautical miles, but through the meridians all converging towards the pole, the size of a degree of longitude must decrease in proportion to its distance from the equator. Its length depends therefore upon the latitude in which it is reckoned. For instance, a degree of longitude which at the equator is equal to sixty nautical miles, in latitude 30° is equal to fifty-two, in latitude 60° to thirty, and in latitude 80° has decreased to about ten and a half nautical miles. Longitude is also measured in time, that is, in hours instead of degrees, for the following reasons: the earth, in her motion on her axis and in her orbit round the sun, describes, once in nearly twenty-four hours, a complete circle, or 360 degrees. Hence the longitude of a place may be measured by the time the earth takes to revolve through the distance between the meridian of Greenwich and the meridian of that place; that is, the earth turns through 360 degrees in twenty-four hours, through 180 degrees in twelve hours, through 90 degrees in six hours, and through 30 degrees in two hours. A place therefore may be said to be situated in longitude 30 degrees East, or in 2 hours east of Greenwich.

Arc and Time.—In reckoning by arc or by degrees, each degree is divided into sixty minutes, and each minute into sixty seconds. In reckoning by time or by hours, each hour is similarly divided into minutes and seconds. But a distinct notation for each of these has been adopted; degrees, minutes, and

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seconds being represented by ° ′ ″, and hours, minutes, and seconds by ^{h} ^{m} ^{s}; and care should be taken not to use the same marks for both, as great confusion will arise by so doing. Longitude in arc and longitude in time are easily convertible, for since 360 degrees is the equivalent of 24 hours, 15 degrees is equal to 1 hour, 1 degree to 4 minutes, and 1 minute to 4 seconds; or $360° = 24^{h}$, $15° = 1^{h}$, $1° = 4^{m}$, and $1′ = 4^{s}$.

Charts.—A chart—without which navigation would be impossible—is a marine map intended especially for the use of seamen. A chart is constructed for the purpose of ascertaining the position of a ship with reference to the land, and of finding the direction in which she is to steer, and the distance she has to sail or steam.

For the purposes of navigation it is necessary to exhibit the seas and oceans on flat surfaces. Charts are therefore artificial representations of portions of the earth's surface delineated upon a cylinder instead of upon a sphere. This idea, conceived by Gerard Mercator, a Fleming, in 1569, and perfected by Edward Wright, an Englishman, is known as Mercator's projection, and charts constructed upon this principle are universally used, as upon such charts the track of a ship always steering the same course appears as a straight line.

On the globe the meridians all converge towards the pole, the degrees of latitude are all equal to each other, those of longitude unequal: on a Mercator's chart the meridians are drawn as parallel lines, and the degrees of longitude are all equal to each other. To compensate for this error, the degrees of latitude on a Mercator's chart are distorted, being extended as they leave the equator beyond their true lengths, in the same proportion as the degrees of longitude on the globe diminish in size as they approach the Pole. The length of the degrees of latitude on a chart consequently increases as the latitude increases, three and a half degrees in the latitude of 70° being equal to 10° in the neighbourhood of the equator. It is, however, only when equatorial and polar regions are thus contrasted on the same chart, that the distortion is so evident; contiguous countries and seas appear but little out of their true proportion to each other, and no other projection has been discovered that so well meets the general requirements of the sailor.

In charts, the upper part, as the spectator holds it, represents the *true* north, and that towards his right hand the east; latitude is accordingly measured on

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the right or left sides of the chart, and longitude on the top or bottom edges. All distances must be measured upon the latitude scale, using that part of the scale which is in the same latitude as the ship; *e.g.* distances between places in latitude 50° and 60° must be measured upon the latitude scale between 50° and 60°. Besides charts employed in ocean navigation, *plans* of harbours, islands, or small districts, are constructed on convenient scales for reference when a ship is close in with the land. On these plans are inserted the leading marks for channels, or for avoiding sunken dangers, with numerous other details of importance to the sailor.

The surface of the sea on charts will be seen to be studded with numerous small figures. These are the soundings; they indicate the depth of water through which the ship may be moving, or the nature of the unseen bottom of the sea, and give information of the utmost importance to the sailor. No matter how well the land may be surveyed or finely delineated, unless the soundings are shown, a chart is of little use to the navigator. In consequence of the changes that are constantly occurring through the building of new lighthouses, the improvements and alterations in the character of the old lighthouses, the changes that necessarily happen in the buoyage of channels, the discovery of new dangers, and the variations that in the course of time take place in the mouths of rivers, the charts in use on board ship perpetually require correction. The Admiralty and Trinity House issue from time to time *Notices to Mariners*, giving full information upon these alterations, which it is the duty of the sailor to see made upon his charts. The Orient Company have their charts inspected and corrected before each voyage, and every care is taken to insure their steamships leaving port as efficiently provided as are the vessels of Her Majesty's Navy.

The Compass.—The applicability of the magnet for the purposes of navigation, was recognised in Asia long before Europeans were aware of its value. The Chinese used the magnet in 2634 B.C., calling it *tchu-chy*, the directing stone, and the earliest travellers speak of Arab sailors floating the magnetic needle in water and so finding their north. The compass is an instrument which utilises the directive force of the magnet. The needle, or magnetised bar of steel, is attached to the under side of a circular card carefully poised upon a fine point rising from the bottom of a brass bowl. The circumference of this card represents the horizon, and is divided into thirty-two divisions

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called *points*, and also into 360 degrees. The four principal points, or as they are called the *cardinal points*, are North, South, East, and West; and are written by their initials N., S., E., and W. The rest of the points are named by combinations of these four letters; those which lie midway between the several pairs of the cardinal points being defined as N.E., S.E., S.W., and N.W.; a third combination gives N.N.E., E.N.E., E.S.E., &c.; and so on, until each point has its name expressive of its angular distance from a cardinal point: thus N.N.E. means 22° 30′ from the North point towards the East, E.S.E. 67° 30′ from the South point towards the East. To "box the compass" is to repeat the points in the right order. The *binnacle* is the case or box which contains the compass; it is glazed and furnished with suitable lamps to illuminate the compass at night.

Variation and Deviation of the Compass.—The magnetic needle seldom directs the north point of the compass card to the *true* North. There are two causes for this irregularity, known as Variation and Deviation, and named east or west as the north end of the needle is drawn to the right or left of the true North. Variation is the disturbance caused by terrestrial magnetism, and varies with the geographical position of the ship. The variation of the compass even in the same place alters in course of years. In London in 1576 the needle pointed 11¼ degrees to the *east* of the true North; about 1660 there was no variation; in 1815 it pointed 24½ degrees to the *west* of the true North, since which time it has gradually returned towards the true North, as in 1882 the variation was only 18 degrees westerly.

Deviation is a further disturbance arising from the effect of magnetic influences in the ship itself which carries the compass, such as the local attraction of the iron in the ship. These influences can be counteracted by such means as placing the compass above the deck out of the attraction of the iron in the hull, or by surrounding it with a counter attraction of magnets.

When it is desired to discover the total error of the compass, *i.e.*, the effect of variation and deviation combined, the "bearing" or direction of the sun is taken by the ship's compass, the *true* bearing is also calculated, and the difference between these bearings is the total error. The *true* bearing of a heavenly body can always be obtained because its motions are known. Thus, when any heavenly body is at its highest altitude it bears *true* north

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or *true* south of the observer. Again, at rising and setting, the celestial body touches the horizon at a known number of degrees from the *true* east or *true* west—this is its "amplitude." Tables are published giving the *true* bearing of the sun, for every four minutes throughout the day, as well as its amplitude at rising and setting. To one of the compasses on board, known as the Azimuth compass, is affixed a small movable mirror which reflects the sun down to the horizon in connection with the compass, and so enables its bearing to be taken with greater accuracy.

In the steamers of the Orient Line the error of the standard compass is determined at least once in each watch, day and night, when the weather permits, and is duly recorded in a compass log for reference.

The necessity for this continuous watch over the compass will be readily admitted when it is remembered that an undiscovered error of half a point in that instrument, would, in a distance of 100 miles, place a vessel nearly ten miles right or left of her intended destination.

The Log may first be considered as the instrument by which the apparent distance sailed over in a given time is determined on board ship. The common log consists of a *log-chip* or *log-ship* (often exclusively called the log) and the *log-line*. The log-ship is a thin wooden quadrant of about six inches radius, loaded with lead sufficient to make it float upright; the log-line is the line attached to the log-ship: this line is divided, and marked in equal spaces, known as *knots* and *half-knots*. When used, the log, and some portion of the line known as the *stray-line*, is thrown over the stern, the log soon losing the impetus of the vessel, remains stationary in the water, and the line is permitted to run out freely as the ship steams onward, for an interval of time marked by a sand-glass known as the *log-glass*. The line is then stopped, and the length that has run out is the distance the vessel has travelled in the time shown by the sand-glass. As the knots and half-knots on the log-line are so placed, that the length between each mark bears the same proportion to a nautical mile, as the time measured by the log-glass does to an hour; no calculation is necessary, the number of knots run out representing the rate per hour at which the vessel is then travelling. The patent log is a piece of modern mechanism, that measures automatically the distance a ship travels at sea; a rotatory fan, that revolves a certain number of times in passing through a certain distance in the water, is attached to a box in which, by means of wheel work, these rotations are registered upon dials.

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The term "Log" is also applied to the *Log-book*, or the official daily record of the ship's proceedings. The number of knots steamed, together with the *course, i.e.* the direction in which the ship has been steered as shown by the compass, is entered every hour in the log-book in columns ruled for the purpose. The direction and strength of the wind, the state of the weather, the bearing of any land that may be in sight, the soundings that may be obtained, anything in fact that relates to the navigation of the vessel, are religiously entered in the "Log."

Dead Reckoning is a method by which the ship's position is found from the courses steered, and the distance she appears to have run through the water. Every day at noon the progress the steamer has made in the past twenty-four hours is deduced from the hourly entries in the log-book; the amount of change she has thus made in her latitude and longitude is found by plane trigonometry, applied to the position found for the preceding day, and the new situation determined. The latitude and longitude so estimated are entered in the log-book as the "Position by Dead Reckoning." The place of the ship thus found must however be considered as approximate, as, in working the dead reckoning, no account can be taken of unforeseen changes in the compass, drift caused by the violence of wind—errors that may occur, even in the most carefully conducted ships, in steering and logging. Nevertheless in fogs and cloudy weather, when the land, or sun, or stars, cannot be seen, dead reckoning is the only method of finding the ship's position, and the constant care of the good pilot is to see that the ship is kept upon her course, and that the distance run is correctly estimated.

Currents.—Among the causes which prevent the true position of the ship from being found by dead reckoning are the currents of the ocean. The ship is not only moving through the water, but that water may also be moving over the surface of the earth. There are Drift currents, and Stream currents. The Drift current is merely the effect of wind upon the surface of the water, as the drift of the Trade wind, where the whole surface of the sea is converted into a slow current moving to leeward. The Stream current is caused by the accumulation of this drift into a collective mass by the intervention of some obstacle; the water thus banked up takes the direction imposed upon it by the obstruction, and becomes a stream or current pursuing its way like a vast river through the ocean. These "oceanic rivers," of which the well-known Gulf Stream in the North Atlantic, and the Agulhas current in the South Indian

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Ocean, may be cited as instances, vary in breadth from 50 to 250 miles, and run with such rapidity as to be uninfluenced materially by wind, except near their borders. The stream currents are generally warm, and where they flow against the colder waters from the polar regions, sailors are prepared for unsettled weather, with cross and turbulent seas which always attend these meetings of the waters. As a practical knowledge of the localities, directions, and velocities of these ocean currents is most necessary to the navigator, special charts are published by the British Admiralty, giving full information upon this important subject.

The Sextant.—Before treating of the methods by which a ship's position is found at sea by the assistance of sun, moon, or stars, or "by observation," it will be necessary to describe briefly the instruments used in that process. For the purposes of navigation, an instrument is required by which the angle at the eye between a celestial body and the horizon can be accurately measured. The want of such an instrument was severely felt by our forefathers of the sea, who nevertheless did great things in navigation by means of such indifferent implements as the cross-staff and astrolabe. The cross-staff consisted of a straight, square, graduated staff, with two wooden cross pieces made to slide along it; by moving one of these to or from the eye placed at the end of the staff, until one end of the cross piece appeared to touch the sun, and the other end to touch the horizon, the required angle, or altitude of the sun, was crudely measured. The astrolabe was a graduated circle, having a movable diameter carrying sight vanes; it was suspended by a ring made to represent the zenith, and the angle was measured by moving the diameter until it was directly in line with the sun from the eye. The great want of an efficient instrument was met in 1730 by John Hadley, who by the invention of the sextant conferred a never-to-be-forgotten benefit upon the sailor. In the sextant, two mirrors, one movable and one fixed, are used to measure the required angle by means of reflection. The movable reflector, called the index glass, is placed at one end of a metal bar, on the other end of which is a vernier, that can be moved round a graduated scale, which is marked upon the curved side of the sextant. The fixed reflector, called the horizon glass, has only one half of its surface silvered; the observer looking at the horizon through the unsilvered half, by moving the bar carrying the index glass, causes the reflected image of the heavenly body seen on the silvered half of the horizon glass, to just

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touch the line of the horizon. This done, the observer then clamps the bar to the graduated side of the sextant, and reads the required angle noted thereon. Shades are attached to the sextant to moderate the brightness of the sun.

Latitude by Observation.—Provided the sun or stars are in sight, and the horizon clear, the navigator can always obtain his position by observation. The heavens may be regarded as a hemispherical vault, termed the celestial concave, resting on the curved circular surface of the earth, in the centre of which he stands. Where the vault touches the circumference of this surface is the *Horizon*. Exactly over his head in the vault is the *Zenith*, distant therefore ninety degrees from the *horizon*. Now in this vault is another point known as the Pole of the heavens. If this *Pole* were marked in the sky, the determination of the latitude would be simple, for it is a well-known astronomical fact that the *altitude*, or height of the *Pole* above the horizon is equal to the latitude of the place. By means of the *Nautical Almanac* the sailor is, however, able to find at any instant the distance on the celestial concave between the sun and the *Pole*. This is called the *Polar Distance*. Every day at noon the sun on attaining its highest altitude, is said to "cross the *Meridian*." If, then, at the instant that the sun crosses the *Meridian*, the sailor measures the *altitude* with his sextant, he is able, by subtracting the *altitude* from ninety degrees, to find the sun's distance in the celestial concave from the *Zenith*. This is called the *Meridian Zenith Distance*. The difference between the *Meridian Zenith Distance* and *Polar Distance* must be the distance between the *Zenith* and the *Pole;* which, if taken from ninety degrees, will give the *altitude* or height of the *Pole* above the *Horizon*, which is the latitude of the place. This observation, to determine the latitude by sun, moon, or star, must be taken at the moment of the body's highest altitude—in other words, at its "meridian passage." This explains the assemblage of officers with their sextants every day when at sea, a little before noon.

The Chronometer.—Time is an important element in the practice of navigation, for, as it has been before remarked, longitude is measured in hours as well as in degrees. All places upon the earth's surface have a different time, unless they happen to be situated exactly upon the same meridian, *i.e.* upon the same great circle which passes through them and

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the Poles of the earth. There is Greenwich time, and Paris time, Melbourne time, and Sydney time. The cause of this difference of time is the rotation of the earth. As the earth revolves, every spot upon its surface must come in turn directly under the sun. At that instant the sun appears to attain its highest altitude, is said to be on the meridian of the place in question, and it is there noon, or twelve o'clock *by the sun*.

As the earth completes one revolution under the sun in about 24 hours and moves uniformly, it is evident that distances can be measured by time; the 360 degrees of the earth's circumference representing 24 hours, 180 degrees 12 hours, 90 degrees 6 hours, &c. If then we can ascertain the true difference of time between two places, we know the distance their respective meridians are apart, and therefore their *difference of longitude*. To find the time at the ship is a simple matter, as will shortly be shown; the difficulty is to find the time at Greenwich. Longitude as has been before pointed out is reckoned from Greenwich. If the time at Greenwich be accurately known, then the difference between that time and the time at the ship must be the longitude *in time*. The inability to find reliable Greenwich time at sea, the great difficulty with our forefathers, was solved by the invention, by J. Harrison in 1765, of the *Chronometer*, or as it has been well called the *Timekeeper*. Hadley gave us the sextant; Harrison the chronometer; may their names live for evermore!

The chronometer is a watch of superior construction used by the navigator to determine his longitude. Its mechanism is upon the same general principles as that of a common watch, with the addition of a contrivance for counteracting the effects of changes in temperature. The chronometer is therefore furnished with a compensation balance, formed by a combination of metals of different expansive capacities. Another cause which affects the good going of watches is the violent action to which they are at times subjected. Chronometers are, therefore, defended from violence by their cases being lined with cushions; they are kept in a horizontal position by suspension in gimbals, and on being received on board, are stowed in a room specially prepared for their reception, and on no account subject to removal or displacement. By means of the chronometer the navigator is able to carry in his ship that desideratum, Greenwich time. On leaving port he is careful to know the *error of his chronometer*, *i.e.*, how much it is fast or slow of Greenwich time; he also finds

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its *daily rate*, or the number of seconds the chronometer may gain or lose every twenty-four hours; by these means he is able, with very little labour, to tell at any required instant during the voyage, the time at Greenwich.

Longitude by Observation.—Provided there is a clear horizon the time at ship may be found by the aid of the sun or stars. It will be sufficient here to explain how it is found by means of the sun. The sun, as it appears to move across the sky, may be regarded as the hour hand of a great celestial clock. At the instant of the sun's attaining its highest altitude, or crossing the meridian, it is twelve o'clock *by the sun*. Could the hours be marked in legible characters upon the firmament, no observations nor calculations would be necessary; as however these facilities are denied to the mariner, he has to resort to a process by which he can determine the time at ship. In any spot on the earth of which the latitude is known the time can also be found from the altitude of the sun, because in its apparent course across the celestial concave, between rising and setting, the sun attains certain altitudes at certain times. By help of the sextant, the altitude of the sun is therefore measured, and from this observation the time at ship is calculated by spherical trigonometry. At the instant of taking the altitude, the time by chronometer is also noted, and Greenwich time obtained; the difference between which and the ship's time is the *longitude in time*; this converted into arc or degrees gives the *longitude*. The *latitude* has already been found from the meridian altitude of the sun, and the ship's position is thus satisfactorily determined by observation.

Attention must here be called to an important fact that the time obtained by observation at the ship has to be corrected by what is called the *Equation of Time*; that is the difference between sun time, or time shown by a sun-dial, and the time shown by a clock going correctly. This difference, noted in ordinary almanacs as "clock before sun," or "clock after sun," amounts twice in the year to more than a quarter of an hour. Time by the sun, called *Apparent Time*, has therefore to be corrected by the Equation of Time, and changed to time by the clock or *Mean Time* before it can be used with the time obtained from the chronometer, which is always the *Mean* time at Greenwich.

Longitude may be obtained at sea by the heavenly bodies independently of the chronometer. Certain phenomena can be predicted to take place at certain times at Greenwich, such as the eclipses of Jupiter's satellites, or the

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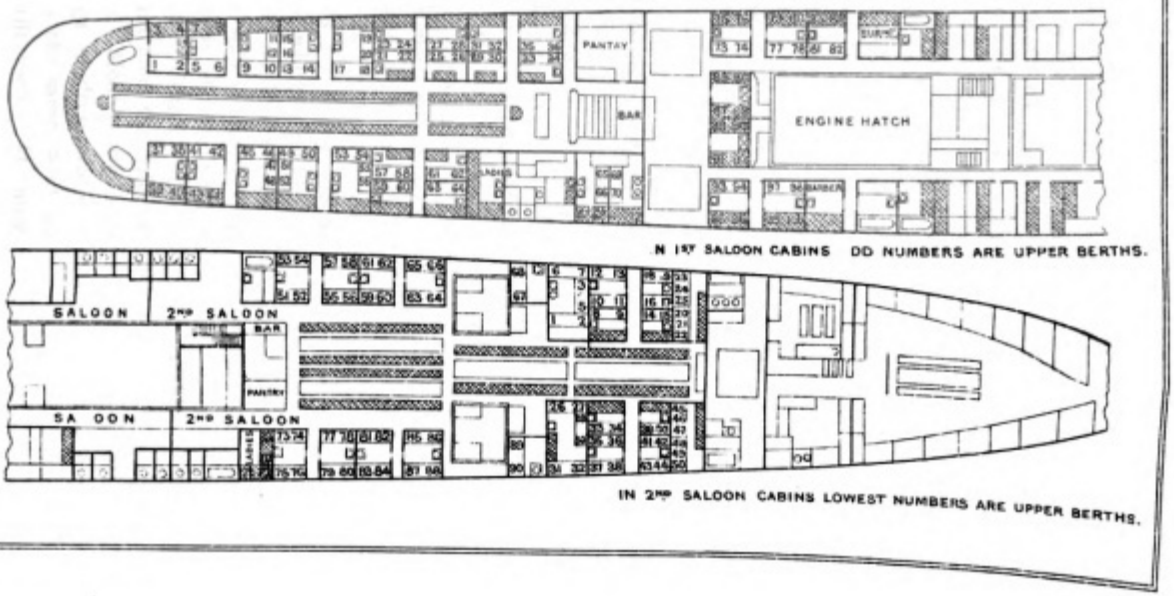

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occultation of stars by the moon. In the Nautical Almanac are also registered for every third hour of Greenwich time the distances in the celestial concave between the moon and certain well-known heavenly bodies. To observe the eclipses and occultations requires a steady and powerful telescope; to measure the distance between the moon and the stars necessitates the possession of a superior class of sextant, advanced observing powers, and some labour in calculation, the resulting determinations being much more liable to error than those obtained by chronometer. An error of half a minute of arc in measuring the lunar distance would affect the longitude to the extent of fifteen minutes. (See Chapter VIII.)

Making the land is one of the most important operations in navigation; to make a good landfall being a point of honour with the proper pilot. Letting it be granted that favourable weather has allowed the ship's position to have been obtained by observation there is but little difficulty in making the land of a coast that is fairly laid down upon the charts. It is said that at such an hour a certain lighthouse or headland will be seen, or if soundings have to be taken such a depth of water will be found, and these predictions will be found to be trustworthy.

The Lead.—At times, however, the land has to be made when the sun or stars have not been seen for days; then is felt the value of keeping a good dead reckoning and possessing a knowledge of the currents. There are, of course, even to the passenger numerous indications of the vicinity of land, coast birds and sea-weed may be seen, more vessels may be passed, and the water may change its tint; but in thick weather the pilot, on approaching land, trusts to one of the best inventions for saving life at sea—to that simple but important instrument *the lead*, which is nothing more than a piece of lead attached to a line measured and marked in fathoms, used to ascertain the depth of water through which the ship is moving. The depth of water and nature of the bottom of the sea is shown upon the chart by means of small figures called soundings; (see "Charts," above) by their aid, and using the lead as a beetle does its antennæ, the pilot feels his way in towards the land, in the densest of fogs. Modern ingenuity has invented sounding machines by which the soundings in deep water can be obtained with greater facility, but the principle is the same, and when in less than 20 fathoms the old lead and line is still used. It may here be remarked that true sailors

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never neglect the four L's in navigation, viz., Lead, Log, Lookout, and Latitude.

Cross Bearings.—When in sight of land the position of the ship is fixed from time to time by taking what are called "cross bearings." Two straight lines can only cross each other in one point. If at the same time a light-house bear north from a vessel, and a promontory north-east, and lines on their bearings are ruled from the same lighthouse and promontory upon the chart, the intersection of those lines must be the vessel's position. The place of the ship may also be found by the "four point bearing." Any prominent point or building that may be marked upon the chart is watched as the vessel steams along until it bears four points on the bow: *i.e.*, if the ship be steering W. until it bears N.W.; the time is then noted. The ship is carefully kept upon the same course, and when the same object is exactly abeam, that is, at right angles to the course the ship is steering, the time is again noted. The object abeam will then be the same distance from the ship as she has run in the interval. Due allowance must be made for the set of the tide.

The distance from lighthouses or objects the heights of which are known, may be found by measuring with the sextant the vertical angles they subtend at the eye; tables are published in which the required distance will be found by entering the table with the observed angle and known height of the lighthouse or object.

Buoys will be also seen marking dangers, or the edges of navigable channels. It is to be regretted that no uniform system of buoyage has been initiated to mark by colour the port and starboard sides of a channel; the shapes and colours of buoys differ under the present regulations in almost every port.

By night the lights on the coast make navigation easy. These lights are made to differ so that the sailor may the more readily determine the position of his vessel. One will be "fixed" or permanent, another will "flash" every few seconds, while a third will "revolve" and show its light but once in a minute; some show coloured lights, others exhibit lights of greater or less brilliancy. In cases where the features of a coast are not strongly marked, or in hazy weather, it is easier to navigate by night than by day, because before one known lighthouse is lost sight of, another is recognisable.

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Judging Distances at Sea.—The distance in miles of the visible horizon, is a little more than the square root of the height in feet of the observer's eye above the sea. For example, if the observer's eye on the deck of a steamer be twenty-five feet above the sea, the visible horizon will be over five nautical miles off. Any object seen at sea whose base is beyond or farther off than the horizon, must have the square of its own height in feet, added to the distance the observer is from the horizon, to give the distance of the object. For instance suppose that the observer see only the topsails of a ship showing above the horizon, and these topsails are sixty-five feet above the sea, that ship will be about nine miles beyond the horizon, and fourteen miles distant from the observer.

Guns are often fired in a port. Take the time of the flash and the time of the sound reaching the ear. Divide the seconds elapsed by five, add one-twelfth of the quotient, and the result is the distance in statute miles. Most pocket chronometers beat 150 times in a minute, common watches vary. At a temperature of 60° Fahr. sound travels 150 yards in one beat of a chronometer beating 150 times in one minute, so that if the beats of a chronometer be counted during the interval that elapses between seeing the flash and hearing the report of the gun, that number of beats multiplied by 150 will represent roughly the distance in yards of the observer from the gun fired.

When the port to which the vessel is bound to is approached, she is boarded by the local pilot, who conducts her to the anchorage; cross bearings to fix the position of which being duly taken, the navigator's duties cease for a season.

Although these methods for determining the ship's position are in truth simple, still the passenger must remember that in obtaining the necessary observations in foul weather as in fair, and in conducting the vessel in safety from port to port, there is but little rest for the "toilers of the sea" in their continous struggle with the elements. Proficiency in the science and handicraft of navigation can only be attained by incessant practice at sea, and requires a capacity for taking trouble and unremitting attention. The true secret of the sea is thus known to few, for

> "Only those who brave its dangers,
> Comprehend its mystery."

The Stars.—There are few more interesting and attractive studies than a

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careful observation of the stars on a clear night. On board ship, as distinguished from shore life, the majority of passengers will be found to prefer the deck and sweet fresh air of the tropical evening, to the closer atmosphere of the saloons; and voyagers have thus almost forced upon them the manifold beauties of the heavens at night, or as Shakespeare makes Hamlet call it "this brave o'erhanging firmament, this majestical roof fretted with golden fire"! Observation will soon prove that stars rise, attain their meridian altitude, and set, as does the sun. Each night they will be found to rise a little earlier, as the earth changes her position with regard to the sun.

From the earliest ages stars have been grouped together into constellations named for the most part after some fancied resemblance to animals. The stars forming these clusters are known by letters of the Greek alphabet, some of the more conspicuous are further individualised by time-honoured names, chiefly Arabic. The identification of individual stars, a necessity to the navigator, forms a pleasing and attractive study to the passenger. No more pleasant observatory can be conceived than a comfortable deck-chair on a mail-steamer in the balmy tropics.

Considering the heavens by night at first induces a feeling of wondering bewilderment at the multitude, and apparently inextricable confusion of the stars. But the unchangeableness of their positions has enabled them to be mapped out from a remote antiquity.

By first taking note only of the brighter fixed stars a ready acquaintance will be formed with each, and the observer will be astonished to find how soon the map of the celestial concave will become familiar to him. It is obvious that certain stars can only be seen from certain parts of the earth. If by means of a celestial globe we represent the heavens as they appear to a spectator residing at the earth's equator, by placing the poles in the horizon, it will readily be seen that all the stars will be visible to that spectator in the course of the year. If, on the other hand, we elevate either the North Pole to the latitude of London, or the South Pole to the latitude of Melbourne, it will be equally manifest that certain stars in the southern hemisphere are never seen in London, nor others belonging to the northern hemisphere in Melbourne. Four maps have therefore been given to assist passengers in their study of the stars, viz., two polar and two equatorial, by which means a fair representation of the heavens is given for any season of the year, or for any part of the world.

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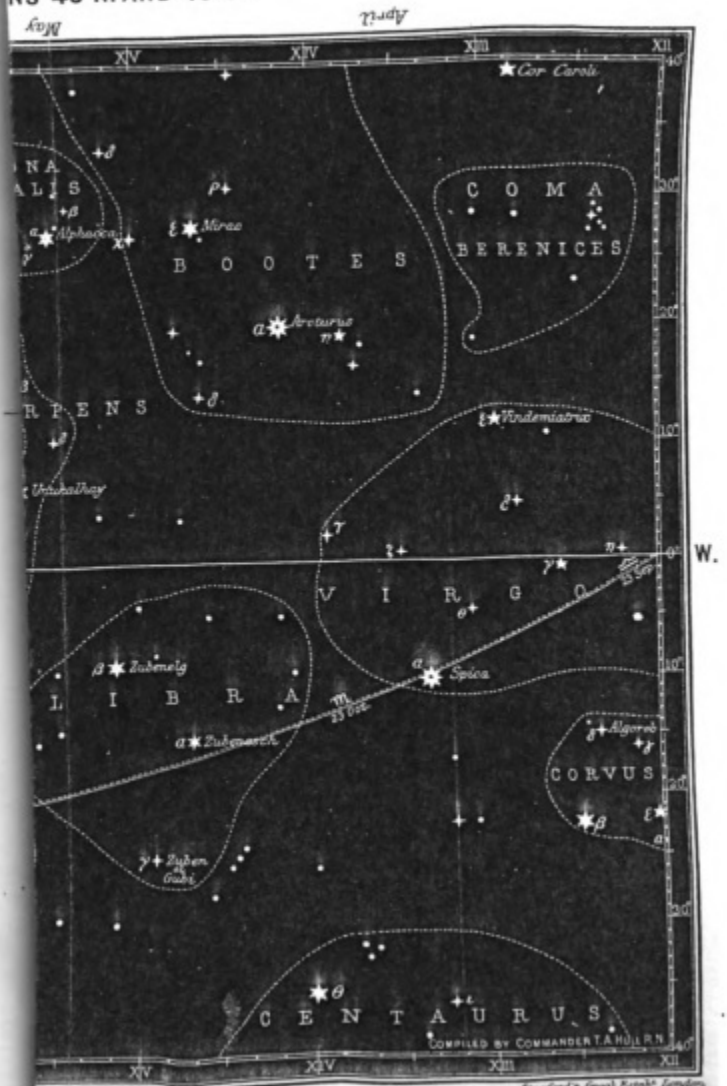

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Beginning with the north polar map, the Great already known to many, will be easily recognised to the Pole star, the last star in the tail of the stars of the conspicuous four in the Great Bear, known to this important star. On the opposite side of the Great Bear, and about the same distance from the Pole, is the constellation of Cassiopea, familiarly known as the Lady's Chair. If an imaginary line be drawn from the four stars of the Great Bear, through the four stars of the Little Bear, it will lead the eye to Deneb, the bright star in Cygnus, a constellation forming a great cross in the northern skies. To the left of this cross, looking still from the direction of the line of the Bears, is Vega, the brightest star in Lyra; while onwards in the same line, and forming a great isosceles triangle with Deneb and Vega, lies Altair in Aquila, easily recognised as a brilliant star lying close to, and midway between, two lesser stars. Continuing the tail of the Great Bear in the same curve will lead the eye first to Arcturus, the bright star in Bootes, and then to Spica, the great star in Virgo. Similarly in the southern hemisphere, the Southern Cross, and the bright stars in Centaurus which point towards the Cross, will first attract the eye. The South Pole has no star of any brilliancy in its vicinity, although close to the Pole lies *Sigma* Octantis, a small star of the sixth magnitude. The length of the Southern Cross points to the Pole, which is situated about midway between that constellation and Achernar, the bright star in Eridanus. A line through the upper and the smallest star of the Southern Cross will lead to Canopus, the largest star in Argo.

Within the tropics, during the month of March, the Great Bear and the Southern Cross will be above the horizon at the same time. Orion is a well-known constellation; his "belt" will be observed to point in one direction to Aldebaran in Taurus, the "Bull's eye," and in the other, at about an equal distance, to Sirius in Canis Major, the "Dog Star," two of the brightest stars in the heavens. Thus, with the help of the maps, it will be easy

"To know night's goodly company of stars,
And those bright lords that deck the firmament."

Their Twinkling.—One of the first lessons we learn in astronomy when we are children is that stars twinkle and planets do not. On the trip to

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Australia the observer will see that he must unlearn this nursery knowledge; for he will notice that in the tropics stars that are high up in the sky do not twinkle. And it will be observed that planets, especially when near the horizon, *do* twinkle. This twinkling or scintillation, Arago explained, is caused by the "difference of velocity of the various coloured rays penetrating the unequally warm, unequally dense, unequally humid layers of atmosphere surrounding this earth." These layers are fewer overhead; and in the tropics they are usually more equable and homogeneous than in the temperate zones. Seeing then that stars at times do not twinkle, and that planets at times do, we must look to distinguish the one from the other by the fact that "fixed" stars do not appreciably change position in regard to one another, whereas planets in one night, and even in one hour, visibly shift their position in regard to surrounding heavenly bodies. The planets can be easily placed on the maps by the positions given in the Nautical Almanac for the year.

Their Numbers.—It may startle some to be told that on the clearest night there are only about 1,500 stars distinctly visible to the naked eye in the vault of the heavens. Yet such is the fact, as may be proved from a deck-chair by actual counting. But if an opera-glass or telescope be applied it will be found that by aid of the greater power of the glass, there are more visible, and the observer will not be surprised to hear that astronomers have already counted some twenty millions of stars all told. The Catalogue of Stars of the British Association for the Advancement of Science, contains the position of 8,377 Fixed Stars. Stars differ in brilliancy, and they are divided by astronomers into classes or magnitudes. Stars of the first six magnitudes are all visible to the naked eye. Of these, there are a few more than 3,100 in number; but they are never all of them above an observer's horizon at the same time. Of stars of the first magnitude there are nineteen; and to know these by name and position is to know the sign-posts of the heavens.

There are two stars in Centaurus that point to the Southern Cross. The one of these farthest from the Cross is generally regarded as the fixed star that is nearest to the earth; but its distance is twenty thousand times that of the sun. Such distances are almost inconceivable. Supposing one could journey to the sun in one day it would take about fifty-five years to reach this nearest star—*Alpha* Centauri. It is no wonder that at such dis-

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tances even the most powerful telescopes are unable to show as disc in stars. We may see the disc of a penny at a distance with a telescope; but place it at 1,000 miles away, and one will not see more than 1,000 times the disc of a penny at most powerful of glasses.

Fixed stars, in spite of their apparent fixity, do however move. sun, a fixed star to others, travelling with his system of planets enormous orbit, is at present moving towards a point in the constellation Hercules. The centre round which the sun's orbit lies is supposed to be the Pleiades. And all other star systems are moving "in their courses" through their enormous distance their motion is to us very small. taken the nearest star to us, *Alpha* Centauri, 500 years to travel portion of the heavens as long as the apparent diameter of the moon.

Their Brilliancy and Colours.—As with lighthouses on earth, we have fixed or permanent, and revolving or temporary lights, so in the heavens some stars shine with a permanent and persistent light, while others brilliancy waxes and wanes, and sometimes disappears altogether.

In the Whale is the star Mira, *Omicron* Ceti, which each year is practically invisible for five months. After this for three months its brilliancy increases till it approaches the second magnitude, and is as bright, at times, as neighbour Aldebaran. It remains at its greatest brilliancy about a fortnight, then wanes again, and in three months more is again invisible to the naked eye.

In Perseus is the star Algol, which in the course of every three days alternates between the second and the fourth magnitudes.

The four stars in the body of the Great Bear were in the seventeenth century of similar magnitude. One, it will be noticed, has fallen off considerably since then in brilliancy.

In Orion, the star Betelgeuse alters in magnitude during a regular period of 200 days.

But perhaps the most remarkable of these stars is one that appears periodically in Cassiopeia. In November, 1572, a bright star suddenly appeared in Cassiopeia, and soon rivalled Sirius in brilliancy. In March, 1573, it began to lose lustre, and in March, 1574, it had completely disappeared. It was at the first white in colour, and then yellow, and then red. Similar apparitions, in approximately the same position, were recorded

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in 945, and again in 1264. The year 1885 would be a middle date for a return of the maximum brilliancy of this star. The passenger will thus have additional incentive to watch the constellation of Cassiopeia. The average of this star's appearance is 314 years; and this carries us back approximately to the year of the nativity, and of the journey of the wise men.

Several such recurring or variable stars have appeared most suddenly and remained, while others have completely "gone out," after shining from time immemorial; what the causes may be, is undetermined: some suppose variation in the stars themselves; others, the intervention of other bodies, or of nebulous masses in the outer heavens somewhere between us and them. The new theory that the sun in his journey through space, absorbs as fuel gaseous matter, and dust, with which space is full, may allow the supposition that such matter in suspense may, in the vast distances the stars' rays have to penetrate in order to reach us, be sufficient to intercept certain light rays, and partially deflect others.

Closely connected with these phenomena is the fact, that stars vary in colour, not only as compared with one another, but in themselves from time to time. Aldebaran and Betelgeuse, near together in Orion and Taurus, are distinctly red, as may be seen by comparing them with their white neighbours, Sirius and Regulus in Leo. The Greeks recognised only red and white stars, but modern astronomy recognises a large variety of tints; Aldebaran, Betelgeuse, Arcturus, and Antares in Scorpio, are decidedly red. The Pole Star and Procyon in Canis Minor, are yellow, Castor in Gemini is distinctly green, and Vega is blue. In long periods of time, stars change their colour; Sirius was reported red by the ancients; and stars in the Lion and the Dolphin, that at the beginning of this century were white, are now red. Astronomers are not yet confident as to the causes of these colours. Some have held them due to the relative speeds with which the stars approach or recede from earth. Others hold that the colour represents the process of formation or decomposition of the star itself; others believe it to be some not yet understood attribute of the spectrum. It may be due to the gaseous vapours and dusts that, as we have before hinted, fill space and certainly affect all rays of light permeating space.

Double and Binary Stars.—Over three thousand of the stars we know when observed through the telescope, show that they are made up of two

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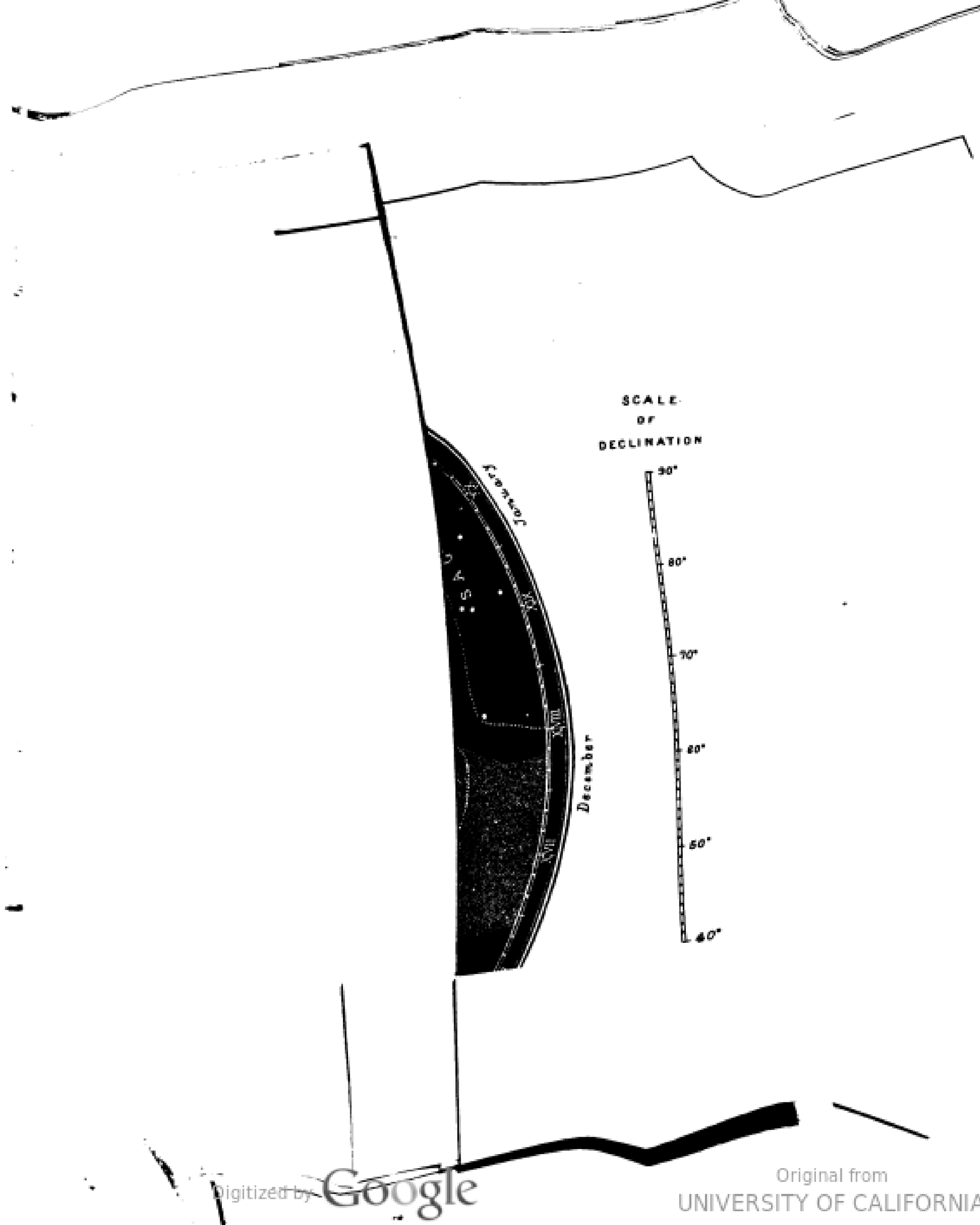

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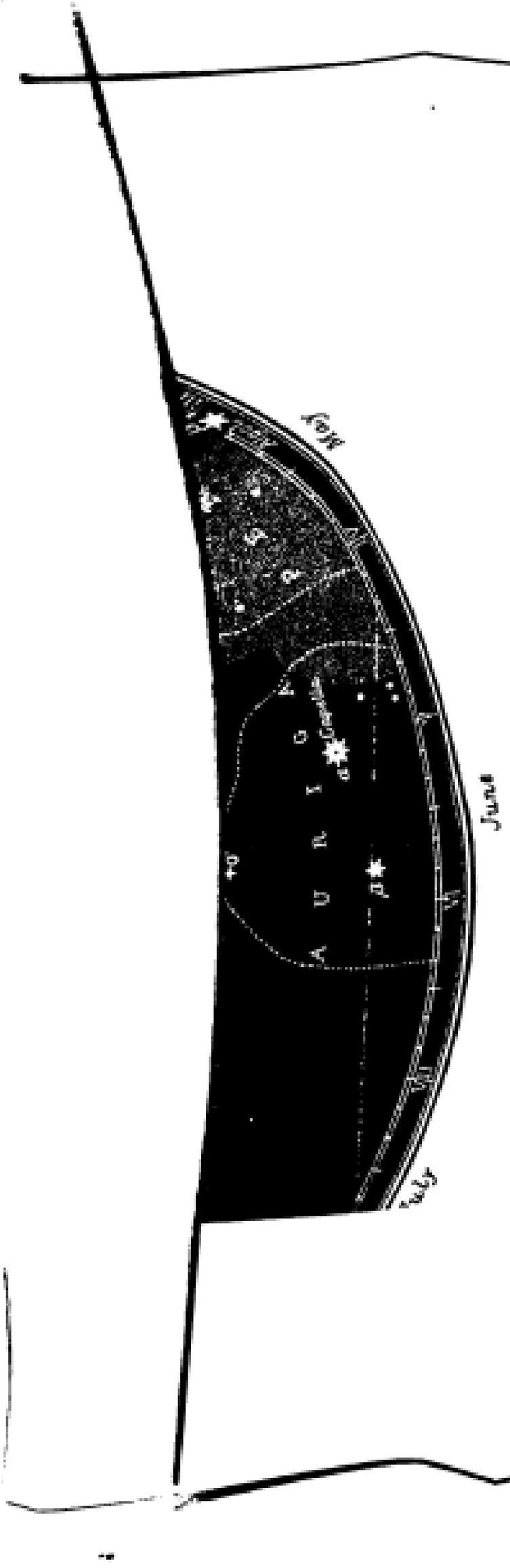

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or more stars; these are frequently of different colours. In the sword-hilt of Orion there is a star which when seen through a powerful telescope is found to form a group of no less than seven stars; while close to Vega in Lyra there are two couples or two pairs of stars, appearing to the eye as a single star. Binary stars are composed of two stars revolving about each other in regular orbits.

Clusters of stars are seen in many places in the heavens; sometimes these are mere effects of perspective, but in other cases stars do actually congregate in close vicinity. The Milky Way is the most notable example of this, consisting of eighteen million visibly separate stars. Sir W. Herschell compares it, hypothetically, to a great mill-stone in shape, the rim split open into two for nearly one-half of its circumference. We are situated nearly midway between the two surfaces, and about where the split is. As we look up or down, so to speak, we see but few stars, but as we look along, through the level of our mill-stone as it were, we see the dense numbers of stars in what we call the Milky Way. Imagination may lead us to regard our own solar system as but one in the twenty million that go to make up this mill-stone of solar systems; and it may lead us further to marvel how many of these "mill-stones," there may be occupying space. Our powers of observation at present only enable us to see the limits of our own mill-stone, and the farthest star in this is so distant that its rays of light take not less than 10,000 years to reach us.

There are also other thoughts to which an intelligent study of the heavens may lead us. In the planet Mars, we are now watching most curious lines that some hold definitely to be the work of conscious inhabitants of that planet. Space itself presents us with endless objects for thought and observation. The shooting stars appear to be larger particles of "dust" that we meet in our path through space, and that gleam either with the reflected light of the sun or with an incandescence due to the friction they encounter on entering our denser atmosphere, and which frequently ends in consuming them altogether. Then there are the comets, combinations of gaseous matter, and kernels of dust, which Mr. Huggins, by means of his most successful spectroscopic observations, has shown to shine both by the reflected light of the sun and by their own innate incandescence; and which seem, in appropriate relation to this double character of their light, to travel into and

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also out of the limits of our solar system. And lastly there are the nebulæ. Many so-called nebulæ have been resolved, by the application of superior telescopic power, into clusters of separate stars. but others admit of no such resolution, and remain masses of gaseous matter. The sky round the South Pole contains two most remarkable nebulous masses known as the Magellanic Clouds. They lie between Canopus, Achernar, and the South Pole. These two "clouds" are the largest of visible nebulæ; and although superior telescopic power analyses much of them into actual star clusters, there is a considerable residuum that is actually nebulous. Mr. Huggins has made the grand discovery, by means of his spectroscopic observations, that nebulæ are not suns, nor incandescent matter, but merely glowing masses of gas. It is this same spectrum analysis which enables astronomers to see for certain that the various heavenly bodies contain metals and elements similar to those which constitute our own earth. Thus, in the last few years, has human intelligence, by working among the metals of the lights close to hand, become gifted with the power of recognising the materials of which heavenly bodies are composed, that are thousands and hundreds of thousands of million miles distant. This is one of the grandest achievements of the human intellect; and it is part of that most suggestive science of astronomy which can be entered upon with pleasure on the long sea voyage.

Waves.—The most appreciable effect of wind on water is the wave; and it is well worth a voyage to the great Southern Ocean, to see the watery downs and valleys nature can produce. The prevailing westerly gales in the southern hemisphere drive right round the globe a continuous series of waves, the crests of which are often 30 feet high, and 390 feet apart.

Many less useful things may be done on board than registering the height of waves. The passenger standing on the deck or climbing up the rigging can bring his eye into line with the top of the wave and the horizon: he can then measure the height of his eye above the water-line of the ship, and so gauge the height of the largest wave from trough to crest. Sir James Ross observed waves of thirty-six feet in height.

The waves are generally caused by friction between wind and the mobile surface of the water; but the effects extend far and wide, like the ripple of the proverbial stone. The "fog waves" of the English Channel come rolling in accompanied by fog, but by no wind. The well-known

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"rollers" of many parts of the world appear, continue, and die away [illegible] out any local wind accompaniment. H.M.S. Julia, anchored off [illegible] d'Acunha, suddenly felt a heavy swell come on, and was eventually [illegible] away from her anchors and wrecked on the island without a breath of wind stirring. The London Meteorological Office have suggested the [illegible] coincidence that rollers prevail at St. Helena when heavy north[illegible] prevail in the North Atlantic, and *vice versa*.

The waves will often *seem* to race with the ship, but beyond [illegible] surface drift, the waves do not actually move; it *is* progress of the motion of the water, not of the water itself. In this *sense* indeed, the velocity of waves may be said to vary between *seventeen and twenty-eight* nautical miles per hour; but a piece of wood *thrown* upon them, uninfluenced by wind, will remain stationary, save *for an* "up and down motion."

This surface agitation of the waters does not affect the great body of the water. The breaking of a wave shows that its upper portion has lost cohesion with the lower, and this is the case when the impulse given to the upper part is prevented from extending to the lower by the *vis inertiæ* of deep water, or of land, or other obstruction. This causes breakers and surf. If the waves are large, they will break in very deep water.

Colour.—The colour of the sea is a perpetual object of admiration. The dull green of "soundings" passes off into the ultramarine of the deeper waters, and finally resolves itself into the "navy blue," the black blue, of the deep sea. This colour is the combined result of depth, of matter in suspension, and of the rays of light.

In this exposition of what to observe at sea, we have but called attention to the great amount of useful knowledge that may be acquired on a sea voyage by the study of the matter man sees around him.

Electric Lighting, Refrigerating Machines, and Ship's Engines.—Lighting by electricity has been successfully applied on board some of the steamships, and this additional means of comfort and safety is being extended to all the vessels in the Orient Line. The small delicate pear-shaped lamps, known as *Incandescent*, which are distributed all over the interior of the vessel, require neither trimming nor lighting; oil, wicks, smoke, and all resulting odours are therefore abolished. The present pretty illuminators are simply connected with wires along which the electric current is allowed to pass to and from the revolving dynamos.

There are two ways of producing electricity, viz., by chemical action or by mechanical action : the latter, or friction, is the method here used. The electric current is generated by independent machinery fixed in the engine-room ; this sets in motion a dynamic electric machine, which is simply a contrivance for converting mechanical energy into electric energy. The current is led from the dynamos to the various lamps along insulated wires ; after passing through the lamps it returns to the machine through the iron work of the vessel, the resistance of which to the passage of the current is quite inappreciable.

This electric current is worked at a very low tension, so low that its presence can scarcely be detected by taking hold of the bare conductors with uncovered hands.

The lamp consists of a fine thread of carbon inclosed in a glass bulb from which air has been carefully excluded. This thread of carbon offers a very high resistance to the current passing through it ; the result being that the energy is expended in raising the thread of carbon to a white heat. The permanence of the carbon is dependent on the total absence of oxygen ; should the glass bulb be broken oxygen is of course admitted and the carbon thread is immediately destroyed by combustion.

All the lamps are arranged so that they can, either singly or in groups, be turned off and on at will, by means of switches. Bridges of metal, fusible at a low heat, being inserted at different places along the wires, all risk of fire from short circuit producing high tension is thus obviated, and various other precautions are taken which render the electric light the safest from every point of view for a passenger steamship. The total absence of smell or smoke, its steadiness unaffected by the motion of the ship, combined with superior brilliancy, gives to the electric light a special value over any other means of illumination.

Mechanical refrigerating machines occupy a prominent position on board all steamships of the Orient line. All the cattle required to furnish fresh meat for the voyage are killed on shore in prime condition, and when this meat comes on board it is placed, with the necessary vegetables, fruit, and other delicacies, in insulated chambers, the temperature of which can be reduced by means of the refrigerating machines as low as — 60° Fahr. ; food is thus kept in a sound and fresh condition until required for use. The refrigerating machines are also largely used for purposes of making ice, and cooling wines

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and other fluids; thus furnishing the passengers with luxuries highly appreciated in the voyage through the Red Sea and the tropics.

Large insulated chambers are also fitted on board the steamers for the purpose of bringing quantities of frozen meat as cargo to Europe. At consignments form an important source of supply of meat to our markets.

The following description of the steamship's engines applies more to the vessels lately added to the Orient Line. The main engines are used to three-cylinder type, wherein two low-pressure cylinders are used to steam from the high-pressure cylinder, and so complete the expansion engines have been found to be economical, convenient in working, and a minimum of vibration. The propeller has four blades, which also reduce the vibration in the extreme after part of the ship.

The propeller shaft is of compressed steel, hollow from end to end. The crank shafts are also of steel, all having such a degree of strength render a breakage in mid-ocean most improbable.

There are four double-ended boilers, each of great size and built of mild steel, with a large superheater standing on each pair of boilers. Upon the superheaters stand the steamer's two great funnels, which are of oval form, so as to offer the least resistance to the wind; the funnels from the various galleys and from the donkey-boiler being brought into the main funnels. The donkey-boiler is placed above the height of the main-deck, so that even if water should get into the lower stoke-holes and put out the fires in the main boilers, all the pumps are still workable. This boiler is also connected with two large condensers, which are each able to supply two hundred gallons of fresh water per hour. It should be mentioned that the four stoke-holes are lifted by steam friction hoists which are perfectly noiseless, and are forced through the side of the ship below the main This is a great improvement, and overcomes what is ordinarily an annoyance in passenger steamers.

The power of the pumps is a specialty. There are two large centrifugal pumps with independent engines. These pumps are placed high up in the engine room, and have connexions with the bilges. They are capable of discharging two hundred tons of water per hour. A centrifugal pump is also

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fitted for pumping in or discharging water ballast, with connexion to the bilges. Besides these there are four large additional pumps, the total pumping power of the whole being equal to nearly three thousand tons of water per hour.

The model of the engines above described won gold medals at the Sydney and Melbourne Exhibitions.

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PART II.

CHAPTER IV.—The Cape Route.

Except that the Orient steamers frequently go out to Australia by way of the Cape of Good Hope during the hot weather in the Red Sea, their route both out and home may be said to be as a rule *vid* Suez; calling at Naples, and Diego Garcia, an island in the Indian Ocean. To meet exceptional circumstances, however, such as the recent political troubles in Egypt connected with Arabi's rebellion, and an epidemic of small-pox at the Cape of Good Hope, the Managers have from time to time adopted for the steamers both out and home, either the Cape route or that *vid* Suez, without regard to minor considerations, such as temperature on the voyage, &c. We will begin by describing the Cape route from the point of view of a passenger proceeding from London to Australia.

Not the least of the interesting or amusing incidents of the voyage are the places sighted or visited. At some of these it is well worth while for those not pressed for time to remain for the interval between two or more steamers. We propose, therefore, to give a brief but sufficient itinerary of all the routes followed by the Orient Steamers.

Fenchurch Street to Plymouth.—First comes the leavetaking of friends at railway stations and on piers, and the voyage is finally commenced when the screw of the big ship takes its first turn or two in Gravesend Reach—so soon as "all for the shore" are out of her. In the hurry of the moment, the passenger will have little time to survey the rich pastures behind the tidal embankment, where cattle are fattened for the London market with such succulent grasses, that as much as £6 or £7 rent per acre is often paid for the mere right of grazing. Tilbury Fort, on the left hand, bears monumental witness of England's determination to keep out the invader. As the steamer turns out of Gravesend into Sea Reach, on the

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right and left will be seen the low-lying, effective modern fortifications that command this entrance to the Port of London.

Soon on either hand the land recedes, and by the time the long pier and villa-studded shore of Southend are passed on the left, the mouth of the Medway river appears on the right hand, guarded by the fortifications of Sheerness and Isle of Grain. Further inland, the heights of Chatham tower over one of the most important of our national dockyards. On the light ship that is now passed is seen the short but pregnant word "Nore," calling up recollections of the past naval history of England. On the right, in the distance, is the flat Isle of Sheppey and the coast of Kent, with Herne Bay, Westgate, and Margate. Chalk cliffs soon commence, and the promontory of the North Foreland passed, a bee-line is taken for the South Foreland high light. Dover with its cliffs and castle are next rounded, and the steamer fairly enters the English Channel.

The Channel.—The first point passed is the remarkable shingly flat of Dungeness with its conspicuous lighthouse, this is succeeded by high downs, at the foot of which nestle Hastings, St. Leonard's, Eastbourne, Brighton, and a long succession of watering places. Next, the picturesque outline of the Isle of Wight rises boldly to protect the anchorage of Spithead, Portsmouth with its dockyard, Southampton with its steamer trade, and Cowes and the Solent, the centre of the yachting world. Passing Bonchurch and Ventnor, basking in the sunny "chines" of the Undercliff, the Isle of Wight is seen to terminate westward in the chalk "Needles," and the steamer, with a distant view of Bournemouth and St. Alban's Head, steers towards the curious peninsula of Portland. Here a mass of rock, rising like Gibraltar, is connected with the mainland by an isthmus of shingle cast up by the western drift; a breakwater constructed parallel with this isthmus forms the important and extensive refuge-harbour of Portland. Off Portland there is a great meeting of tides over an uneven bottom, causing strong eddies. This is known as Portland Race, and in tempestuous weather when wind and tide are opposed, the agitation is so violent as to render the Race dangerous to small vessels.

From Portland a bee-line is taken across the West Bay, to the Start promontory. Northward of this headland lies Torquay; and the picturesque

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PLYMOUTH SOUND & BREAKWATER.

60

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entrance to the Dart. Following along this magnificent rocky coast to the north-west the steamer enters Plymouth.

Plymouth.—The historical associations of Plymouth include the story of the defeat of the Spanish Armada, that grand vindication of national independence and liberty, civil and religious. These memories of Drake, Hawkins, and Frobisher, carry us back to the days of discovery; and the foundation of the British colonies. The *Mayflower* leaving Southampton in August, 1620, after putting into Dartmouth, finally sailed from Plymouth on 6th September to found New Plymouth in America. From Plymouth Cook and Vancouver sailed to give England New South Wales in the East, and British Columbia in the West. The famous harbour of Plymouth thus well claims the title of the cradle of Britain's Colonial Empire; and voyagers will do well to sojourn for a few days in this neighbourhood. The locality abounds in objects of interest and beauty. The scenery of the Hamoaze estuary and of the meandering Tamar and Plym are backed by the hanging woods of Mount Edgcumbe, and the higher moorlands of Devon and Cornwall. The harbour and dockyard are for extent and for variety of work unsurpassed by any in the world. It is easy to obtain admission to the best portions of the Government works.

The fortifications, as at Chatham, Portsmouth, and Milford Haven, are numerous and substantial; and it will be seen at once that Great Britain is resolved on maintaining inviolate her various great naval arsenals. The Royal Albert Bridge across the Hamoaze (Brunel's masterpiece) is worthy of note, but the object of greatest interest is the enormous breakwater which has converted Plymouth Sound into a land-locked harbour. It is nearly a mile long, and its total cost approached £2,000,000. There are many notable buildings in Plymouth, and for architectural interest, the new Town Hall is well worth inspection. It is an elaborate and magnificent structure, in size, beauty of finish, and general result, rivalling the most celebrated of the old Stadthouses of the Netherlands. Churches, theatres, museums, libraries, hospitals, and numerous other public buildings, new as well as old, ornament the towns of Plymouth and Devonport, and are evidence of the public spirit and prosperity of the 200,000 inhabitants.

Ten miles from Plymouth Sound the Eddystone rocks are passed. Rising

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abruptly from the bottom, in the midst of deep water, they have long been known to navigators. "A gentleman of Essex, of a mechanical turn" began in 1696 to construct a lighthouse on these rocks. In four years this Mr. Winstanley completed his work; but three years afterwards, in a terrific storm, he and his lighthouse were washed away together. Four years later a new lighthouse was determined on and erected; it was composed chiefly of wood, and was destroyed by fire in 1755. In 1757 Smeaton began his great work; and for more than a century his well-constructed stone lighthouse had successfully withstood the buffeting of the waves; but though sound in itself, the untiring sea had sapped its rocky foundations, and it has now been replaced by the new Eddystone lighthouse. The good folk of Plymouth are erecting the old lighthouse on their magnificent marine promenade, the Hoe, where it will remain in sight of its former triumphs and in full view of its successor. The new light is 133 feet above the water, and has an illuminating power equal to 700 candles.

The Chops of the Channel.—From Plymouth, the course steered is across the Chops of the Channel. On the right, the high moorlands and magnificent rocky coast of Cornwall are soon lost to sight. Little is seen of France except that Ushant is sighted. The steamer ploughs her way over the scene of two of the greatest naval contests France and England have ever fought. Ushant itself is a small island, inhabited by fishermen, and interesting as the last foothold of heathen idolatry in Europe. Even so late as the seventeenth century Christianity had failed to penetrate to it.

The Bay of Biscay.—Ushant, and Cape Finisterre in Spain, are the horns of the Bay of Biscay, and they are as many miles apart as there are days in the year. Into this hollow Bay is perpetually driven the great westerly swell of the North Atlantic; currents and tides are strong, and the result is the tumult of waters that has given the Bay its unenviable notoriety. Nevertheless, unless the wind be violent, the swell has little effect on the great powerful modern steamer, which speedily carries the passenger in one day across the dreaded Bay. Soon Cape Ortegal and Cape Finisterre in Spain, are sighted—Coruña recalls Sir John Moore; and the passenger looks down into the deep blue sea, feeling that somewhere beneath him rests the unfortunate turret ship *Captain* with her crew of 500 men.

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62

THE HOE, PLYMOUTH.

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Within thirty-six hours of Plymouth a different climate has been entered: balmy warmth has replaced cold and bracing airs; moreover, the prevailing westerly winds are now lighter, with occasional calms.

The passenger may amuse himself in looking out for turtle, frequently to be seen here floating on the waters asleep, or basking in the sun. Or he can remember that away to his right lie the curious Azores Islands. On these islands all tropical produce grows well, and the celebrated St. Michael's oranges flourish at a height of 600 feet above the sea. These islands are the peaks of a volcanic ridge, rising abruptly in deep water, and in activity even now. As a colony of Portugal, these islands will be of interest to Australians; and they may care to remember that they are represented in the Portuguese Parliament by four members.

When the group of islands known to the world as Madeira is approached, sea-sickness will have been forgotten, ocean-going familiarity to a large extent will have banished all reserve, and the little world of the steamer will already be plotting various social movements. The first wonders of being at sea may have lost their freshness, and observation and inquiry will succeed. The gulls and other "coast" birds have long departed, and the busy Mother Carey's chickens alone flit about the steamer's wake. The brilliant heavens at night are now more observed, because the increasing temperature not only invites, but positively compels passengers to spend their evenings on deck. Occasionally porpoises gamble round, as if to mock the best speed of the steamer; the sea is sometimes sprinkled with the pretty Portuguese man-o'-war; and flying fish are seen. These various items of new interest we shall speak of more fully elsewhere. A group of islands, of which Madeira forms the chief, soon loom in sight; and although the Orient steamers do not usually call, the passenger will like to remember that this island, rearing to a height of over 6,000 feet, is densely covered with vegetation; and that the vine flourishes up to 2,000 feet above the sea level; three of the islands, the Desertas, are uninhabited. Those of a romantic turn will conjure up the remembrance that the Madeiras were first colonised by the English, in the persons of Robert Maclin and the lady with whom he eloped from Bristol, in 1344. Madeira itself is 30 miles long and 12 broad. Its population of 150,000 does a trade valued at £400,000 each year. In 1801, and again in 1807, Madeira was captured by the British, but in each case given back to the

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Portuguese. The vineyards are rapidly recovering from the terrible ravages of the oïdium.

The steamer is now to the south of the Mediterranean. When the wind blows directly from Africa, it is occasionally charged with clouds of desert sand, and, not infrequently, when a storm has raged on shore, the wind brings with it vast flocks or flights of butterflies, locusts, or other insects, and birds of varied type.

The Canary Islands are the next point of interest. The peak of one of them—Teneriffe—is usually sighted, inasmuch as it is 12,180 feet high, and therefore visible 100 miles off. It was close under the summit of this Peak, and two miles directly above the sea level, that the Astronomer Royal for Scotland—Professor Piazzi Smith—accompanied by his wife and some attendants, camped out for two months, making a series of observations "to ascertain how far astronomical observations can be improved by eliminating the lower third part of our atmosphere." This peak, white in winter with snow, and in summer with its own pearly pumice stone, forms a most notable sea mark. The Phœnicians navigated by its aid, and the Dutch are said to have taken the meridian of the Peak as their Prime Meridian. Its legendary grandeur is happily alluded to in the following sonnet by Mr. Matthew Arnold, inspired by the voyage to Australia of his son in the Orient steamer *Lusitania*:—

S. S. "LUSITANIA."[1]

I read in Dante, how that horned light,
Which hid Ulysses, waved itself and said:
"Following the sun, we set our vessel's head
To the great main; passed Seville on the right,

And Ceuta on the left; then southward sped.
At last in air, far off, dim rose a height,
We cheered, but from it rushed a blast of might,
And struck—and o'er us the sea-waters spread."

[1] *Nineteenth Century*, January, 1879, p. 1. We have to thank Mr. Arnold for kindly allowing this reprint.

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I dropped the book, and of my child I thought
In his long black ship speeding night and day
O'er those same seas; dark Teneriffe rose, fraught
With omen: "Oh, were that mount passed!" I say,
Then the door opens and this card is brought:
"Reached Cape Verde Islands,—*Lusitania*."

All this group of islands is of volcanic origin, and on some of them are active volcanoes. Altitude and sea breezes make the climate healthy; and it is remarkably dry. Some of the islands have at times no fresh water on them. Nevertheless, vegetation of a tropical and subtropical character flourishes luxuriantly. The vine does well, and the islands have long been famed for their wine. It will interest Australians to know that one of the chief present exports, that of cochineal, was non-existent in 1831; and that now 400,000 kilogrammes of these minute dye-yielding insects are exported. This is a novel but most profitable industry. Soda is another great export. The canary-bird (*Fringilla Canaria*) still exists in large numbers, though the colour is greener than that of the yellow variety which has been bred in Europe during the last three centuries.

These islands are a colony of Spain. They are interesting as containing many relics, historical and monumental, of an older race of inhabitants—the Guanches, whom the Spaniards found in possession. These were men of grand physique, and far advanced in civilisation, of the old eastern stock, connected with the Arabs who had pushed westwards, and possessed high moral and intellectual calibre. Their knowledge of embalming has preserved to us evidence of their good physical capabilities.

Passing the Canaries, the passenger finds himself well within the trade wind regions. The steady perennial breeze curls the deep blue water into a ceaseless ripple. There is nothing violent, but there is a sense of persistent life and hurry. The ocean swell is not heavy, but it is perpetual; the waves are not high, but they are lively; and the steady wind drives a continual stream of "detached cirrus," those small clouds that are invariably compared to flocks of unsheared sheep, across an otherwise clear blue sky. Shortly after leaving the Canaries, when latitude 23° is reached, the passenger is within the Tropics, and may have the sun over his head at noon. The

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saloons are neglected for the deck; and cabins deserted at night for improvised sleeping quarters above. On fine nights, during the months of March and April, will now first be seen, a little above the horizon in the south, that small but brilliant constellation, the Southern Cross, with its two attendant stars, *Alpha* and *Beta Centauri*.

The next land seen—800 miles from the Canaries—is the Cape De Verde group of islands. The steamer picks her way to one of the smallest of them—St. Vincent—but possessed of a good harbour in Porto Grande. The group is a colony of Portugal. There are ten islands, with a population of some 100,000, though Europeans do not number more than 10,000. All tropical products flourish well. The highest peak in the group is that of the active volcano in Fogo (9,760 feet). Here again a red dye, the orchil lichen, forms a profitable export, though it is a Government monopoly. The highest point in St. Vincent itself is only 1,000 feet above the sea; and the population of the island about 1,880. It has been called "a mountainous and utterly barren mass," and so it is to external appearance. The structure of the houses—iron-stone walls, bamboo rafters, and grass thatch—is peculiar. Water is often very scarce, and it is said that occasionally no rain falls during the whole of a year.

Shortly after leaving St. Vincent, between July and September the north-east trade wind fails, and the steamer enters a belt of calms and variable winds known as the "Doldrums," that intervene between the N.E. and the S.E. trade winds. In the other months of the year the limit of the N.E. trade is found further to the southward. The cloud effects are grand in the extreme. Electrical discharges are frequent, and the usual calm surface of the water enables the observer to notice the myriads of "slimy things that crawl with legs upon the slimy sea." This zone, however, is soon crossed, and the passenger can sympathize with his fellow countrymen on the neighbouring West Coast of Africa, whose duty or interest calls them to live for about eight months of the year in such a climate. The S.E. trade wind is soon entered, and the "crossing of the line" attracts notice. The old customs that have been at once a delight and a terror to crew and passenger alike, and that grouped themselves round a traditional visit of Neptune to make the acquaintance of those who for the first time visited him at sea, are rapidly becoming memories of the past. One main cause of this is the speed with which

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the steamer now ploughs her way. There is neither time nor leisure to commemorate such momentary events as the "Crossing the line."

Steaming against the S.E. trades, the passenger will remember that on his right lies the small island of Ascension, a lonely rock near the middle of the South Atlantic, about 800 miles from Africa and 1,200 from America. This little island is fitly entered in the British Navy List as a commissioned ship. It is 2,818 feet high, rocky, has a supply of fresh water, a tolerable roadstead, and has long been used as a recruiting ground for Her Majesty's ships stationed on the unhealthy West Coast of Africa. Its dryness and freshness, in the perpetual trade wind, make it far preferable as a storehouse, to the damp low shores of the adjacent continent. Turtle, and the eggs of "the tropical swallow," are the chief commercial products.

Further on, in the South Atlantic, 700 miles to the south-east of Ascension, the bold rocky island of St. Helena rises to the height of 2,700 feet above the sea. With plenty of water, and balmy atmospheric surroundings, the island is particularly fertile. The fir and cinchona may be seen growing side by side. As the last residence, and for some time the grave, of Napoleon, the island is of great historic interest; Byron calls St. Helena "the proudest sea mark that o'ertops the wave!" The Emperor's remains were transferred to France in 1840. The old prosperity of the island depended on its supplying sailing vessels with water and provisions. Steam and the Suez Canal have robbed it of much of this trade. The island has been in English possession for more than 200 years.

The trade wind is generally carried as far as latitude 30° S. The weather becomes cooler and more refreshing: and about 1,700 miles beyond St. Helena the African shore is approached, and Cape Paternoster and Saldanha Bay sighted. In three or four hours Table Mountain is seen ahead, and, passing between Ribbon Island and the coast, the steamer anchors in Table Bay.

Cape Colony.—While the steamer remains at Cape Town much may be seen of this mother city of the South African Colonies. Australians will be curious to view it, and will be at once struck by the fundamental difference between South Africa and Australia, viz., the difference of races: half the population of Cape Town is European, the Dutch claiming a large proportion: but the rest of the population is made up of Malays,

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Negro, and East Indian immigrants, together with the Hottentot and Kaffir natives.

The town and immediate neighbourhood contain many objects of interest. The breakwater, harbour works, and graving docks, will teach Australians what enterprise can do. The various public buildings and institutions are superior of their kind. New Zealanders will like to inspect the library, and see the collection of rare manuscripts and old books presented by Sir George Grey when he was Governor. The suburbs of Cape Town are most picturesque, and well worth visiting. Table Mountain, 3,550 feet, with its flat top immediately over the town: its two supporters, the "Devil's Berg" on the right, and the "Lion's Head" on the left, are the first mountains of the peninsula of high land, which, commencing near Cape Town, trends down to the Cape of Good Hope, 30 miles to the south.

To the north are the wide sandy flats that reach away to Simon's Town on the east, and to the mountains of "Hottentot Holland," on the north. On the slopes of Table Mountain are some of the most celebrated Cape vineyards. Constantia is only 11½ miles distant. Lines of railway are rapidly spreading. Stellenbosch, 30 miles distant by rail, is an interesting specimen of a Dutch colonial town. If the Australian can so arrange, it will be well worth his while to stay in this neighbourhood over the interval between two steamers. He will then be able, at his leisure, to inspect the wine industries of the Cape, and to see for himself the specialty of ostrich farming and the Cape methods of sheep farming, including the production of mohair and the tending of Angora goats. In each case he may well hope to acquire knowledge of what to do or of what to avoid. He will find travelling easy and speedy, until he reaches the wildest parts; but these will have but little interest for him.

Steaming out round the breakwater, the passenger obtains a fine view of Table Bay and its attendant mountains. Soon the cliff-like series of the "Twelve Apostles" and the brilliantly-coloured mountains of the Peninsula are passed, and the famous Cape of Good Hope itself rounded after a run of 30 miles. Then he crosses False Bay, within which is the Imperial naval station, and follows the coast to Cape Agulhas, the southernmost point of Africa. Thoughts are carried to the mainland; and it is remembered that along this coast, now trending away out of sight to the northeastward, are the

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rapidly growing ports of Mossel Bay, Port Alfred, and East London. Port Elizabeth is there also, the second town—and the greatest commercial emporium in South Africa.

The Southern Ocean to Australia.—The world outside the steamer has now completely changed; and for the 16 days' run across the great Southern Ocean to Australia, the mountainous swell that pursues its way round and round the world in this great southern circle of water, at once arrests the attention, more especially of those who can appreciate what is grand in Nature. To them, as to others, the sudden multitude of birds that attend on the ship will add a novel interest and new life to the scene.

The rude southern swell does, however, break on sundry groups of islands. To the southward of the steamer's course lie the Prince Edward, the Crozet, and Kerguelen Islands. These islands are, for the most part, volcanic, and bold in outline. The latter alone contains good harbours. On them is found a not inconsiderable supply of food in the shape of wild duck, seals, and an edible wild cabbage. Tolerable coal has also been found; and there is much peat. On Kerguelen's Island was successfully established for some time the scientific expedition to watch the transit of Venus in 1874. To the northward of the steamer's course are the two isolated ocean islands St. Paul and Amsterdam, also volcanic in origin, sterile and bold in outline. It was on St. Paul that the crew of the sinking *Megæra* established themselves and all rescued.

Speedily and surely the steamer ploughs her way until in longitude 115° E. she passes the meridan of Cape Leeuwin and fairly enters the Great Australian Bight. This "Bay of Biscay of Australia" lies between King George's Sound and Adelaide. Its shores, for the most part sandy and waste, are the scene of the heroic journey of Mr. Eyre, who was a whole year struggling over the distance of 1,200 miles. Such remembrances of the enterprise and pluck of the pioneer colonists in the vast continent of Australia, form a fit preparation for the first land-fall, and for the coming to an anchor off the port of Melbourne or Adelaide as the case may be.

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CHAPTER V.—THE SUEZ ROUTE.

As already said, the Orient Steamers commonly take the route *vid* Suez on the outward voyage to Australia as well as homewards. It will, however, suffice to describe this route from the point of view of a passenger returning to Great Britain.

Cape Leeuwin to Aden.—Bound for Europe, the last glimpse of Australia is of the bold highlands around Cape Leeuwin. A few days after this the smooth waters of the south-east trades are entered; and as the steamer heads away from Australia, thoughts linger in speculation whether Western Australia also is destined suddenly to leap ahead and rival her more eastern sisters. Between November and April the south-east trade fails in about latitude 9° S., and the north-west or middle monsoon is entered—a belt of light north-west winds, with squalls, rain and frequent calms. Soon after crossing the equator the steamer passes into the north-east monsoon, the wind veers round to that quarter, and so continues with fine and settled weather until Aden is reached.

From May to October the south-east trade is generally experienced until near the latitude of 2° S., when the wind veers round to the southward and westward as the steamer enters the region of the south-west monsoon. Here the wind blows steadily and fiercely from the south-west, with bad weather in June and July, but moderates in August. After passing Cape Guardafui and entering the Gulf of Aden the force of the monsoon is less felt; but the weather is still squally and unsettled with frequent calms, followed at times by strong breezes from the west and south-west.

Diego Garcia.—On the edge of the south-east trade from April to September, just within the region of north-west or middle monsoon between October and March, and on a bee-line from Cape Leeuwin to Aden, lies a group of coral islands, known as the Chagos Archipelago. At Diego Garcia, the southern and principal island of the group, the Managers of the Orient Line have established a coaling station. The company having expressed their willingness to coal the steamers of the royal navy as well as their own, the Admiralty sent H.M.S. *Eclipse* to verify or correct previous

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surveys, a process which the Company repeated by means of their surveying officer, whom they sent for the purpose. The Company leased some land, buoyed the harbour, and otherwise provided for its navigation. The island is favourably situated both for commercial strategic purposes, lying near the centre of the British possessions in Indian Ocean; 2,136 miles from Cape Leeuwin, 1,160 from Mauritius, and 2,085 from Calcutta, 2,873 from Aden. It forms a cocoa-nut plantation divided among three Mauritius planting Companies. Under European superintendence, black labour produces an annually increasing output of cocoa-nut oil, amounting now to about 150,000 gallons. The soil is poor, the brackish; but fish is abundant, and poultry and pigs are plentiful. Swarms of rats inhabit the cocoa-nut trees and levy a heavy tax upon their produce. Land-crabs, turtles, and birds, once a marked feature of the group, rapidly dwindling in numbers. The climate is remarkably healthy for tropics, and agreeable. The temperature rarely exceeds the few degrees "play" between 77° and 85° Fahrenheit.

Diego Garcia, formed by a narrow wall of coral surrounding a lagoon, is 13 miles in length, and about 5 miles in breadth; the entrance to the lagoon being little over one mile in width. The visitor interested to see here in perfection a coral island of the Atoll The coral "insects" build by separating the particles of carbonate from the salt water and forming them into an agglutinated mass generation growing up upon the lime leavings of its ancestors. Occasionally coral is formed round an island that is "subsiding." As such gradually decrease in circumference, and as the coral continues perpendicularly on its original foundations, a ring of coral is formed the ultimate peak of the subsiding island, and we have what is termed atoll. A remarkable feature of these atolls is their generally horseshoe shape, with the opening to leeward of the prevailing winds. This probably due to the general drift of the water which passes to leeward, has, so to speak, been sieved of its lime.

The Chagos Islands form, with the thirty Seychelles, a Dependency of Mauritius. These latter islands are the home of the curious double nuts, which before the discovery of these islands had only been drifting on the water, and were consequently declared to be a sea growth.

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Socotra.—A run of 1,653 miles from Diego Garcia, across the tropical Indian Ocean, brings the steamer in sight of land again at the island of Socotra. This island, about 80 miles long, and 20 broad, consists of a table-land, or plateau, 800 feet above the sea level—from which rise granite ridges, to a height of 4,656 feet. There is a native population of about 5,000 keeping flocks and herds, and cultivating the best aloes in the world, as well as many of the choicest gums and herbs. In 1876, England made a treaty with the local "Sultan," by which, in return for an annual subsidy, he agreed that no foreign settlement should be made without the consent of the British government.

The steamer's course lies between the western end of Socotra and Cape Guardafui, the most eastern point of Africa. Arab dhows may here be seen, and thoughts will revert to the liberal support given by England to the suppression of the slave trade, simply in the interests of humanity and of sympathetic kindness to the various native races of Africa that have hitherto been the victims of this nefarious traffic.

Aden.—Rounding Cape Guardafui a run of 376 miles brings the steamer to Aden, the centre of British influence in this part of the world. On the opposite coast of Africa the Italians are endeavouring to found a Colony to introduce the thin end of the wedge of European civilisation and order. Away to the right trends the coast of Arabia—civilised from the most ancient times; but never attaining to any great prosperity or population. It was along this coast that not many years ago was discovered in the tomb of a "Princess" an inscription supposed by some to detail her visit to Joseph in Egypt.

Aden is an English settlement on a rocky and barren volcanic peninsula, rising to a height of 1,770 feet, separated from the mainland by sandy and rocky flats. It is the Gibraltar of the Red Sea and commands an excellent and capacious harbour. British authority extends over the peninsula of Aden itself and of Little Aden opposite, and also over a strip of coast-line three miles broad; two thousand years ago it was celebrated as a military stronghold; in the time of Constantine and again in the twelfth and thirteenth centuries, it was an opulent trade emporium; after that its prosperity dwindled, till, in the earlier years of this century, it was no more than a wild village-

In 1837 a Madras ship was wrecked in the bay and pillaged; this

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brought the place under the Dominion of the East India Company; its subsequent growth was rapid and now it has some 30,000 inhabitants and is again a great trade centre. It is wisely kept as a free port. The English garrison occupies the main town situated in an extinct crater some five miles along a good road from the port. The great need of the district is water, but the soil is fertile, and if irrigation could be resorted to on an extensive scale the whole aspect and atmosphere of the place would be changed. The previous occupants of Aden constructed an aqueduct from the main land, remains of which are still to be seen on the isthmus. In the twelfth century great tanks were constructed in the gorges of the crater to collect rain water. These were in a dilapidated state when the English took possession, but have been thoroughly repaired. When full they hold sufficient for a three years' consumption. The distillation of fresh from sea water is the method now adopted for the supply of the place.

The natives—the Somalis—are physically a fine Arab race; and their vigour is seen in the pace at which they row the visitor ashore. Here also, as in many ports in tropical latitudes, the natives surround the ship and dive for coins thrown overboard—a far easier operation than it first appears—for the flat disc settles through the water very slowly. The passenger will note with curiosity the fact that these divers have apparently no fear of sharks—indeed, occasionally, human being and shark may be seen under water in close proximity.

From Aden vendors of a variety of goods crowd off and display their wares on deck. It is needless to remind intending purchasers that the price asked is but little indication of what will be finally accepted. It may be worth while noticing that the wily merchant intends to take back with him ashore a certain sum in exchange for his goods, therefore if he makes some good bargains at first he will often be found ready just before the steamer sails to part with the remainder of his goods at really cheap prices Maribou trimmings are a specialty of Aden.

The Red Sea.—A run of about 90 miles from Aden takes the steamer to the Red Sea. Guarding its entrance stands the little island of Perim volcanic in its origin, about three miles long by one mile wide, with a lighthouse standing 250 feet above the sea. The island was first occupied

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by the British in 1799; and is now guarded by a small garrison from Aden. The channel is narrow between Perim and the Arabian coast, the breadth being only one and-a-half miles; but between Africa and Perim the strait is twelve miles broad. There is a good harbour on the south-west side of the island, well sheltered, with ample depth of water.

Passing this island the steamer enters a narrow gulf 1,200 miles in length, and of great and varied interest. The climate is at times trying, the sea running N.N.W. and S.S.E. through a region where rain seldom falls, and the heat is great so long as no breeze can be felt. In the southern part south winds prevail from October to May, and north winds the rest of the year; in the northerly portions of the sea the wind is usually from the north. So long as the steamer is head to wind the heat is less felt. But this trying weather is soon past, such is the speed of the modern passenger steamer. In the old sailing ship days it was held that "for six months out of the year you cannot get into the Red Sea, and during the other six months you cannot get out of it owing to the prevailing winds." But the steamer mocks at the winds, and carries the passenger from Perim to Suez in four or five days at most. Thus is restored to this historic sea the traffic with which it was enlivened at a period anterior to sailing ships, when vessels were classed by the number of their oars; by the man-power of their motive force as now by the "horse-power."

Never exceeding 180 miles in width, the navigation of this strange inlet from the Indian Ocean has always been accounted difficult and dangerous owing to the number of low islands and coral reefs which line the shores. The central channel is generally very deep. Immediately inside the entrance, 40 miles from Perim, on the right hand side is Mocha, of coffee celebrity. The industry still flourishes and makes for the whole world a sort of standard of perfection in coffee. Thirty-five miles further on, the Hanish Islands are found, after which on the right hand are passed the guano islands of Jebel Zukur, and Zebayer, and the volcano of Jebel Teir, sometimes, but rarely, in a state of eruption. It was ascended in 1837 by Major Leveson. On the left hand the Dhalac Archipelago is passed, behind which lies the island of Massowah and the port of Annesley Bay—the scene of the Abyssinian expedition in 1867, when England spent no less than £6,000,000 to uphold respect for her flag in savage countries. The Egyptian Government exercises

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dominion over the coast line; but the back country belongs to the mountainous kingdom of Abyssinia, ruled over by a primitive Christian people. Magdala, the capital, is situated at an elevation of over 9,000 feet above the Red Sea.

Five hundred miles from Perim, Souakim, the port of Upper Egypt is passed. Another 100 miles takes the voyager nearly half way along the Red Sea, and on his right-hand is Jiddah, the great pilgrim port of Mecca. After passing 170 miles of barren coast on either hand the steamer reaches the latitude of Zemba or Yenbo, the port of Medina, from which it is, however, 130 miles distant. Opposite to Zemba, on the Egyptian coast, is the supposed port of Berenice, in the same latitude as the first cataract of the Nile, which lies some 150 miles inland. Another 165 miles brings the steamer to the two remarkable islets known as the Brothers, which lie off Kosseir, an Egyptian port at the point where the Nile approaches nearest to the Red Sea. Here the Indian contingent of Sir R. Abercrombie's expedition landed in 1802—struggled across the desert, and so marched boldly down on Cairo. Another hundred miles bring the steamer to the island of Shadwan, shortly after which the island of Jubal is passed on the left-hand; and on the right, the Gulf of Akaba trends away to the N.N.E., and the steamer enters the Gulf of Suez, having on its right hand the Sinai Peninsula, on the southern part of which Jebel Katherina, near Mount Sinai, rises to a height of 8,630 feet. The Gulf of Suez is from ten to twenty-five miles in width. On either hand, mountains, table-land, and bold ridges three and six thousand feet high, challenge admiration, not only for their picturesque outline, but also for their marvellous colouring. The peculiar atmosphere of this "rainless region" of the earth lends unique effects to the scenery. On the right, as Suez is approached, will be seen the stunted palm tree of the oasis, known as Moses's Well.

The Red Sea is known to the Arabs as the Bahr Malek, or Salt Sea. It has a coast line of about 3,000 miles, and yet not one single river flows into it. The entrance is only fourteen miles in width, and in consequence there is a great inflow of "fresh" salt water from the Indian Ocean, to balance the great evaporation always proceeding. It has been calculated that but for this continuous supply the level of the sea, by evaporation alone, would

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fall twenty-three feet per annum. It would seem then that if the entrance were blocked for a hundred years, the bed of the Red Sea would be turned into one huge mass of salt. The water is said to have reached a temperature of over 100° Fahrenheit. In the main part of the Red Sea the tide seldom rises more than two or three feet, but at Suez the spring tides rise seven feet.

The question will always be asked whence this title of Red? It does not appear to be a corruption of any old title. This "mare rubrum" of the Romans was also the sea of Edom, which, being interpreted, means "Red," but it was the *Salt* Sea of the Arabs and the *Weedy* Sea of the Hebrews. Its waters are blue; and though there is much red coral, there is hardly sufficient to generalise appearances. At times quantities of oscillatoriæ give a red hue to the water. It seems, however, more probable that Edom supplies us with the right clue. The Northern shores are composed greatly of red sandstone; the whole atmospheric colourings are decidedly pink—and the general blush of the aspect probably led the first visitors from the North to retain for the sea that title which appealed to the senses.

Suez.—As the steamer enters the Suez roadstead, the eye looks over the desert that has always been the highway between Asia and Africa. A line drawn north from Suez until it touches the Mediterranean is the geographical boundary between Asia and Africa. On the left Mount Attaka stands up boldly above the plain to a height of 2,700 feet. Soon, however, the port of Suez is entered, and a succession of quays and docks, including capacious dry docks, are seen with the ancient town of Suez, 1½ miles away over the flats.

The quays swarm with the celebrated donkeys and no less celebrated donkey boys, both lively and lusty of their kind. The visitor will be favourably impressed with these specimens of the fine physique of the desert fellaheen, and he will see that in Egypt the dry heat does not prevent the growth of muscle and stamina. Humour is apparently an invariable attribute, and much fun accompanies the scamper from the quays to the "City."

Suez itself possesses unique interest as a city of the desert, and as marking the spot where the great crossing place has existed from West to East. History gives successive details of Egyptians, Israelites, Phœnicians.

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Greeks, Romans, Mohammedans, Turks, Venetians, Portuguese, Italians, French, and English, utilizing Suez in their migrations and their commerce. The docks and quays are necessarily European in character; but the visitor will find much to interest him in the narrow alleys of the city. The ornamental lattices are a feature in the house architecture. From behind them womankind may look on the gay world unveiled but unseen:—

"Spectatum veniunt at non spectenter ut ipsæ."

The Bazaars are thoroughly Egyptian and well worthy of attention. A visit to the desert gate—including an evening stroll beyond it—will give the visitor a sample of desert life and its monotonous surroundings. There are some 15,000 inhabitants in this city. The Suez Hotel affords fair accommodation on the tropical English system.

The fresh water supply is by means of a canal from the Nile. The local wells only yield brackish water which is often offensive in taste and smell, though clear as crystal. The whole of the country is slowly emerging from the sea; hence its sterility and saltness. The town of Suez, a seaport in the sixteenth century, is now 1½ miles inland.

The Suez Canal.—Leaving the port of Suez on the north, the steamer enters between the long moles that preserve the channel of the Suez Canal, a narrow water-way across the desert, eighty-seven geographical, or about one hundred statute miles in length. The first narrow portion of the canal cuts through from the Red Sea to the Bitter Lakes. The slight Red Sea tide is felt as far as this, and the general character of the canal is well seen. The Bitter Lakes widen the surface of water, but the available channel is still narrow. They are the remains of a dried-up arm of the Red Sea on which once flourished the ancient port of Arsinoe. To the west is seen the verdured line of the fresh-water canal that now runs from the Nile to Suez. Behind this ~~rises the Geneffe range, affording profitable~~ quarries of porphyry and marble. Through the Bitter Lakes the steamer can travel at greater speed, as there are no banks to wash away; and at their northern end the canal is again entered thirty-four miles from the Red Sea. About nine miles of canal have now to be traversed before Lake Timsah, the "Crocodile Lake," is entered. On either hand is the

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desert. On the left is situated the Serapeum railway station, around which may be found remains of many ancient buildings inscribed with Persian and Egyptian characters. The chapel of Our Lady of the Desert commemorates the flight of the Holy Family into Egypt. A neighbouring ancient monument gives to this portion of the canal its name of "the Serapeum cutting." On February 28th, 1869, the Prince and Princess of Wales "let in the waters" to this portion of the work.

At Lake Timsah the accompanying fresh water canal turns abruptly away to the west, along the land of Goschen; and here is situated the town of Ismailia, clustering round a summer palace of the Khedive. This was the centre of the celebrations at the opening of the Canal in November, 1869. The Empress Eugenie, the Empress of Austria, and the Crown Prince of Prussia, were among the chief stars of the ceremony. The town was planned and built most artistically, but the drainage was so forgetfully executed that it is said to have found its only outlet in the fresh water canal that was the mainstay of life in the desert. The consequences were inevitable, it very soon became fever-stricken; and it is now practically deserted. Ismailia in 1882 was galvanised into a brief life of extreme activity when it became the base of Sir G. Wolseley's brilliant campaign. The canal and lakes were crowded with men-of-war and transports; the town was filled with all the busy needs of an army of 20,000 men. While Arabi and his troops blocked the way into Egypt from Alexandria the British navy seized Ismailia; men and material were rapidly concentrated; the army pushed along the line of the railway and sweet water canal; the Egyptian lines of Tel-el-Kebeer were stormed at the point of the bayonet, and Cairo occupied without further resistance in a campaign of three weeks. At Ismailia the railway leaves the line of the canal; and the desert is entered.

Between Lake Timsah and Kantarah seventeen miles of narrow canal have to be passed. At the commencement of this there are some difficult curves, and as the regulation pace is slow, it is here that steamers most frequently ground and obstruct the general traffic. The cutting of this part was the hardest piece of work on the canal; the ridge of El Guisr rose from seventy to one hundred feet above the desert and was penetrated with difficulty. This is the one strip of terra firma between the lake of Timsah and the marshes

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of Lake Menzaleh. Along this strip is the ancient desert route to Syria; and at the pontoon-ferries fully equipped caravans may be seen waiting their turn of crossing.

Kantarah is about sixty-four miles from the Suez entrance. It boasts an attempt at a town and hotel, and is on the most frequented road to Syria. Shortly after leaving this, on either side stretch away the wide swamps and marshes of Lake Menzaleh: wild fowl, including large flocks of pink flamingoes, abound; and the thought recurs that these unproductive shallows were once fertile wheat-growing plains watered by the Pelusaic and Tanitic mouths of the Nile. But the sea has invaded and oppressed the rich soil with a coating of sand and salt, burying even the remains of many ancient towns and cities that once flourished there. Twenty-four miles of steaming brings the vessel at last to the north end of the canal at Port Said on the Mediterranean.

The canal has at present an average width of only twenty-five yards, but great improvements are about to be made in this respect. Strange to say, the narrow waterway is found best for large ships, and it is almost always a small one which grounds in the canal. This is explained when we remember that such a vessel as the *Orient* or *Australi* cannot get across the channel, whereas a smaller boat, blown by the wind, or affected by the slight current, or awkwardly handled by her crew, sometimes contrives to block the passage for days together. By way of preventing these disasters, several changes are about to be carried out. M. de Lesseps and his colleagues recently traversed the canal in the largest ship which makes the voyage to Australia by the Suez route, namely, the *Australi* of this line, and their observations have resulted in a scheme by which in places the waterway will be doubled, and in places will be simply widened, so that the dangers of traffic as at present conducted will, it is confidently expected, disappear.

At present, ships are piloted on the "block system," except in the great lakes where they can pass each other freely, and steam at full speed. At each of the stations or "gares," there are signal posts, and a ball above a flag says "go into the siding," while a flag above a ball says "go into the canal." There are, of course, other signals. It is a fine sight to see sometimes as many as twenty "stately ships go by," while you wait at a siding, and nothing gives the traveller so great an idea of British commerce as the fact that something like

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nine out of ten are going to or from England. One writer in a newspaper lately said that he had been through the canal, one way or other, six times, and only saw one foreign ship, and she ran into that on which he had embarked.

As the end of the passage is neared, every one on board watches the wonderful flights and flocks of birds on Lake Menzaleh to the westward. Sometimes thousands of pelicans appear sitting so close together that they look like a whitewashed wall at a little distance, and it often requires a strong glass to resolve such a cloud of birds into its component individuals. The spectator is fortunate if a flock of flamingoes rises into the air, because while the flamingo looks white when standing, the under side of his wings when he flies is rosy pink.

It has been found quite practicable to prevent any serious silting of the canal by the desert sand. The washing away of the banks can also be successfully counteracted by facing them with stone and concrete.

The main engineering trouble of the present, is the silting up of the Port Said or Mediterranean entrance. To obviate this, the western breakwater, a mile and a half long, has been constructed to protect the entrance from silting of the mud and sand carried down to the Mediterranean by the Nile. It is probable that much may be done by placing smaller intermediate breakwaters along the coast nearer Damietta.

While waiting in the sidings for other vessels to pass or for the night, the strange colourings and peculiar aspects of desert scenery will be enjoyed to the full. Even a run on the sands of the desert may be indulged in. The mind will also recur to memories of the persistent attempts of the ancients to have a ship canal across this desert. Necho (B.C. 600) made a canal from Suez through the Bitter Lakes to Lake Timsah, and then west to Bubastis on the Nile. Herodotus describes this work with its water gates, and tells us that vessels sailed through in four days. This cutting became choked with sand, but was afterwards cleared and re-opened by Caliph Omar in the seventh century.

Port Said is built on the flat sands at the entrance of the canal. It is an active coaling station, the work being performed by Arabs, who will put 200 tons of coal on board a steamer within the hour. The town, built on a platform formed of material dug out of the canal, is laid out on

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the Franco-African system, and contains nothing of interest. Here sojourn various agents of numerous interests. Communication is kept up with Ismailia by a postal steam launch.

The Mediterranean.—The first sensation on entering the Mediterranean after traversing the canal, is that of chilliness; for no matter what the actual temperature may be, it is a great change from the temperature of the Red Sea to that of the Mediterranean. On arriving at Port Said, it is advisable at once to put on extra clothing, for the change is sudden; at the same time the cooler and more bracing atmosphere is much enjoyed. On leaving Port Said, the low lying Egyptian shore is seen for some time. The Damietta mouth of the Nile, and the scenes of the battles of the Nile and of Aboukir are passed, and were we near enough to see them, Alexandria and its buildings would remind us of the bombardment and destruction of the formidable forts by the British Fleet, under Admiral Sir Beauchamp Seymour, and of the subsequent sacking and burning of the city by the Egyptian rebels. Cyprus, Crete, and Greece, are left at a long distance to the north, and no land is sighted until, leaving Malta to the left, the steamer steers along the coasts of Sicily for the Straits of Messina. Etna may be seen towering to an altitude of 10,880 feet. Soon the shores of Italy appear on the right hand, and the steamer enters the narrows between the legend-honoured whirlpools of Scylla and Charybdis. The Mediterranean here is practically tide-less, the rise and fall being but a few inches.

The currents in the Straits of Messina are variable, and at times attain a velocity of three knots; near the coasts counter currents are experienced. The meeting of the opposing currents produces in several parts of the strait whirls and great ripplings, locally known as "Garofalo." The principal whirls occur on the coast of Sicily, between the Faro Point and Sottile Point with the ebb, and off Palazzo tower with the flood. At Pezzo Point, on the Italian coast, there is a very strong "Garofalo," which is dangerous with a south-east wind. The eddies on the Sicilian coast appear to represent Charybdis; those on the Italian coast, Scylla. These straits at the northern entrance are but 2¼ miles in width. On the Italian side, just north of the narrowest part, is the village of Scylla, standing 200 feet above the tidal eddy. Under the village, the

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rocks are hollowed away, and the agitated waters make the strange sound that legend attributed to the dogs of Scylla. The depth of water is no less than 70 fathoms.

Messina itself, founded by the Greeks as a Colony nearly 3000 years ago, is still a flourishing port. The long line of its Marina, with handsome buildings rising one above another, the whole being backed by a dark forest, gives the town a fine appearance from the sea.

Reggio, the capital of the province of Calabria, is about ten miles distant from Messina on the opposite coast of Italy, and is the birthplace of Ariosto the poet, and Corregio the painter.

On clearing the straits the steamer passes the remarkable Lipari Islands, of volcanic fame. On the right is the coast of Italy, hardly visible in the distance, till the Licosa point is approached. After this the Gulf of Salerno is crossed, and rounding by the Isle of Capri the Bay of Naples is entered.

Naples to Gibraltar.—Naples we describe elsewhere. Leaving Naples the steamer follows a direct course first for the southern end of Sardinia, and then for Tarifa, the south point of Spain. If the steamer's course lay near to the African coast the fine bay of Algiers, with the ancient city and modern villas and suburbs, might be sighted; and the change noticed that has come over this place, which, from its foundation in the tenth century till its bombardment by the British fleet under Lord Exmouth in 1816, had been a formidable pirates' nest. Until that year the Algerines were the terror of the seas and specially dreaded on account of their habit of retaining in slavery all whom they captured in war. The French seized the district in 1830, and now the town and its neighbourhood have become a sanatorium for modern Europe.

Passing along to the westward, the high land of the Sierra Nevada, at the south-east corner of Spain, is sighted. Cape de Gata is passed. On the left, in the midst of the sea is the small Spanish isle of Alboran, a resort of fishermen and smugglers, and even, it is rumoured, seafarers of a more lawless description. Just west of Cape de Gata is the Spanish town of Almeria, the centre of one of the richest as well as most picturesque provinces of Spain. One hundred miles further westward Malaga may be seen nestling at the foot of the mountain ranges, north-eastward of which is

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NAPLES & VESUVIUS.

82

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Granada with its Alhambra, the last foothold of Moorish dominion in Europe.

Sixty miles beyond Malaga rises the curious peninsula of Gibraltar, finds its only outlet to the ocean—which and Ceuta, on the opposite African coast, the Mediterranean

Gibraltar itself is too well known to need lengthy description. It has been, since 1704, in the possession of Great Britain. To the north the sandy isthmus that separates it from Spain is dominated by a sheer precipice 1,330 feet high. In this are the celebrated galleries hewn within the rock, opening here and there in portholes which, with batteries in commanding positions about the rock, render it impregnable: The only landing is on the west side; but the garrison has hitherto successfully beaten off all attacks, including the persistent efforts of the French and Spaniards, who maintained a three years' siege in 1780-82. The signal station is 1,294 feet above the sea, and the highest point 1,408 feet. The Barbary Ape is to be found on these summits;——the only place in Europe where the wild monkey exists. In Gibraltar will probably be seen a greater variety of nationalities than in any other town in the world. The cantonments for the main body of the British troops are on the sandy isthmus to the north of the town. At Windmill Hill in 1867, some remarkable and extensive caves were opened, which have yielded a rich harvest of remains of extinct animals and also of "prehistoric man." In some of these the stalactites are superb. *The Peninsular Coast.*—Steering out of Gibraltar across the Bay the Spanish town of Algeciras is seen on the west side. At the south-west point is the Pearl Rock—on which H.M.S. *Agincourt* once struck.

The Straits of Gibraltar are between Calpe (Gibraltar) and Abyla (Apes' Hill), these being the ancient "Pillars of Hercules." The narrowest part of the straits is under eight miles across, six miles less than the mouth of the Red Sea, and there is always a strong current, or rather two currents, running. On the surface and to a depth of 200 fathoms there is an inflow from the Atlantic often running at a rate of four to five knots an hour; and creating at times much surface commotion. The velocity of this current is, however, checked by the influence of the local tide. Below 200 fathoms the waters are affected by the in-running current of the Atlantic, and set east or west for equal periods according to the tide. The deepest part of the straits is over

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500 fathoms, but currents are much complicated by a remarkable submarine rocky ridge or barrier that runs from Cape Spartel in Africa towards Cape Trafalgar in Spain, where the greatest depth is only 190 fathoms.

Leaving the troubled waters of the Straits the steamer follows along the Spanish coast line. Low lying Cape Trafalgar is passed with the stirring memory of the great sea-captain's last battle fought in 1805—in every way the greatest of naval battles. The mind's eye will follow the few vessels of the enemy that escaped in their flight northwards into Cadiz harbour. And the imagination leads us to remember that there too are the vineyards of Xeres and the picturesque city of Seville. Cape St. Vincent is soon sighted ahead. Nelson again recurs to memory, capturing the "San Joseph" and the "San Nicolas" in Lord St. Vincent's signal victory in 1797. The coast is now that of Portugal, that small strip of Western Europe which at one time held in its dominion all the trade outlets down the west coast of Africa, along the East Coast and by Arabia, right round Hindostan to the Islands of the Eastern Straits. The Portuguese, all credit to them, were the pioneers of that commercial colonization which the Dutch so developed and which the British nation appear to have perfected.

Steaming along at some distance from the land, presently are seen the curiously stratified cliffs of Cape Espichel, to the eastward of which is the old Phœnician, Roman, Moorish, and Portuguese Port of Setubal, famed for its oranges. A few miles further, and the mouth of the Tagus is passed, and a glimpse caught in the distance of the fine city of Lisbon. This view is soon shut out by the serrated ridge of Cintra, about 1,600 feet in height. On one summit is perched the now deserted "Cork Convent"; on another the romantic palace inhabited by Don Fernando, the intellectual consort of the late Queen. Cintra town, with its old Moorish palace, is clearly discernible with the telescope. In the midst of magnificent gardens, crowning a grassy knoll, and surrounded by thriving woods of gum trees brought from Australia, is the well-known villa "Monte Serrato," celebrated by Byron. All these slopes are planted with the vineyards that produce the famous Lisbon wines.

Nine miles beyond Cintra, with a telescope may be seen the huge pile of buildings of Mafra Palace, reputed, next to the Vatican, to be the largest building in the world. Monastery, Royal Palace, Barracks, School, Library,

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University, Hospital, all find roomy accommodation within its ample precincts. Above this, stretching from the sea to the river Tagus, are the heights of Torres Vedras, celebrated in the peninsular war as the lines successfully defended by Wellington against the best efforts of an overwhelming French force.

Rounding the outlying rocks, the Berlingas, the steamer follows the straight coast of Portugal, past the town of Oporto, and the Douro, with their port wine traditions; past Vigo and its magnificent harbour, to Cape Finisterre, that southern horn of the Bay of Biscay, to which we had conducted the passenger in describing the Cape Route.

CHAPTER VI.—Natural History at Sea.

The Naturalist at Sea.—The student of Natural History at Sea will enjoy special opportunities of observing strange living things, many of which are rarely if ever to be found within sight of land. Of this new deep sea field for intelligent observation, the old English writer, Fuller, makes a quaint home-thrust in the words, "Indeed these be God's wonders; and that seaman the greatest wonder of them all for his blockishness who, seeing them daily, neither takes notice of them, admires at them, nor is thankful for them." If we substitute passenger for seaman we may be severe, but not without reason, as all passengers will agree who have utilized a voyage to their great profit as well as pleasure in studying the new world of living beings to be met with only out of sight of land. The introduction of steam is not, however, from a naturalist's point of view, an unmixed advantage; a voyage in a sailing vessel, not unfrequently delayed by calms, or moving slowly through the water, afforded periods of enforced leisure, in which were ample opportunities for both passengers and crew to observe and collect specimens of the strange denizens of the sea. It is when the ship is stationary in the waste of waters that the living beings of the outside world can best be seen and captured. And now, save in the rare instance of stopping the engines for rest or repair, the intelligent passenger has not those old opportunities. Moreover, steam enables ships to

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choose their own courses, and as a consequence they are deserting for the smoother waters and more direct routes of the tropics, that great wilderness of waves of the Southern Ocean which is so prolific of bird and fish life. Nevertheless, the passenger by the Orient Steamer will see and can well study that peculiar animal kingdom which exists out of sight of land.

Land Birds.—Birds first claim our attention. They are the most obvious and the most welcome apparitions at sea; adding life to the otherwise inanimate seascape, and conjuring up direct evidence of the actual existence of the unseen land.

Distinction should be drawn at sea between land birds, coast birds, and ocean birds. Land birds are only at sea by accident; coast birds are seen at sea, but only in the proximity of land; ocean birds cruise far away at sea, seldom visiting the shore except during the breeding season. To follow these differences is to follow not only an interesting but also a useful study. Land birds explain wind currents, while the difference between coast and ocean birds is the difference between signs that do and signs that do not prove proximity of land.

Of land birds swallows, being migratory, are most often met with at sea, and they will associate themselves with the ship for days together. Sandpipers, finches and other small birds are not unfrequent visitors, while representatives of the hawk and pigeon tribes occasionally hover round and settle on the ship. Steaming down the coast of Africa a squall will sometimes blow off to the steamer swarms of locusts or butterflies and other insects—and will bring in their train land birds of various descriptions—giving to the vessel for the time a most pleasant smack of shore life. Many of these birds alight on the vessels wearied nigh unto death, and may be readily caught and handled and fed while resting. Land birds appear at great distances from the coast—often many hundreds of miles; but it seems certain that in such cases they do much of their journeying by roosting temporarily on ships.

Coast Birds.—Coast Birds, although frequently seeking their food out of sight of land, are too accustomed to their surroundings ever to allow themselves to be blown even by the fiercest gales far out to sea. To recognise them is to recognise the proximity of land. As a rough distinction it is worth while remembering that the more a bird lives on the land, the more he

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flaps his wings. The rook flaps continually; the gull skims and flaps in about equal ratio; the albatross rarely if ever flaps.

Gulls, cormorants, and divers of the penguin and puffin class are well known coast birds of the temperate zones. Terns are also common. Grey in colour, with black caps in temperate, and white in tropic zones, with a pretty angular flight, they are the objects of much notice and admiration. Gannets of a brilliant white, with black tips to the wings, tower high in the air and, in pursuit of their prey, shoot headlong into the water with such force as to leave, where they have disappeared, a spot covered with foam as if a large stone had fallen from a great height into the sea. And there are special coast birds of the tropics; the Frigate Bird (*Tachypetes aquila*), alias "Seahawk," alias "Man of War Bird," might also be called a Gannet-Eagle; with powerful hooked beak and claws, partially webfooted, and with great strength of wing, it is "built" to cruise a pirate among birds of the sea. It is reputed to catch flying fish in their flight, but it has a greater propensity to rob other birds of their hard-earned prey, attacking them in the air and appropriating their booty as it falls from their grasp. The male, of a bright black above, and the female of a duller tint, are known by their great size and eagle-like manœuvres in the air. The curious may investigate the pouch the male alone possesses under his bill. Rare instances occur of a similar appendage in other birds; as with the Australian musk duck; but no one has yet satisfactorily explained its functions.

Ocean Birds.—Of ocean birds, that is, of birds that habitually spend most of their life out of sight of land, few are met with within the tropics. They are to be seen chiefly and best on the great Southern Ocean, which puts a complete girdle of sea round the earth. They are distinguished from the other classes of birds by never settling on the ship, and seldom flapping their wings. These birds are met with in large numbers, 1,000 miles from land, and it is almost provoking to see them without any apparent effort soaring along directly over the ship, though she may be going her fourteen or fifteen knots in the hour. Moreover, marked birds have been known to keep with the same ship for four or five days, and this without any apparent rest. It is difficult to believe they can sleep on the wing; in rough weather they are rarely seen sitting on the water, though in calms they are frequently to be seen not only sitting, but sleeping on the water.

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Among them, or frequently in company with the Frigate Birds, or winging its direct way over the pathless ocean of the tropics, is seen the "Boatswain Bird," otherwise "Phaeton," or "Tropic Bird," or "Strawtail." This is much smaller than the Frigate Bird, the length from bill to root of tail averaging under twelve inches; two long feathers, much prized, project another twelve inches beyond the tail. The more common species has white plumage, tinged with a delicate roseate hue.

The ocean birds generally belong to the great Petrel tribe. The smallest representative and the commonest at sea, and the only one that appears within the tropics is the "Stormy Petrel" (*Thalassidroma*), or "Mother Carey's Chicken." It is from this bird that the whole tribe derive their name. It may be frequently seen under the vessel's stern picking up its food, pattering or walking on the water. Very much resembling the house-martin these energetic little birds may be seen by the hour together, "questioning" the wavy hollows of the ship's track for what she turns up in her course. They are so oily that a wick inserted through a dead bird will burn as if in a lamp.

Next in size is the "Whale Bird" (*Prion*), with plumage of a pearly tint, elegantly skimming the water in large flights, the prettiest bird in all creation in its flight. Their favourite food is squical and other jelly fish, on which whales also feed; hence they harbinger the likely presence of whales.

The "Cape Pigeon," or "Pintado Petrel," is perhaps the best known of all the Cape Birds; it has a spread of wings of some two-and-a-half feet, the white grounding barred during flight with dark brown stripes. The "Cape Dove" or "Fulmer Petrel" is rather larger, and of a plain, dull dove colour. Known to our own North Sea fishermen as the Mall Duck, the Fulmer appears in all cold seas, both north and south. Other ocean birds are confined to some one district of sea; and this is consequently reputed by naturalists to be the most numerous of any known species of bird.

The naturalist, as the good ship steams from the Cape to Australia, will notice several larger varieties of petrel, ranging between the Cape Dove and the true Albatross, but all of them of uniform dark hue. Sailors apply to these generally the terms "Stinkpots" and "Cape Hens"; and the special epithet "Parsons" to a lesser species, with white bill, and white "spectacles" round the eyes. To the larger, with greenish beak, the terms "Nelly," and "Mother Carey's Goose" are applied. This is the Sooty Petrel (*Diomedea*

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spadicea), and it is the Petrel that most frequently soars over the deck, and may be shot so as to fall on board.

Albatross.—Larger than all of these are the Albatross tribe. They may be distinguished by the prevailing colour on the underside of the wings, which is white, with the hindmost edge of a black or brown. The Mollymauk is the smallest of the tribe (*Diomedea chlororhynchos*). It may be distinguished by the black on the top of the wings being continued across the body. Of the Albatross proper there are two types. The great Albatross (*Diomedea exulans*) may be more or less black on the top of the wings, but the back is always white. Another type, scarcely inferior in size, is the Dusky Albatross (*Diomedea fuliginosa*), which is brown in colour all over, but speckled with white. The usual stretch of the wings is from ten to fourteen feet, but the largest that has been measured reached seventeen feet. The Albatross is as noble and handsome a bird as any that exists; very daintily marked, with a fine head and bold carriage, and a strangely grand eye and countenance. In life it has a pink beak, and delicate rose streaks on the cheeks, but these tints disappear soon after death, and are consequently not seen in stuffed specimens, and their occurrence is therefore generally overlooked by naturalists. These birds are most clumsy on the water, very timid in approaching anything that moves, and in all probability would have neither the wish nor the power to attack "a man overboard" until he had become motionless in death. Their name is probably a composition of the Arabic-Portuguese "Alcatraz," meaning any big sea bird. The Albatross is rarely, if ever, seen within the tropics; it is very common in the great Southern Ocean; and curiously enough, though frequent in Behring's Strait, it is practically unknown in the North Atlantic.

The passenger will watch the Albatross sustaining his twenty pounds of weight on an area of sixteen square feet of wing for hours together without any apparent effort; crossing and recrossing the wake of a ship steaming along at sixteen miles an hour; and all this with his wings perfectly still save for an occasional flap, say three or four times in the hour.

Fish—Rays and Sharks.—Crossing the deep sea the voyager will become acquainted with many fish that rarely if ever are seen ashore. Rays of enormous size and unusual shapes are sometimes seen basking near the surface; and should the steamer come to a stop, they will approach and swim curiously around. Seldom taking bait they can only be obtained by means of harpooning.

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Closely allied to the rays, the sharks belong to an order (*Chondropterygii*) distinguished by a cartilaginous instead of a bony skeleton. Their skin is singularly tough, and their muscular system very highly and very unusually developed. The teeth are angular and serrate, with a sharp cutting edge, while the eyes, unlike those of the majority of fishes, which are prominent and unprotected, are furnished with a movable outer skin corresponding to the inner eyelid in birds; and there are peculiarities in the structure of the eye itself which allow of rapid movement, a great advantage to the creature when roaming in pursuit of its prey. It is a popular fallacy that from the peculiar position of the mouth, low down below the snout, it has some difficulty in seizing its food, and that the action in turning the head and forepart of the body is a necessity; the action is really designed to give the sharply serrated teeth their greatest possible effect in cutting in two the object of attack that its parts may be more readily swallowed. In disposition and habits sharks have been fitly compared with the birds of prey. Sustained by their powerful fins, they range at will through the upper regions of the deep sea, and have been known to follow in the wake of some vessels for days together, without apparent effort.

The Blue Shark (*Carcharias glaucus*), a wandering fish, is usually from six to eight feet in length, but has been known to attain fourteen feet. It is remarkably retentive of life, and when caught and hauled on board may prove a dangerous enemy, until stunned by a heavy blow on the nose or crippled by the loss of its tail. The White Shark, (*C. vulgaris*) like the last an inhabitant of the Mediterranean, and met with in all tropical seas, more commonly haunts the bays and harbours of the West India islands, where its dreaded presence creates a real peril for bathers, or sailors whose misfortune it is to fall into the sea. Attaining a length of from twenty-five to thirty feet, it is the most ferocious of its species; though, like the blue shark, it may at times, by violent splashing, be scared or driven from its prey. The Fox Shark or Thresher (*C. vulpes*), said to attain a length of fifteen feet, has the upper lobe of the tail as long as the body. By vigorous blows of this tail it attacks even the whale, or defends itself from its enemies. The Hammer-headed Shark (*Zygæna malleus*) is so called from its curiously T-shaped snout. The Notidanus, a name sometimes improperly applied to the white shark, is not often seen at the surface, though not uncommon in the deeper waters of the Mediterranean.

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The largest of the whole group, and the most harmless, is the Basking Shark, which measures occasionally thirty-six feet in length. It has been suggested that a procession of these fish, with their large back-fin and pointed tail rising some three feet out of the water, and seen perhaps at a distance, has suggested to superstitious voyagers the appearance of the "Great Sea-Serpent."

The shark is himself the centre of a little colony of lesser fishes. The Sucking-fish (*Remora*) adheres to the shark's skin by a plate on his head and thus is carried about the ocean to pick up the crumbs that are let drop from his carrier's "table." The Pilot-fish (*Scomber ductor*) is the inseparable attendant of the shark, and the certain herald of his presence. In appearance and size he roughly resembles a large perch, but is otherwise distantly related to the mackerel.

Flying Fish.—The deck of the steamer is a splendid vantage ground from which to observe the singular habits and actions of the various species of Flying Fish. The more common kind is the *Exocetus evolans*, belonging to the pike family; in size they vary from about two inches to nearly two feet in length. Shoals of this fish rise perpetually from the tropical sea and skim through the air, again to dash into the water. They appear to rise when disturbed either by greater fishes or by the passing steamer. At night time, and even occasionally during the day, they fly on board a ship, but as they do not as a rule rise more than fifteen or eighteen feet above the water they fail to reach the high decks of the modern steamer. It is probably a fallacy to suppose they fly at lights in the night. The distance of their flight varies greatly, and in this respect the observant passenger may record much that would be of value. Definite information is still required as to the exact time the flying fish remains out of water. Thirty seconds is about the longest on actual record. "The flying fish," says Colingwood,[1] "when it leaves the water, has its wings in a state of rapid vibration, not so rapid however that the eye cannot follow them, and thus it gains an impulse in a horizontal direction. As soon as it is thus fairly launched, the wings assume a state of rest, somewhat in the position of those of a pigeon in the act of alighting, and thus they continue until the fish drops

[1] "A Naturalist's Rambles in the China Sea."

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into the water. But when it meets or is struck by the crest of a wave, if it emerges from it immediately, as frequently happens, it does so with a similar vibration of the wings to that with which it first left the water; and each time it strikes a wave a new vibration succeeds, as though the contact with the water produced an automatic vibration of the wings which kept them above the surface. When the fish meets with a succession of wave crests, it takes a more or less zig-zag course, changing its direction each time it emerges from the water." But even in its flight the fish will often find itself exposed to new foes—to terns and gannets, and frigate birds. The poetic story of his capture by the albatross is not well founded, the albatross being seldom seen in the latitudes frequented by flying fish. As we have seen, the word albatross originally was applied to any large sea fowl. Flying fish are capital on the table. They are caught in nets above and below water. The Barbadians set nets up in the air on reefs, and then "drive" the shoals over the reefs. Enthusiasts for sport shoot flying fish from a boat.

The Mackerel Tribe—Dolphins.—The deep sea is tenanted by various fish of the mackerel tribe—*Scomberidæ*—headed by the great Tunny of the Mediterranean, reputed to reach a length of eighteen feet. This tribe of fishes is fast-swimming, active, and lives by catching prey of smaller kinds; the Albacore attains to weights of thirty and forty pounds; while the Bonito rarely exceeds ten pounds. They have a strong family resemblance to our mackerel, but are altogether deeper and fuller in shape. When dying, these fish alter in colour with great rapidity, and this change is specially beautiful in the Dourado (*Coryphæna*), the "Dolphin" of the poets. Vivid and brilliant hues appear but to disappear. These fish may be caught from a vessel with artificial bait, roughly resembling flying fish, provided the speed does not exceed three or four knots.

The *Xiphias*, or "Swordfish," is somewhat similar to the Dourado, and is often caught in the Mediterranean. It has been known to run a tilt at a ship, leaving its sword embedded in the timbers. This "Unicorn" fish, which must be distinguished both from the shark, "sawfish," and the whale, "narwhal," is common in the Mediterranean, and classical authorities have confounded together these two, which have a continuous dorsal fin and up and down tail, with the "porpoise," under the generic title Dolphin.

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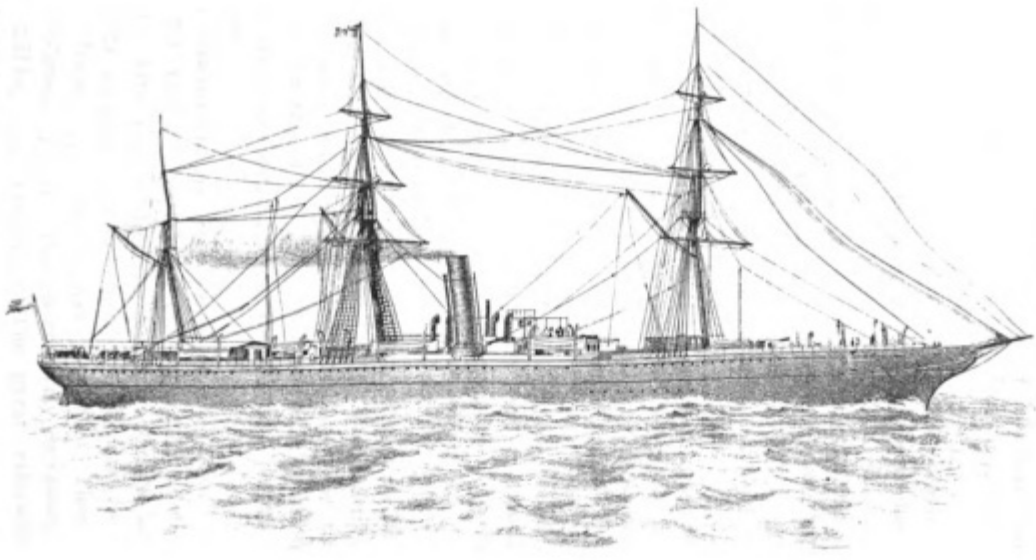

S.S."CHIMBORAZO."

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The Snock.—Another representative of the mackerel tribe is met with near temperate coasts; naturalists call it *Sphyræna barracuda*; sailors "snock," or "barracouta," or "sea pike."

"These barracoutas," says Canon Kingsley, "'*Sphyrænas*' as the learned, or 'pike' as the sailors, call them, though they are no kin to our pike at home—are, when large, nearly as dangerous as a shark. Moreover, they have this somewhat mean advantage over you, that while, if they eat you, you will agree with them perfectly, you cannot eat them, at least at certain, or uncertain, seasons of the year, without their disagreeing with you—without sickness, trembling pains in all joints, falling off of nails and hair for years to come, and possible death."

All fish of the mackerel family are at times unwholesome. They will not keep: hot weather or moonlight seems to affect them at once: their "dying colours" are probably significant of speedy decomposition. The old English law, for this reason, gave to mackerel a special dispensation to be sold on Sundays.

The various harbours and ports will be seen to abound with small fish, and an hour or two on board may be not only pleasantly but profitably employed in catching them. A "shore-going" pike rod with stout running line, and an outfit of old sea-trout flies, small spoon bait, and gut bait line will be found invaluable on such occasions.

Cetaceans.—In all seas Cetaceans are met with, from the gigantic eighty-foot whale to the liveliest of little porpoises. These denizens of the deep are mammals, suckling their young and breathing the upper air through lungs. Their tail is placed crosswise, not up and down as in fishes; this seems to be a development, to give them quick powers of rising to the surface for breath.

These huge mammals are, *par excellence*, the "fish" of the deep sea. Pedants object to the application of this term, but on the sea one should rather conform to the rule of those who live on the sea, and remember that "fish" on a whaler is synonymous with whale. Pedants, too, may be rebuked by quoting to them the old Roman naturalist Pliny, who speaks of the whale as "*Balæna Piscis*," though correctly explaining its possession of lungs, and not gills, for breathing. The great naturalist Gray is forced reluctantly to the same conclusion. A fish is a living being that would

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die out of water; and to fish is to extract something from the water. The Roman Catholics, wise in their generation, allowed of porpoise being eaten in Lent.

Sperm and Right Whales.—Of whales proper there are three great classes—"Sperm," "Right," and "Rorquals." They are all of huge size, and easy to distinguish one from the other. In all the head is from one-third to one-half of the total bulk. The Right Whale has no dorsal fin, and rarely exceeds sixty feet in length. The Sperm has a hump on the back, and has been killed over eighty feet in length. The Rorqual has this hump developed into a tendinous dorsal fin, and attains the length of one hundred feet, thus claiming to be the biggest of living creatures. The Sperm Whale, or Cachalot, is found chiefly in the tropical seas of the southern hemisphere, and has a large "swallow" and a row of forty to fifty enormous conical teeth in the lower jaw. It appears to feed by taking in a mouthful of sea, full of animalcula and even fishes, and then ejecting the water, and using the teeth as a sieve to retain the food. A big "fish" will yield one hundred barrels of sperm oil from its blubber or "blanket." And, besides this from his head is obtained about twenty-four barrels of "spermaceti"; while the intestines provide a secretion valued as the ambergris of commerce. The ears of the huge beast are mere minute holes that will hardly admit of the insertion of a small quill. These whales come to the surface for ten minutes at a time to breathe, blowing for three minutes continuously. They then "peak their flukes," and disappear into unknown depths often for more than an hour. Occasionally the voyager is lucky enough to witness the huge beast in the act of "breaching;"—*anglicé*, throwing himself completely out of the water.

The Right Whale (*Balæna mysticetus*) is found only in temperate or arctic seas. Its swallow is ridiculously small, not more than two inches in diameter, and the well-known "baleen," or whalebone, hangs, as it were, from the palate of the mouth, and acts as a filter, like the teeth of the Sperm Whale. It differs from the "Sperm" in having a pointed and not a blunt square nose. There are nearly a thousand pieces of whalebone in the one mouth; and it is curious to remember that this, the largest of beasts, lives habitually on the smallest of animalcula. Though its ears are minute, and its eyes no larger than those of an ox, the whale can see

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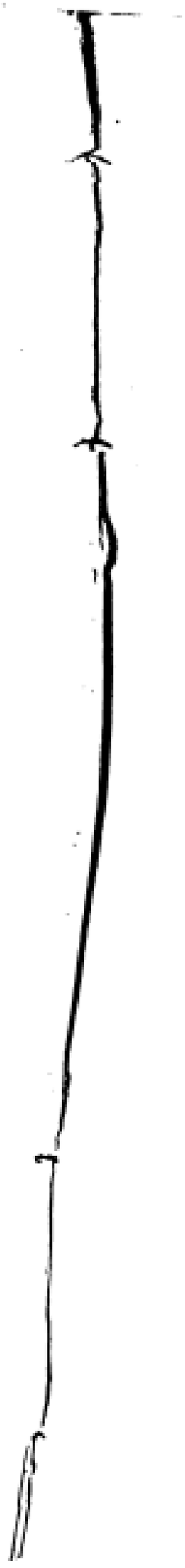

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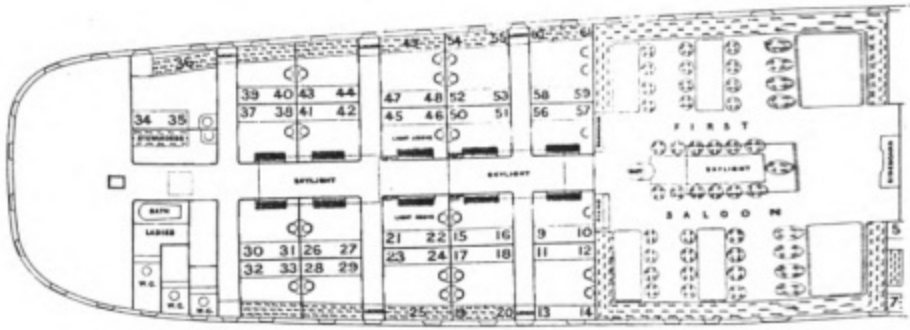

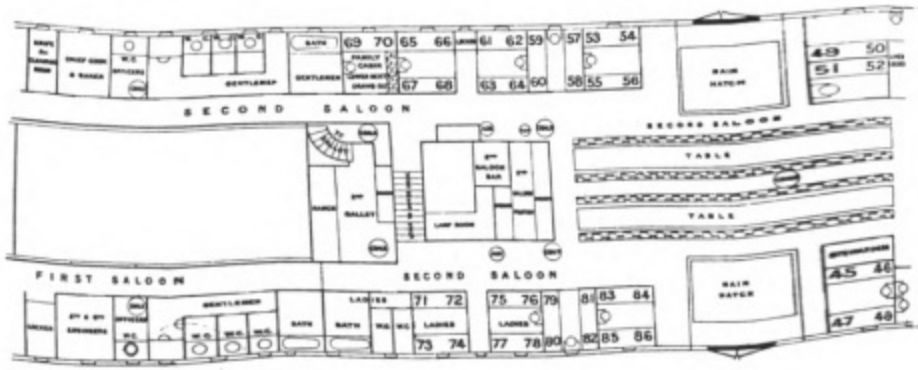

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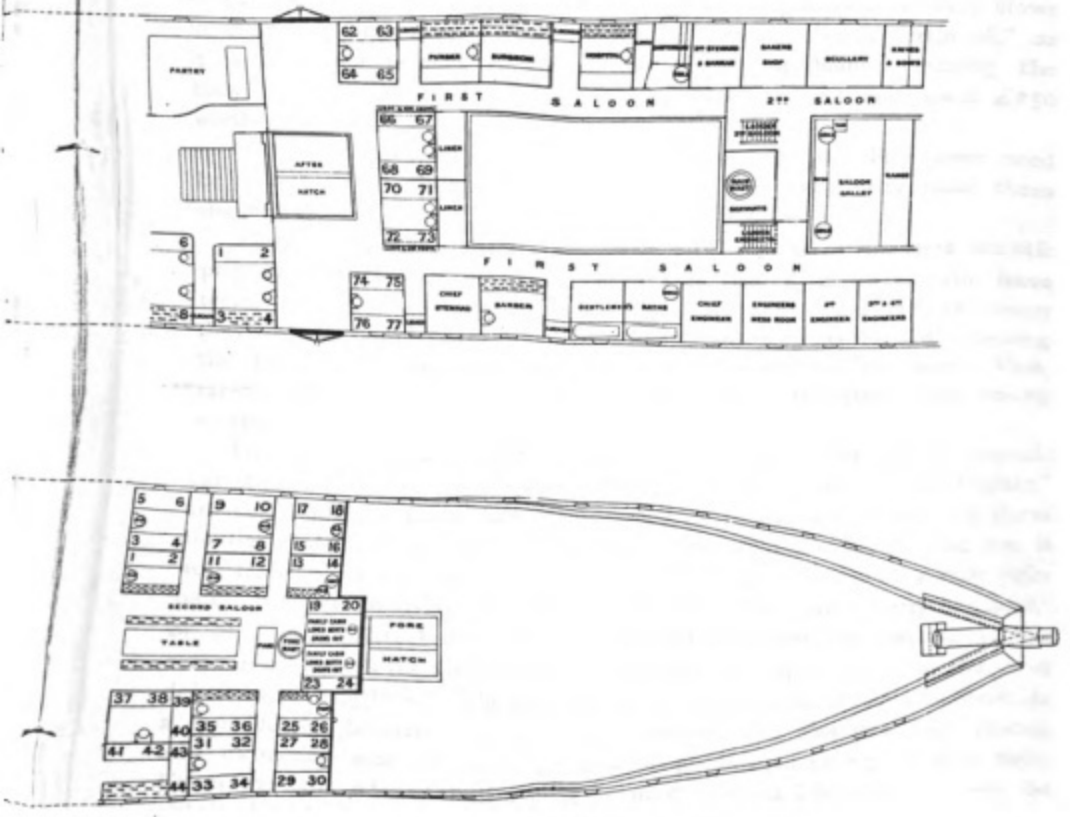

ODD NUMBERS ARE UPPER BERTHS.

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and hear with great acuteness, but only under water. This whale may also be distinguished from the "Sperm" by its manner of "blowing." It comes to the surface frequently, rarely remaining below for more than fifteen minutes; and at the surface it makes eight or nine short blows in about three minutes. This species yield most valuable "train oil," as it is technically termed, all from the blanket or blubber incasing the body. An average whale will yield £450 worth of oil and about £250 worth of whalebone.

Of the Rorquals, with their dorsal fins and huge size, little more need be said than that their poverty in oil and peculiar ferocity make them shunned by all whalers.

Porpoises.—Of the smaller cetaceans all have heads in more artistic proportion to their bodies than have their larger brethren. All have teeth, and live by catching fish. They are active and fast swimmers playing with provoking ease round a vessel steaming its hardest. Among the larger kinds frequently seen are the Grampus and the White Fish, rarely exceeding twenty feet in length, and to be distinguished from young whales by their prominent dorsal fin.

Of the smaller kinds, the Porpoises have a dorsal fin well developed; varieties such as the "bottle-nose," the "white-beak," and "necked-dolphin" are sufficiently described under their names for casual recognition. All these smaller kinds may be captured by harpooning from the vessel when she is not travelling more than three miles in the hour. They will seldom take bait; but they afford capital "cuts" for the table. In "Merry England," of old, cooks prided themselves on cutting fish, flesh, or fowl out of the same porpoise. The Greenlander is reported to "quaff its oil as the most delicious of draughts." The Indians of the North American Atlantic coast do a considerable business in shooting porpoises with shot guns from canoes, and extracting six or seven gallons of good illuminating oil from each. From the jaws, about half a pint of most valuable lubricating oil may be obtained. The skin of all these smaller cetaceans is generally known in commerce as "porpoise hide."

The Microscope at Sea.—The sea, especially on or near the surface, is full of living organisms; the greater proportion of these are invisible to the naked eye, but when, as is frequently the case, they exist in dense numbers, they cause

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distinct discoloration, and at night their luminosity will excite general admiration. Much interesting and instructive work may be done with a microscope, if, when pace is ever slackened, a muslin net be towed overboard for a few minutes. On its being carefully washed out in a glass of water, the eye will discern, and the microscope explain, a host of interesting objects. But even a casual bucket of sea-water strained through muslin, will yield ample material for investigation.

Of marine organisms, those which most frequently occur belong to the lower divisions or groups of the animal kingdom. Of the Molluscs, the Squids, or Cuttle-fish, are often met of small size, but in vast numbers, discolouring the ocean for miles. On such a mass whales delight to feed. Occasionally species of larger size are to be seen floating on the surface of the sea. Lately, especially on the Labrador coast, many huge specimens have been captured, with bodies twenty feet long, and arms extending twenty feet around.

Nautilus.—Another cuttlefish inhabits a fragile but very beautiful shell and is known as the "Nautilus." In its normal condition it lives, and seeks its food, crawling at the bottom of the sea. It can, however, rise at pleasure, and in calm weather will be seen at the surface, along which it progresses as do other cephalopods by admitting sea-water into its body and ejecting it, thus producing a retrograde motion. The sail-like arms correspond with the mantle in molluscs, and form a close covering to the shell.

Passing to Crustaceans, we light upon a peculiarly numerous tribe, crablike and shrimplike, occasionally met with in enormous quantities. The Mysis, which has been described as a "shrimp-bug," has an inveterate habit of springing out of the water; denses masses of these form what is known as "whales' food," and discolour the sea sometimes for miles.

Zoophytes.—Of Zoophytes, of which the lower classes seem to form a connecting link between animal and vegetable life, the ocean is full. The larger of these may sometimes be seen in millions from the deck of the steamer. Among the most conspicuous is a singular creature popularly known as the Portuguese Man-of-war (*Physalia pelagica*). To this zoophyte is often improperly applied the term nautilus, which belongs in science to a shell-inhabiting mollusc. The physalia are seen floating sometimes singly, sometimes in vast numbers, in tropical seas. They have a bladder-like body of

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a delicate light blue above and a darker shade below, egg-shaped, and
inches in length, surmounted by a crest, which can be raised or low
pleasure, and which is pink in the smaller and gradually deepens into or
the larger and older specimens. Below hangs a bunch of short flask
tubes with suckers, which forms the stomach or central body of the
Below this again are tentacles of a dark blue colour, resembling
small globules. The tentacles can be contracted or extended to a
several feet, and they sting severely, even after death. These zoophy
appear to have the power of sinking at will. They are found th
beaches after storms, full of air, and may be seen on the surface
numbers during very rough weather.

A more transparent of the *Medusæ*, familiarly
"jelly fish," numerous tribe is that mass of gelatinous ma
like a basin floating bottom upwards; the sides are drawn in and
nately, and so propel the animal through the water. From th
lower side hang tentacles surrounding the mouth of the sto
varying considerably in size are met with in immense shoals,
the same direction. All these zoophytes have tentacles, inva
tint. Fishermen might take a hint for their lines and
universal colour of these fishers of the
Of other swimming zoophytes, there are many vario
them is the Venus Girdle (*Cestus*
attaining a length of five or six
inches. These are not unfrequently mi
Luminosity.—What passengers, ho
these various zoophytes yield of their
at night of what is incorrectly known
ing illumination proceeds exclusively
dependent on two conditions—the pres
"phosphorescent" powers, and the dis
phosphorescent
be agitated by the motion of the sh
porpoises, at once a "phosphorescent
animalcula and zoophytes in the neig
of water drawn at night and left qui
becomes vividly bright. Thirty thou

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bucketful, each of which, if seen under the microscope, would be found attached to a separate living organism. Buffon and others attributed the light to electricity. Modern research has suggested putrefaction of animal substances, the crystallisation of such salts as soda and potash giving off similar effulgence. But the light is seen inside the living beings, and they exhibit it in fresh water, or even in spirits, or in air; but probably not long after death. It would appear to be due to some action, whether chemical or magnetic is not yet determined, dependent on the living organs being in a state of excitement. The analogous light of the firefly only occurs in the female, and is specially prominent in spring; it has been assumed to be a means of attracting the male. But the excitement that lights up the ocean animalcula seems that of fear rather than love; eyes have been found in the *Pleurotoma* dredged up from the bottom, one mile below the surface. The peculiar sharks caught in water five hundred fathoms deep off the coast of Portugal have eyes. How is light provided in these deeps impermeable to the sun's rays? Sir Wyville Thomson indorses the suggestion "the whole of the light beyond a certain depth may be due to phosphorescence;" if this be so, the luminosity of the sea is a mere superficial exhibition of one of the most wonderful of providential contrivances for enabling animals to live, where otherwise the darkness is profound.

Turtles.—During calm weather in the tropics Turtles may be seen basking calmly on the surface. They may be readily captured from a boat—if care be taken first of all to "shoot" the boat up to them with no splash of oar or noise in the boat. One man leaning out over the bows, quietly grasps the turtle by one flapper, and easily turns it on its back. But turtles are usually caught ashore. The male turtle indeed never leaves the water, but the female goes ashore to lay her eggs, and so becomes the turtle of aldermanic commerce. The Italian professor Redi has reported some cruel vivisective experiments upon turtles. He cut off a turtle's head, and the body for some time afterwards displayed all the energy of life. In another case, he cut out all the brain, the creature lived and groped about for six months afterwards; but, though the opening in the skull healed over, no new brain was ever formed. A pretty Greek legend attributes the origin of "string" music to a dead turtle washed up by the sea, and lying sun-dried on the shore, the wind playing harmoniously among its dried tendons.

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Seaweed.—Rarely seen save in the neighbourhood of land or in one or two remarkable eddies of the ocean. The most famous of these eddy beds is that known as the Sargasso Sea, in the North Atlantic. It lies to the westward of the Canary Islands, and is in the eddy caused by the Gulf Stream. There congregate large masses of the *Sargassum vulgare* and *Sargassum baccíferum*, the "Tropic grape,"—yellow sea-weeds that abound in large areas of the Atlantic, Indian, and Pacific Oceans, especially within the tropics, that live and increase indefinitely in the open ocean, but only produce their fructification when growing attached to rocks on the sea-shore.

CHAPTER VII.—Under the Sea.

In our remarks upon the Cape and Suez routes, occasional reference was made to the rocky headlands and island groups by which the voyager is carried, and the preceding chapter has been devoted to "Natural History at Sea." Our description would be incomplete without a reference to what is beneath the waves, the bed of the sea above which the steamship travels: but some preliminary remarks are necessary.

There are few educated readers at the present day who have not acquired some information, however superficial, of the physical history of the earth. The revelations of geology, and the teachings of what is known as "Darwinism," have resulted in a singular advance in all modern thought; and theories which were once stoutly contested, and inferences which were treated with ridicule, are now regarded as facts so well established that they hardly require demonstration; or as so just and reasonable, that even if not at once accepted they are at least held worthy of consideration. That the relative arrangement of land and water has undergone many and extensive changes is not now denied, and even the immense periods of time, the hundreds of thousands of years which are assumed to have elapsed, and which must have certainly passed away while many of these important changes were being effected, are now generally allowed. There is proof sufficient in our own country of upheavals so vast that the imagination can hardly realise their magnitude, of depressions of land so

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deep and so gradual that untold ages must have witnessed their completion. Sea shells and marine remains of comparatively recent species are found on the higher slopes of Moel-Tryfaen in Snowdonia. The greater part of Scotland was, in times yet nearer to our own, more than 2,000 feet below its present level; while at some earlier period, how far back we cannot even suggest, stratified beds of sand and shale and coal, 10,000 feet in thickness, have been planed away from a large part of the district now known as South Wales, and every foot of clay, of sand, or gravel which fills our English valleys, or crowns her hills, bears witness to the action of ice, or waves, or running water. The possibilities everywhere of alterations in the levels of land and sea must therefore be accepted, and the strange results which such oscillations would effect may be temperately discussed. With these ideas we will again follow the steamship's track, and endeavour to describe the possible as well as the certain changes which mark her path.

Before leaving the Thames, the outgoing voyager will remark, upon his left, a long expanse of low-lying land behind the tidal embankment, while on his right, at some distance from the shore, he will see chalky cliffs and downs, like those with which perhaps he has become familiar in railway journeys, north and south of London.

The low-lying lands on the left have in many places been excavated, especially where the large docks at Tilbury are now in course of formation. There are here three distinct beds of peat, separated from each other by well marked deposits of mud and clay and gravel. These peat beds, as proved by their contents, are of three very different ages. The upper and most recent, now buried beneath a thick clay, was once a forest of birch and hazel, standing well above low water; below it lies a second bed of clay, deposited by some ancient river, which filled the whole valley of the Thames from hill to hill; lower still is a deep sand bed, in which, 34 feet below the present surface, has been found a human skeleton, the remains perhaps of some hunter or fisherman who plied his trade when the mammoth, the cave-bear and the hyæna ranged freely over what are now the British isles. The chalk beds to the right have a much earlier history, and tell of far greater changes; measuring in some places over a thousand feet in thickness, they were, as their fossilized contents reveal, deposited beneath the sea, where, for untold ages, they were slowly formed from living coral, and the

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remains of coral animals, sponges and molluscs, and the numerous lime-secreting organisms which to this day abound at varying depths in the open sea. The evidence is conclusive, and in its presence no theory or tradition of the former existence of sea or land, where water or hill and valley now prevails, should be rejected as improbable.

Passing the North Foreland, the steamship enters a channel of moderate depth between the Kentish coast, and what are now known as the Goodwin Sands, covered, at high tide, with from one to three fathoms of water. These dangerous sands, in which many a good ship has found her grave, were, says tradition, at one time part of the estates of Goodwin, earl of Kent, the father of the unfortunate Harold, who yielded both life and kingdom in fight with William, earl of Normandy. The destruction of the land in this case was not occasioned by any local depression of the country, but has been caused by the wasting action of the water, such as is perpetually at work along our eastern coast, (the final catastrophe no doubt being due to some break or fault in the strata), and at the present day beds of shifting sand, below which are found the clays and chalk of the adjoining mainland, are all that remain of what once were fertile fields and woods.

Entering what is marked on the chart as the Straits of Dover, the sea-bed as compared with the greater depths of the German Ocean gradually shallows from 120 fathoms to 58, to 38 and 18, and in one part to less than 2 fathoms; the dividing ridge follows a line drawn between Romney Marsh and Boulogne. From this the English Channel deepens slowly as we proceed westward, so that the Straits of Dover may be said to part two seas.

In comparatively recent times, as geologists count time, the Straits and even the English Channel did not exist, and, except that south of Brighton, about half way between the present coasts, the soundings tell of what must have once been a considerable lake extending towards the west, continuous hill and valley connected the British islands with the continent. Of the depression of this whole area now covered by the sea, and the perpetual widening of the channel by the wasting action of the waves the English coast-line affords the clearest evidence. There is not a single cliff or headland unprotected by carefully constructed sea-wall, which is not yearly receding. Shakespeare's Cliff at Dover is no longer the "fearful and dizzy height" described 250 years ago. The ancient realm of Lyonesse, known in Arthurian romance, has disappeared,

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but in almost every bay along the southern coast, extending far beyond low water mark, traces still exist of the forests which once clothed a pleasant undulating land, diversified with lake and running water, above which fishermen now drag their nets; it needs but 200 feet of elevation to displace the sea, though it might not restore the face of the country disintegrated by the wearing action of the waves; a general upheaval of 600 feet extending over the whole of northern Europe would efface the Baltic and the German Ocean, unite in one country the whole of the British Islands from the Shetlands to the Scillies, and carry the empire of England 10 degrees further to the west.

Leaving the English Channel the track of the steamer lies in a south-westerly direction. Passing Ushant on the left, the 100 fathom line is soon reached, and the voyager is borne above the deeper waters of the Bay of Biscay: within a few miles the sounding line would tell of an almost precipitous descent of 1,000 fathoms, and before the lead could be recovered, a still deeper valley of 2,000 fathoms is reached. Soon again the sea bed rises rapidly, and before reaching Cape Finisterre the deepest water has been passed, and the ship's course follows a line of shallower water along the coasts of Portugal and Spain. Two thousand fathoms, (12,000 feet,) does not measure by any means the deepest part of the Atlantic, but even at 2,000 fathoms it was long supposed that the existence of animal life was impossible. One result of the scientific voyage of *The Challenger* has been to show that the lower forms of life are not injuriously affected by the singular conditions which prevail at so great a depth. It is an abyss into which not the faintest ray of the most brilliant and unclouded sunshine can penetrate, and, so great is the pressure of the superincumbent water, that, as Wyville Thompson, the historian of the expedition, expressed it, "at 2,000 fathoms a man would bear upon the surface of his body a weight equal to twenty locomotive engines, each with a long train loaded with pig-iron"; yet a living creature, supported in all its tissues within and without by incompressible fluid, at the same pressure, is not incommoded. The profoundest depths of the Atlantic lie further to the west, some hundred miles north of the Antilles. At one place nearly 4,000 fathoms was reached, (3985), and the pressure proved so enormous that strong thermometers specially constructed for deep-sea sounding were crushed as in a vice. A sad incident marked this sounding; the first death on board had taken place from an accident

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the previous day, and for a poor sailor boy a grave was found in the deepest spot which has ever been fathomed in the ocean.

Just as in the seas which have already been passed through, the bed of the Atlantic wherever it has been sounded is found to vary greatly in depth. Our knowledge of the irregularities is to a large extent due to the careful soundings which have preceded the laying of the Atlantic telegraph cables. One result has been to show that in the neighbourhood of the Azores, lying to the west of the Orient track, and also of the Madeira Islands, the Salvages and the Cape De Verdes, which are more to the south-west, the sea is shallower than elsewhere, and it is possible to map out, though somewhat roughly, more than one plateau at a very considerable elevation above the rest. These discoveries reopen a question which has interested the scientific world for more than two thousand years: it is, whether one or more of these groups of islands are not the few remains of a continent which once assisted to span the gulf between the new world and the old; the fabled, the mythical, but perhaps actual "Atlantis"; the country of which Plato wrote as once existing beyond the Pillars of Hercules (the rocks of Calpe and Abyla), which guard the entrance to the Mediterranean; the land in which were placed the Elysian Fields, and the Garden of the Hesperides; from which the early civilisation of Greece and Egypt, and Asia Minor, were derived; and whose kings and heroes were the Olympian deities of a later time. The legend enshrined in the *Critias* of Plato is of singular interest. It is told as an old world story, the repetition of an earlier tradition, learned by Solon at the lips of the Egyptian priests. It is of a mighty nation who dug canals, built ships and temples and palaces, and in pursuit of trade or warfare extended their empire over the whole of the then known world, but who perished utterly from the face of the earth in a fearful convulsion, when there occurred, "violent earthquakes and floods, and in a single day and night, the island of Atlantis disappeared, and sank into the sea." Of the possibility of such a catastrophe there can be no doubt; all these islands are more or less volcanic, and with the evidence continually afforded, in other parts of the world, of the enormous forces exercised by internal heat in the upheaval or depression of very considerable areas of country, we cannot reject this legend of the destruction of Atlantis on the ground of improbability. It must at the same time be acknowledged that the objections to the theory may not be lightly set aside. Naturalists will contend that, if this continent existed, the flora and fauna of the Eastern and

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Western Hemispheres would show some closer relationship: and geologists may argue that the period of its elevation must have been too remote to have influenced historic times, or have become the subject of tradition. On the other hand, there are many mysteries which the former existence of Atlantis would resolve. Among these are the almost universal legends of a deluge, bearing a curious resemblance, which it is difficult to believe are accidental, but which the existence and destruction of Atlantis would explain; there are similarities in custom and modes of worship, in forms of building and even resemblances in letters and the construction of language, which point to some common origin. The sculptured stones of Asia are rivalled in Central America and in Peru; the pyramid of Cheops is surpassed by the pyramid of Cholulo which stands on four times the area of the building by the Nile. The arched entrance to the treasure house of Atreus at Mycenæ, and the Palenque arch of the Aztecs, as pictured in Baldwin's *Ancient America*, are designed on almost identical lines. The traces of ancient serpent-worship prevail on either side, the stone implements, the stone axes and arrow-heads, sole relics of a primæval people, belong to both shores of the Atlantic; and from this lost continent may have come the more mysterious weapons of bronze, an alloy of copper and tin, whose manufacture it is almost impossible to attribute to the barbarous tribes with whose remains they are preserved. Of these Sir John Lubbock writes, "Not only are the several varieties of Celts found throughout Europe alike, but some of the swords, knives, daggers, etc., are so similar that they seem as if they must have been cast by the same maker." Whether the question will ever be definitely solved it is impossible even to conjecture. A hundred years ago the world knew nothing of Herculaneum, the site of Nineveh was little more than a tradition, and the lost cities of Central America were undiscovered; a hundred years hence perchance the dredge will have penetrated beneath the calcareous mud, the "globigerina ooze," the deep accumulations of dead coral, foraminifera and shell-bearing rhizopods which form the floor of the Atlantic, and our museums be enriched with statues, arms, and implements from this long forgotten land, the locality of Eden, and the cradle of the human race.

Leaving the Atlantic and its mysterious traditions, the Mediterranean is entered by the well-known Straits of Gibraltar. The sea rapidly shallows from 950 fathoms between Gibraltar and Ceuta, until, along a line from Cape

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Trafalgar to Cape Spartel, a distance of 22 miles, a submarine ridge of rock is found, about seven miles in breadth, on which the depth nowhere reaches 200 fathoms. After this the water deepens, until south of Sardinia in about 5° W. Longitude, it reaches 10,000 feet. On the "Adventure" and "Medina" banks the water shallows to 200 fathoms, beyond which is the eastern basin, where at a point between Malta and Crete the sounding line records nearly 14,000 feet. A third ridge or plateau lies between the Grecian Archipelago and the coast of Africa, and soon a depth of 6,000 feet is reached, but the water again shallows as the vessel nears Port Said. These submarine ridges at one time formed a land connection between Europe and Northern Africa, the Mediterranean then existing only as three inland seas. It is probable that at the same period the Sahara Desert was much below its present level, and a continuous sea or strait extended from the Bay of Bengal to the Atlantic Ocean. The bed of the Red Sea is comparatively shallow, and is chiefly interesting in that towards its southern extremity are seen large numbers of massive "coral plants" of a sub-littoral type, which have been growing in their place for centuries. Single corals of the genus Mœandrina and Favia, having a globular form, from six to nine feet in diameter, have been observed, on which, says Ehrenberg, the Pharaohs may have looked, of immense antiquity. Beyond Cape Guardafui lie the two islands described by Marco Polo, which the "salvage men" and their wives inhabited apart, and beyond them Socotra, famous—or rather infamous—for its enchanters, who, he writes, "could make the winds blow as they desired, and produce great tempests and disasters." From this the track, as stated before, crosses the north-western part of the Indian Ocean in a direct line for the Chagos Archipelago. There is a tradition that below this sea lies another buried continent, in which, as in Atlantis, have been localized the four rivers and the pleasant land of Eden, the scene of the creation of man.

The theory of a pre-existing land, as we have already seen, involves no geological improbability; the very formation of the atolls and coral-reefs, with which parts of this sea are studded, requires the gradual subsidence of the land, and in fact, it is known that the whole area is still slowly sinking—from Madagascar and the Mauritius to the Chagos Archipelago and Ceylon, and to the Laccadives and Maldives, off the coast of Malabar, the twelve thousand islands of the old geographers. But compared with the traditions of "Atlantis," the legends of

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"Lemuria" are few and uncertain, and the extent of this lost country beneath the ocean is even less well defined. On the mountain of Sakya-muni in Ceylon, the ancient Seilan, a *Kist-vaen* or megalithic building was long venerated as the sepulchre of Adam. "There," says a traveller of the early fourteenth century, John of Marignolli, "is the dwelling-place of Adam, which he built with his own hands; it is of an oblong shape like a tomb, made of great slabs of marble laid one upon another"; but Marco Polo, who visited Seilan some seventy years before, and heard the story, declared that, "according to the Scriptures of our Lord, the sepulchre of Adam is not in that part of the world." As the print of Adam's foot remains, and, varying no doubt in proportion to the faith of the visitor, measures from three to five feet in length, the cautious Venetian showed, perhaps, his better judgment in rejecting the tradition. Probably the legend of Lemuria would have been long since forgotten, but for the unexpected support which it has received from more recent theories as to the geographical distribution of animals. It is found that certain unusual forms of animal life are peculiar to the islands which surround or lie within this area, and the former existence of a continent which at its northern extremity would connect Africa with Western India, and whose southern range extended so far as the deeper seas between Malaya and Ceylon might account for their occurrence. Beyond Lemuria and Diego Garcia, of which we before have spoken, is a deep channel, which, continued in a north-easterly direction passes east of Java and Borneo, and to the south of the Philippines, dividing these from the Australian region in which are the islands of Celebes, of the Moluccas, of Floris, Timor, and New Guinea. This channel of unknown depth, though in places, as between Lombok and Bali, only a few miles wide, narrower in fact than the Straits of Dover, sharply separates the Australian region from that of India. Although these groups of islands, north and north-west of the continent of Australia, are known by the general name of the Malayan Archipelago, the vegetable and animal life of the areas thus divided are singularly unlike, the contrast is as great as between the flora and fauna of the Old World and the New. On the one side, the indigenous life of Borneo, within whose area the whole of the British Islands might be set down, with hundreds of square miles to spare, is strictly Indian; while on the other, in the still larger island of New Guinea, there is no native cat or tiger, no sheep, or deer, or oxen, or any form of quadruped with which we are familiar, but instead are genera which belong to the adjoining

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continent of Australia. Of seventeen mammals yet discovered, fourteen are marsupial; about one half of the land birds of New Guinea are Australian; the common trees of Timor are various species of Eucalypti; and if these and other genera and species, animal and vegetable, are compared, although the physical conditions are so different—New Guinea with its luxuriant forests and moist hot climate, and Australia with its stony plains and dried-up water-courses—the similarity in their natural productions is the more surprizing, and unmistakably points to some earlier period, we know not how remote, when one vast continent extended from Tasmania to the equator, comprizing within its area not only what is now known as Australia, but the thousand islands beneath the tropics and the more important island of New Guinea.

CHAPTER VIII.—UNIVERSAL TIME.

IN the preceding Chapters we have seen how to the student of Natural Science a sea voyage is a never-ending source of delight; it must not be imagined however that there are not phenomena to be studied from day to day which are quite as interesting to lovers of the various branches of Physical Science.

One of the most remarkable experiments in the domain of physical science made during the present century has been that which we owe to the genius of the illustrious Foucault, who has demonstrated for us, after so many thousand years of doubt, the earth's daily rotation on its axis. Now, the various results of this rotation can nowhere better be studied than at sea, especially on such a voyage as between England and Australia, which are nearly antipodal to each other; and there is an especial interest in these results just now for the reason that the time arrangements of our planet are about to be considerably altered and improved. On these grounds, therefore, we purpose to show in the present Chapter how a voyage in an Orient steamer in either direction may be utilised in acquiring accurate information on a subject of world-wide interest.

We have already, in the Chapter on Navigation, referred to the question of longitude, which of course forms a part of the main subject; we shall, however, have to treat it in a more general way, in order to state more fully the various alterations in the planet's time-arrangements to which we have already referred

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To begin at the beginning. Before the earth's rotation was accepted we find the world known to the ancients to be that part of our planet bounded on the north by the Baltic and Black Sea; on the west by the Shetlands, Ireland, the coast of Spain, and a part of Africa; on the east by Ceylon; and on the south by an imaginary sea. Long before observations of latitude and longitude in the present sense were thought of, the ancients knew that the length, or longitude, of the world as they then knew it, from Spain to Ceylon, was greater than its breadth, or latitude, from the imaginary sea to the Baltic; and in the two dimensions of the oblong world imagined by them, we have the origin of the terms longitude and latitude, which are still retained though we are dealing with a sphere.

Again, before they knew the world was round, they attempted to lay down lines showing latitudes and longitudes. The way for this was prepared by the elaborate records and studies of Eratosthenes, touching the various distances in stadia from one place to another; coupled with the fact that was then established, that this oblong world of theirs really was laid out on a spherical surface, and not on a flat one; it was seen that the lines of longitude must pass through the poles of the sphere, and that the lines showing latitudes must be parallel to its equator; they also saw that to deal with longitude accurately, one of the semicircles must be taken as a starting point, this they called *primus meridianus*—the origin of the words prime meridian, about which we shall hear so much in the next few years. In the first maps which were prepared by Marinus of Tyre and Ptolemy, two centuries after Christ, the top of the map was north and the left hand west; and although this was reversed for a time by the Arabs, because they wrote from right to left, the first mode has remained down to our own day. It was imagined, that the prime meridian should pass through the most westerly point of the known world, which was then Cape St. Vincent, in the region which they had most closely studied, and this strangely enough passed through the eastern portion of Britannia, and very near the Shetlands, the Ultima Thule of the ancient geographers; we may say, in short, that the first meridian known, so far as England was concerned, passed very near the present meridian of Greenwich.

The next geographical discovery made was that the Fortunate Islands, now called the Canaries, in which the imagination of the Greeks had placed the Gardens of the Hesperides and all their delights, had a more westerly longitude

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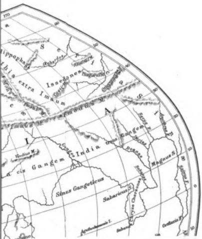

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than the Sacred Promontory, now Cape St. Vincent, and maps were therefore constructed with this prime meridian. Such a map, showing the world according to Ptolemy's ideas, with the longitude reckoned from the Fortunate Islands, is given in illustration of this article.[1] Some more accurate geographers, however, rebelled against this, for the reason that it was difficult to determine the exact longitude of the islands; these geographers therefore preferred to place the prime meridian so that it passed through the most westerly point of Africa, adjacent to the islands; and this prime meridian was favoured by the Arab geographers. Later on it varied to points even to the west of the Fortunate Islands, and at last settled down on Ferro, one of the Canaries, till such time as the observatories of Paris and Greenwich were founded. Since then other prime meridians have been introduced, and we may fairly say that nowadays the confusion in our maps owing to this circumstance is greater than it ever was at the time when a knowledge of geography was confined to the students in the great Alexandrine or Arab schools.

No prime meridian, for instance, ever passed through Alexandria. But what the Arabs were greatly interested in was the meridian running from north to south, and dividing the known world into two equal portions, one east and the other west. Where this line cut the equator was, according to them, the centre of the earth, or, at least, of its surface, having no latitude, and situated at equal distances, 90°, from the four cardinal points of the earth. Here they imagined the famous Dome of Azin or Arin, an enchanted temple or castle most difficult of approach. According to the opinions of some, in it was to be seen the throne of Iblis, and it was the home of demons. The Persians and others believed this to be the centre of created things and of their contrasts, and stories fabulous and impious are told of its inhabitants, who were called Manichaeans.

The first demonstration of the fact that differences of longitude are associated with differences of local time are to be found in Pliny's Natural History; but this fact, which comes out so strongly in a sea voyage, was cloaked to the ancients by the other fact that their division of the day into hours was so widely different from our own. They had only the sun-dial to guide them, and this being so, they made the best of the matter by dividing the intervals

[1] The map is based upon a larger one, given by Bunbury in his admirable *History of Ancient Geography* (Murray).

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between sunrise and sunset, and sunset and sunrise, into twelve hours, the lengths of which of course varied at different times of the year; so that in England the day hours in summer were twice as long as they were in winter. It was the influence of Ptolemy which eventually got rid of this inconvenient arrangement; and as a result of the change of idea we have our clocks, which date from the thirteenth century, dividing the earth's rotation into two periods of twelve hours. This is the origin of our ordinary time, one series of twelve hours beginning at midnight, another series at noon; a day, say the 1st of January, beginning immediately after midnight of the 31st of December.

The preceding is a rough statement, which we must now elaborate somewhat.

The time used in astronomical observatories is not ordinary time, it is star time—a thing vastly different. We know that the earth goes round the sun, and we also know that the stars are so far away that from whatever point of the earth's orbit we regard them they always lie in the same direction; if a telescope, therefore, could always be bracketed on to the same star during a whole year, the telescope would always remain parallel to itself; the exact period of the earth's rotation therefore is accurately determined by observing the same star with a telescope in the same position on any particular night and on the following one; this period has been divided into twenty-four sidereal hours, each consisting of sixty sidereal minutes, each consisting of sixty sidereal seconds; and it is obvious that by watching the stars by an accurate clock, and taking some part of the heavens as a start-point, the same methods which have enabled us to lay down various places and points on the earth with their proper latitudes and longitudes will allow us to map down the stars in like fashion with reference to the earth's rotation, its poles and its equator. Thus we have the celestial equator, the celestial poles; the positions of stars, north and south of the celestial equator are defined by their Declination, the equivalent of our latitude; and the distance from the celestial prime meridian, which passes through the first point of the sign Aries, defined by their Right Ascension, the equivalent of our longitude reckoned east from Greenwich.

This star time begins when the first point of Aries crosses the meridian of any observatory, and is counted through twenty-four hours to the next transit of the same point.

But, however important this sidereal time may be for recording the exact period of the earth's rotation and all that follows from it, it is useless for the

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purposes of ordinary life, for the reason that twelve o'clock, say, would mean, at one time of the year, the middle of the day, at another midnight; at another the time of sunrise, at another the time of sunset.

Astronomers, however, use it to get another time which is much more adapted for the ordinary purposes of life. This time has reference to the sun instead of to the stars, and is so arranged that its start point is always exactly noon; like sidereal time, it runs through twenty-four hours; this is termed astronomical mean (or average) time, for the reason that true sun time, such as that shown by a sundial, is for two chief reasons, which we need not refer to here, too irregular for astronomical use. To bring about perfect regularity and precision astronomers make use of an imaginary sun going at an equal rate along the celestial equator, instead of the true sun going with a variable rate along the ecliptic; and the length of the mean or average solar day is the average of all the true solar days in the year.

We have now, then, passed from star time to mean astronomical time, each running from one to twenty-four hours, the former beginning with the transit of the first point of Aries, which may happen at any time of the day or night, the latter with the transit of the mean sun over the meridian of a place, which can only happen at noon. There is yet something wanting for the purposes of civil life. The astronomical day—that regulated by the mean sun—begins at noon, whereas, as already has been pointed out, our day naturally begins at midnight. We have then yet a third kind of time, which is called Civil Time, and this is the time used for the purposes of ordinary life. It begins at mean midnight and runs to the next mean midnight, two batches of twelve hours intervening instead of one batch of twenty-four. The length of the civil day is the same as the length of the astronomical mean day, only the start point is different, and therefore the length of the hours, minutes, and seconds are the same, all of them being slightly longer than their equivalents in sidereal time; the reason of this is that in consequence of the earth's motion round the sun, which is from west to east, after a place on the earth's surface has got to the same position with regard to the same star after one rotation from west to east, it is not yet in the same position with regard to the sun which it occupied yesterday; it has still to travel through a small angle, and the time spent in travelling this small additional angle necessitates that the hours, &c., of sun time shall be slightly longer than the hours, &c., of star time.

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It will be seen then that at the present day we are in a muddle both as regards longitudes and as regards time. Neither of these muddles touches the person who stays at home and who interests himself merely in his own personal affairs. It is only the traveller who feels the loss of time spent in comparing maps, the longitudes of which start from different prime meridians, take English and French maps as an instance. It is only the man who has large telegraphic dealings with every part of the world, or who takes long journeys frequently, or who studies phenomena which interest every part of the world alike, who has to face the difficulties encountered in turning a hundred local times into the time of his own place, be that London or Melbourne.

The loss of time and labour involved in this way has at last attracted such general attention that a Conference was called together by the American government last year to consider the whole question; and the proposals of this Conference—wise and important proposals—are at the present moment before all the civilised countries of the world for their consideration and approval.

The first resolution adopted was that in the matter of prime meridians we shall go back to the condition of things in Ptolemy's time, that is to say, there shall be but one, and that one is to be that which passes through the central wire of the transit instrument of the Royal Observatory at Greenwich. If this is acted upon, in course of years all navigators who make the voyage from Europe to Australia, or any other, will use maps in which the longitudes of the various places, like the latitudes, shall be independent of the origin of the maps; and this will be a great boon for travellers, inasmuch as it will do away with all risks arising from any inaccuracy or neglect in allowing for the differences of longitudes now shown in different maps for the same stretch of ocean.

Next the Conference proposes that the present arrangement of reckoning 180° longitude east and west from the prime meridian is to stand. The various longitudes therefore between England and Australia will remain as they exist at present on English charts, instead of being all changed, as they would have been, if, as was proposed by some, the longitude should have been reckoned through 360°, going westward. This arrangement, also, has the advantage of retaining the days as they are near the meridian of 180°. It is known that some islands not very distant from Australia, were discovered by vessels going eastward and meeting the sun, and others going westward, or with it; hence the day carried to these islands was different according to the direction in which they were reached.

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We pass now from longitude to time. In this matter the new proposal is that there shall be a something else in the way of time at each place besides its own local time; that instead of there being a day or a period of twenty-four hours only for each place, that there shall be a day or period of twenty-four hours for the planet taken as a whole; this day is to begin at mean midnight of the prime meridian, and is to be counted through twenty-four hours to the next mean midnight.

Now here a very important point comes in. This of course is astronomical time, *par excellence*, and yet the Conference proposes that it shall begin at mean midnight instead of at mean noon, as at present astronomical time does; it will therefore run on all fours with civil time for the first twelve hours at all events, that is, till the next noon, when civil time begins again. The Conference proposes not only that astronomical mean time shall begin at midnight, but that civil time shall run from one up to twenty-four hours.

It requires scarcely a moment's thought to see the enormous simplification of our time arrangements which will be brought about if these resolutions are carried out. Locally the difference between a.m. and p.m. will be abolished. Astronomical mean time and civil time will always be the same, and any confusion which at present arises from things as they are will at once be abolished, while civil time will go on being used as it is for all the ordinary purposes of life. The new Universal Time will of course be something additional at each place, to be used especially for those purposes for which it will be more convenient. These purposes will be telegraphic or astronomical, to begin with, but will not long be thus limited.

Travellers will be specially interested in this new universal time, whether they travel by land or sea, for the reason that in future all changes of time depending upon change of longitude, whether in a long land journey across a continent like America, or in a long sea journey, will be made in hours or half-hours, starting from the prime meridian.

Watches will not be changed according to the time of the prime meridian of each country, but according to the distance from the prime meridian of the planet. In America, for instance, at the present moment, there are five times shown by the clocks from the Atlantic to the Pacific sea-board: we have Intercolonial time, Eastern time, Central time, Mountain time, and Pacific time. All represent even hours of Greenwich time, so that an English watch will only

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require its hour hand altering from one ocean to another; the minutes and seconds will be Greenwich minutes and seconds, only the hours will vary. What the Americans have done in this way for the map of America, will in time be done for the whole planet; each difference of longitude of 15°, or each difference in time of one hour from Greenwich, will have a distinct name given to it, and probably for special purposes special names will be given. I submit with the present article maps showing how this may be worked out for the planet generally, the names of the standard times being suggestions only, and also in the Track Chart I have given names convenient for the special needs of a voyage to or from Australia. In the Chart I have naturally chosen as a designation for each difference of an hour from Greenwich the names of those English possessions which lie most directly under the meridian in question passed by an Orient steamer, whether steaming through the Canal or round the Cape.

It is a curious thing that in this addition to the Track Chart it has come out that the various English dependencies and colonies, or definite parts of them lie as nearly as may be one hour apart. Thus Malta and the Cape are one hour east of London, Cyprus and Natal two hours, Aden three hours, Mauritius four hours, Bombay five hours, Calcutta six hours, Singapore seven hours, West Australia eight hours, Central Australia nine hours, and Eastern Australia ten hours—quite near enough for our present purpose.

I do not for one moment propose to suggest that watches at sea shall be altered according to these new times, because if the ship-clocks are altered in this way without the interpolation of an additional meal on the days on which they are altered on a voyage from Australia, there will probably be a good deal of discontent on board. If this difficulty, however, can be got over, it will be obvious that the time shown by all the watches and clocks in the world may indicate true Greenwich minutes and seconds, and that in all changes necessitated by differences of longitude the hour hand alone need be altered. Indeed, I can imagine the traveller's watch of the future showing minutes and seconds apart from any locality, the Greenwich hour being given on one dial and the local hour on another.

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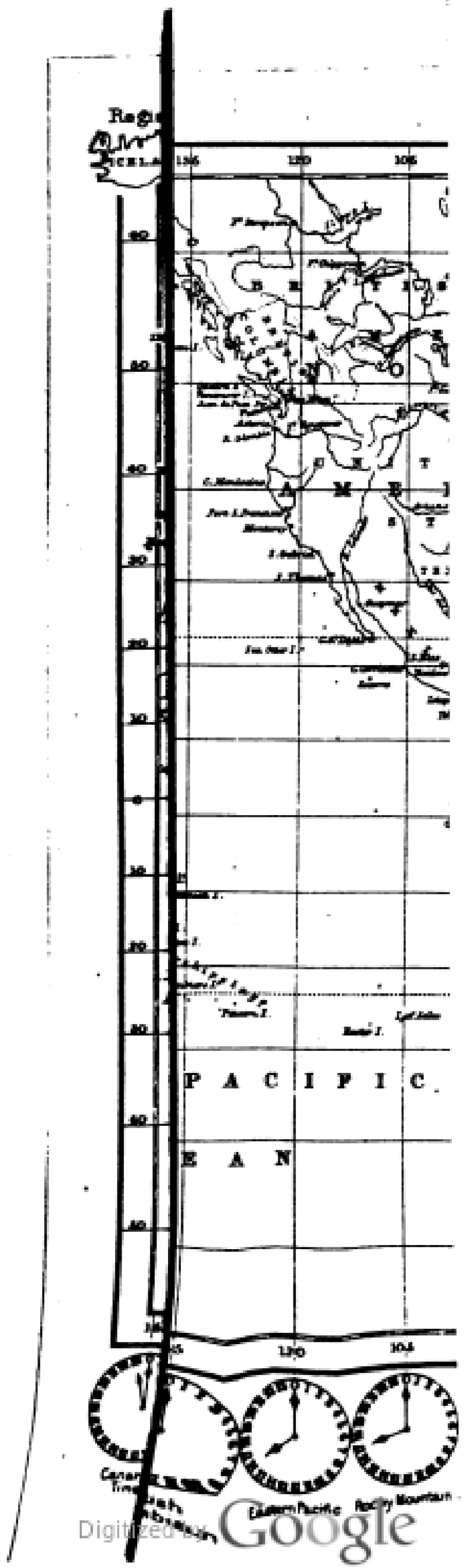

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CHAPTER IX.—The Weather at Sea.

The Weather Prophet at Sea.—The weather prophet at sea acquires his knowledge under peculiar conditions. The study of meteorology afloat has the advantage of being freed from the many local disturbing causes which exist on land. In first facing any science it is of the highest importance to educate the mind down to it, by mastering the important simplicities, and obtaining a true knowledge of the facts upon which the science is based.

In these days of high civilisation and living in houses, the intuitive power of foretelling weather, is, apparently, in process of suppression; and it has become necessary to create a government department to supply the deficiency in this branch of knowledge, so closely connected with man's daily labours. The result has been good, because a mass of recorded facts from various points on the earth's surface have been brought together, with the result that "the weather" has now been fairly well explained. We know many of its laws though we are as yet unable to predict the actual moment of their fulfilment. A sea voyage affords a peculiarly favourable opportunity for forming familiar acquaintance with the laws of weather. The knowledge thus acquired will be found valuable in shore life.

Interesting and Useful Study.—The one great function of the meteorologist at sea is the recording of facts. The Marine Department of the British Meteorological Office, under the experienced guidance of Captain Toynbee, has been for years collecting and collating facts from the "weather logs" forwarded from all parts of the ocean. The office issues a form of log to any who will fill in and return it. These records have already produced many valuable results. The paths of gales and cyclones have been traced, and an elaborate wind chart for various portions of the ocean has been published, giving the probable direction of the wind by means of the records of winds actually found blowing in previous years.

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The Admiralty also publish four Wind Charts of the World, showing for each quarter of the year the probable winds that may be experienced by the sailor as he traverses the various oceans; these have been carefully compiled from a vast number of reliable observations actually made at sea. There is also a Current Chart of the three great oceans drawn upon the same principles. This atlas will be found on board the steamships.

There is then much useful work to be done by recording. But in practising his science at sea the weather prophet must never forget that he is on the move. We shall speak later of the isobars and gradients in which weather travels. The voyager may be crossing these, and is therefore not aware of them—he has no daily "weather chart," telling him what the winds are doing in other places. This shifting of position is of exceptional value in the learning to foretell by the clouds. The observer looks ahead of his ship, and conjectures by the clouds what weather he is likely to meet. His conjecture becomes verified or not, as his floating observatory is carried towards the clouds he has seen.

Prediction depends on observation. The observer records the pressure, temperature, moisture, and motion of the air, by means of a variety of instruments, among which even the spectroscope occupies a prominent position.

The Instruments.—The *Barometer* measures the pressure of the atmosphere. There are two kinds in common use. That made of quicksilver is the more accurate but the more sluggish. The theory is, that on the sea level, at a temperature of 60° Fahrenheit, the ordinary pressure of the atmosphere above that spot will balance a column of mercury about thirty inches high. The other type of barometer in common use is the aneroid, in which the principle adopted is the extreme sensibility to aerial pressure of a metal-surrounded vacuum, and this sensibility, by means of delicate machinery, communicates itself to a dial.

In judging by the barometer, it is more important to note falling or rising than actual height. When the instrument was first introduced, too much attention was paid to the one point of height. Barometer-makers of the present day still foolishly mark the face with "Set Fair," "Rainy," &c.

If we watch carefully the rise and fall of the barometer, we soon see that

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as with all weather signs the more gradual the change the more lasting the effect :—

"Long foretold, long last; short notice, soon past."

The adage, "First rise after low, indicates a stronger blow," is one of special applicability where, as in the English Channel, the cyclonic nature of the gales brings a strong southerly wind and low barometer, to be followed presently by a higher barometer but stronger wind from more northerly directions. The general idea is fairly conveyed in the popular but illogical lines :—

"At sea, with low and falling glass, soundly sleeps a callous ass;
Only while its high and rising, timely rests a careful wise one."

The *Thermometer* measures the temperature and is familiar to all. There is, however, far less general familiarity with that valuable rain foreteller, the *Hygrometer*. Two thermometers, that run well together, are placed side by side. The bulb of one is left exposed; the bulb of the other is encased in linen, which is connected by lamp-wick or a piece of common worsted to a vessel full of water, and thus kept perpetually moist by capillary attraction. This moist cover is subject to constant evaporation, and its thermometer usually marks in consequence a lower temperature than that recorded by the dry bulb. But evaporation is active or the reverse in accordance with the amount of moisture in the air. Thus, in proportion as the evaporation of the water on the linen is rapid or slow, so is the capacity of the air to take in water greater or less. If the evaporation be sluggish, that is proof that the air is saturated with moisture. But as the evaporation is fast or slow, so will the "wet-bulb" thermometer fall or rise, and so differ from the other thermometer. Thus, the nearer the two thermometers "read" to each other, the greater the prospect of rain: and the further they are apart the less the likelihood. If they differ as much as 5° or 6°, even though clouds look never so threatening, no rain will fall.

At sea, the meteorologist always enjoys an uninterrupted view of the air and the sea.

The Air.—The air, with its currents, clouds, and colours may be regarded as an envelope of the earth. It is an envelope made of gas, which expands with heat and contracts with cold; and which is subject to the laws of

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gravity. As it expands, so it becomes lighter, and therefore hot air is, bulk for bulk, lighter than cold air. The air itself as a body is affected not only by those attractions of gravity which belong to this earth and make the difference between light and heavy, but also by the laws of planetary motion which may cause tides in the air, as well as in the water. It is this class of causes which make waves and eddies in this air-envelope. And while heat and the motion of the earth cause *that* apparent motion of the air which we call wind, these other outside influences have much to do with the local perturbations which give to *weather* its endless variety. Recently, indeed, an elaborate argument has been published to the effect that the planets and other bodies periodically approaching the earth have, for a period of 1,700 years, been in such positions *as to* exert an active influence on the air surrounding the earth; but that in a few years' time, these planetary influences will have entered on paths that they are preordained to run for something like 1,200 years, which will prevent their having anything like so powerful an effect on the earth's atmosphere. We are told we may confidently look forward to a long period of *steady* winds and weather. However this may be, it is certain that local perturbations may be satisfactorily and carefully explained on this theory of *eddies* and waves in our atmosphere.

Wind.—The general theory of the wind depends on two factors, heat and the earth's motion. The air near the earth's equator, being heated and becoming lighter gives occasion for a perennial inrush of heavier air from colder regions. But all the while the world goes round, and we *find* what we call easterly winds as we are driven in the equatorial regions against an atmosphere at the rate of about 900 miles per hour. If we take an Orient steamer to Australia, we start in a latitude where westerly winds prevail. Steering on to the south, we pass through a belt of variable winds into a fine N.E. trade wind, blowing at first from the north and gradually veering to the eastward as we approach the equator; here another belt of calms and westerly winds is crossed, and the S.E. trades entered. Off the Cape of Good Hope the steamer finds herself again in westerly breezes.

The heat of the equatorial districts causes the air there to become light and therefore to rise, while the air from the poles continually pressing towards the Line from the colder regions, forms, through the motion of the earth, the

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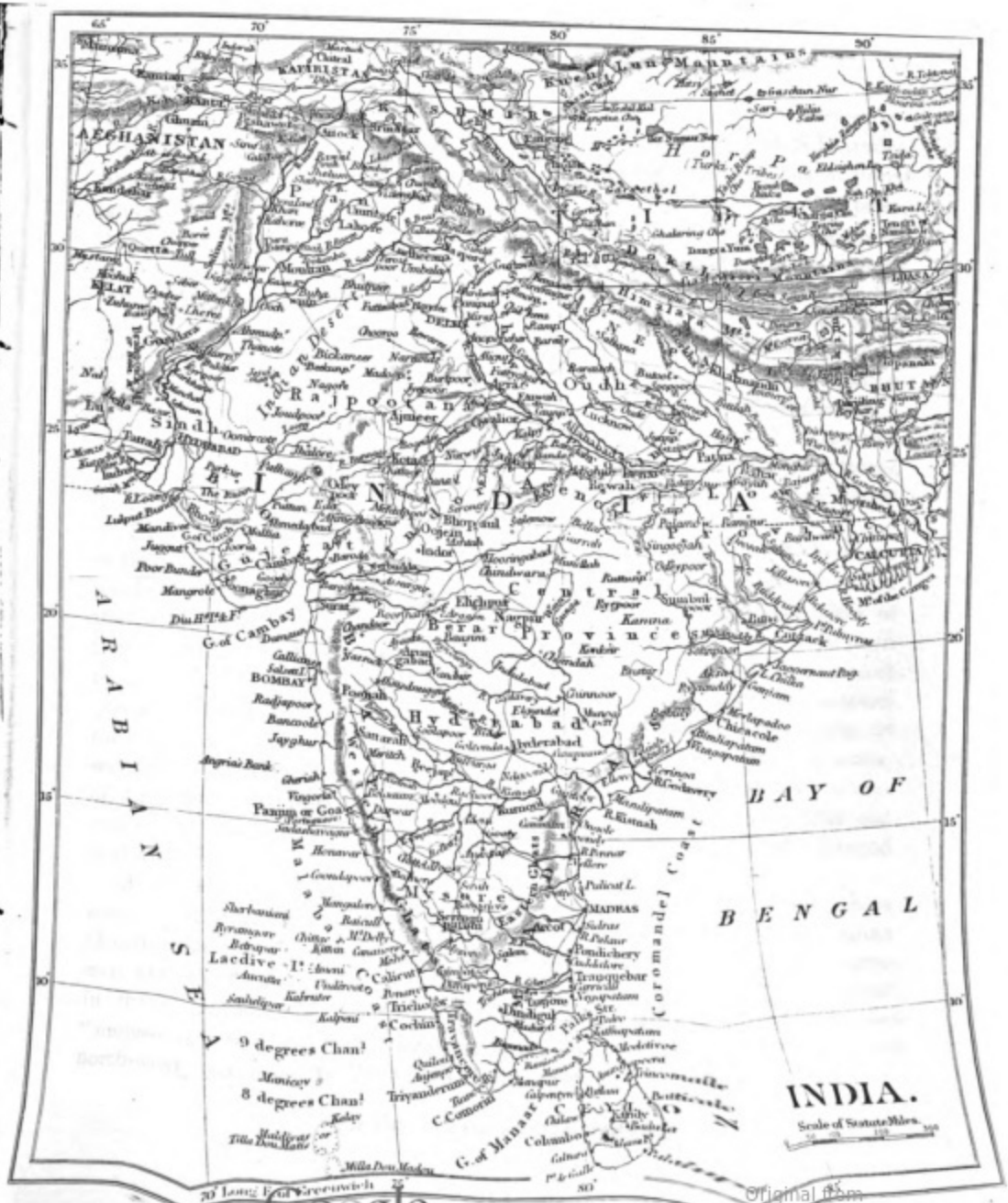

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winds from the north-east or south-east, known as the N.E. and S.E. trades. On the other hand, the air rising from the equator, where it has acquired the velocity of the earth's surface in that region, moves towards the poles, and, descending to the sea, becomes the westerly wind of the temperate zones. When the air drawn in the northern hemisphere southward towards the equator meets the air carried northward from the southern hemisphere toward the same place, these two horizontal currents clash, counterbalance each other, lose their motion, and cause the calms, squalls, and variable winds known as the equatorial doldrums. Similarly, the hot air that rises from the equator, in descending to the surface of the earth, between the latitudes of 30° and 40°, as a southerly or northerly wind, meets and checks the motion of the cold air, rushing from north or south poles towards the equator, and thus forms, in both hemispheres, belts of calm and variable winds, known as the Calms of Cancer in the northern, and Calms of Capricorn in the southern.

Such is the general idea of the motion of our atmosphere; but there are endless local perturbations, the most marked being the "monsoons" or season winds of the Indian Ocean. The alteration in the temperature of the surface of the earth affects the atmosphere in a considerable manner. The sandy plain becomes more readily heated than the wooded hillside. Water is less subject to sudden changes of temperature than land, but at sea there are distinct currents of cold and hot water. The Gulf Stream of the North Atlantic, or the Agulhas Stream off the coast of South Africa, bring great masses of water, warmed in the tropics, into the colder polar seas. The land and sea breezes of the tropics arise from the difference in receptivity of heat between land and water. The air is not only set in motion by these causes, but is itself changed in character.

Monsoons.—The wind systems of the Indian Ocean are much more complicated than those of either the Atlantic or Pacific. In the Indian Ocean, from the shores of Asia to the parallel of 10°, in place of the north-east and south-east trades, with the intervening belt of calms which prevail in these latitudes in other parts of the world; periodical winds termed "monsoons" will be found, blowing from the north-east, south-west, and north-west, according to the season of the year.[1]

[1] *See* Wind and Current Chart, page 70.

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In the Arabian Sea, Bay of Bengal, and China Seas; and as far south as the equator, a pleasant breeze like a trade wind, from the north-east and north, prevails from November to March. This is known as the "north-east monsoon," and brings fair weather. This monsoon blows with greatest force in the China Sea.

From the equator to the parallel of 10° S., between the same months, the prevailing wind is from the north-west, generally light and uncertain, accompanied with squalls, heavy rain, and chequered by periods of calm. This is termed the north-west, or middle monsoon. To the southward of lat. 10° S., the south-east trade will be found.

Between May and September in the same regions an entire change takes place, the winds now blowing fiercely from the south-west with rain and gales. In June and July it is a continuous storm in the Arabian Sea and Bay of Bengal. This is called the south-west monsoon, and is the bad season of the year. The north-west wind, south of the equator is replaced by the south-east trade, which extends nearly to the line, but falls light with frequent calms to the northward of 5° S., and between Sumatra and the meridian of Mauritius. April and October are the months of change during which the weather is uncertain and squally with frequent calms.

The Currents of the Indian Ocean run generally with the monsoons. In the N.E. monsoon the current in the Arabian Sea runs to the southward along the Malabar coast, and then sets to the south-westward, its velocity depending on the force of the wind. On reaching the African shore, this current runs along the coast at the rate of from one and a half to two and a half miles an hour, meeting, in about latitude 4° S., the northerly streams from Zanzibar; both streams then turn to the eastward, setting right across the Indian Ocean between the equator and the parallel of 7° S.

There is a general set of from one to two miles an hour to S.W. along the S.E. coast of Arabia, and into the Gulf of Aden.

In the S.W. monsoon the currents in the Arabian Sea are regular in direction, their velocity depending much on the force of wind and local circumstances. The general course of the current in the middle of the sea is about E., inclining to S.E. as it nears the western coast of India; its velocity varies from half a mile to two miles per hour.

On the eastern coast of Africa the current in the S.W. monsoon sets from

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Zanzibar along the coast to the N.N.E. at a velocity of two to four miles per hour, passes through the channel between Sokótra and the N.E. point of Africa at a rate of one and a half to two miles per hour, pursuing a course northerly and easterly, until it impinges on the Arabian coast about Ras Kosair, whence it takes a north-easterly course along that coast to Rás-al-Hadd, at a velocity of a half to one and a half miles per hour.

The following table gives a comprehensive view of the course and nature of the monsoons in the several regions of the Indian Ocean:—

Arabian Sea.	Bay of Bengal.	China Sea.
November to March. N.E. MONSOON. *Moderate and Fine.*	November to March. N.E. MONSOON. *Moderate and Fine.*	October to April. N.E. MONSOON. *Blows fresh in Nov., Dec., and Jan.*
May to September. S.W. MONSOON. Blowing fiercely, with bad weather in June and July; moderating in August. Cyclones in April and May, and from October to December.	May to September. S.W. MONSOON. Blowing fresh with bad weather in June and July; moderating in August.	May to September. S.W. MONSOON. Moderate, with rain, strongest in June, July, and August. Typhoons from July to November.

East Coast of Africa and the Mozambique Channel.

December to March. NORTHERLY WINDS.	May to November. SOUTHERLY WINDS.

Between the Equator and the Parallel of 10° S.

November to March. N.W., or MIDDLE MONSOON. Light, with squalls, rains, and frequent calms. From the Seychelles to the African Coast the N.E. Monsoon prevails.	May to September. S.E. TRADE. Light, with frequent calms northward of the parallel of 4° S., and veering to the S.W. between the meridian of 80° E., and Coast of Sumatra.

Between the Parallels of 10° and 27° S.

Constant S.E. TRADE.—Cyclones from December to April.

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Cyclones.—When in motion the air, like water, is liable to eddies and waves. These eddies vary greatly in size, from one or two to hundreds of miles in diameter. Such eddies of air will be funnel-shaped, or shorter in the middle than at the sides; consequently in the centre the barometer will be lowest, and it will gradually rise in concentric rings as the edge of the eddy is approached, and as the column of air above becomes higher. These concentric circles are termed "Isobars." A line drawn from centre to circumference, *cutting* these successive isobars at right angles is termed the "gradient." It will be obvious that the steeper the gradient the more violent the eddy. Caution, therefore, will always be requisite on the occasion of any sudden change of pressure, whether it be in the direction of increase or decrease.

These eddies not only revolve in themselves, but also proceed at a considerable pace over the earth's surface. It is by being warned of their approach and being well aware of their character that the Meteorological Office in London has been able to issue storm warnings, about 80 per cent. of which have proved correct. It is not many years since the West Indian hurricane, the cyclone of the Indian Seas, or the Chinese typhoon, were regarded as sudden and capricious outbreaks of nature. Now they are known and understood as merely violent exemplifications of known laws.

The sailor can now always remember that, standing with his back to the wind, the lowest barometer (or, in other words, the centre of the eddy) will always be on his left hand in north latitudes and on his right hand in south latitudes.

But the theory is of most direct importance to the seaman when in those regions which record tells us are peculiarly liable to abnormally violent cyclonic disturbances. These are the tropical zones, where the forces both of the earth's rotation and the sun's heat are most effective. These storms occur generally in the hot seasons when the seas in which they prevail come under the sun. They may be described as gales of great violence, turning round and rolling forward at the same time. The average rate of the progressive movement of their centres is usually between 200 and 300 miles in the twenty-four hours. They travel westward at first, then curve round towards the poles of the hemisphere they may be crossing, finally

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moving to the north-east in north latitudes and to the south-east in south latitudes.

The captain will know that the centre of the storm is about ten points of the compass to his right, as he stands facing the wind in the beginning of the storm, in the northern latitudes; and ten points to the left if in southern latitudes. But he has further to find out on which side of the storm's path the vessel lies. This important point is to be discovered by carefully watching the way the wind changes or veers. Thus when north of the equator the wind will change round the compass in the same direction as the hands of a watch move, if the centre of the cyclone be passing to the right hand of an observer who is facing the direction from whence the storm is coming. The wind will change contrary to the movement of the hands of a watch, if the centre be passing the same observer's left hand. In the southern hemisphere these conditions are reversed.

In observing winds, it is usual to give the *true* and not the magnetic direction. The strength, or technically, the force of the wind is estimated at sea by an arbitrary scale, ranging from 0 to 12; figures which are taken to represent all forces of wind from a dead calm = 0, a moderate breeze = 4, a heavy gale = 8, and violent hurricane = 12. No 9, is the lowest figure which, according to the Board of Trade regulations, can be pleaded by captains as "stress of weather." It is that strength of wind in which a full-rigged ship would just carry her lower or close-reefed topsails and reefed courses.

Squalls.—Squalls are seen at sea in all their native simplicity. An acquaintance with them and their doings formed at sea is of much value ashore, for it is in squalls that showers usually fall. The ordinary squall clouds are heavy and black, and in the form of an arch. The quantity of wind in a squall will be great in proportion as there is rapid rise of cloud, troubled look, and sudden change. A steady advance and quiet appearance indicate heavy rain rather than strong wind. The probable force of the squall is less the more you can see through the arch. There is much truth in the adage:—

"When the rain before the wind, hallyards, sheets and braces mind;
When the wind before the rain, soon you may make sail again."

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Clouds.—It is well that there is water in the air, otherwise its invisibility would deprive the practical meteorologist of those invaluable weather signals; clouds and colours. Clouds are masses of visible vapour floating *in* the atmosphere, and thus serve to show the movements in the atmosphere. Clouds have been divided for purposes of general registration into four *main* classes. "Cumulus" implies large rounded masses; "Cirrus" is applied to small irregular wisps or patches; "Stratus" to layers of cloud—*flat and* monotonous; "Nimbus" to clouds from which rain is actually falling. It is usual in meteorological registers to give the amount of cloud on the sky by a scale in which 0 represents a clear sky, and 10, one completely overcast.

Fine weather is foretold and accompanied by soft and indefinite-*shaped* clouds. Misty clouds forming on mountain tops foretell fine weather, provided they disperse during the morning. Heavy cumulus, of well-defined outline, specially if it appear during the heat of the day, is a sure sign of light winds. Whenever the clouds are seen clearly and distinctly right down on the horizon it is certain evidence of a calm in that quarter.

Change in the weather is heralded by clouds. Strong winds and gales are pioneered by wisps and curls, which gradually increase—the sky becomes mottled and then murky—and, as the gallant French have it,—

"Temps pommelée et femme fardée
Ne sont pas de longue durée."

It will be observed that long lines of cirrus, if they lie east and west foretell fine weather: if north and south rain will follow within twenty-four hours.

Wind makes the clouds the tell-tales of its strength. They come lower down and put on ragged hard forms; and the more "greasy" and troubled they appear the stronger will be the coming breeze. When they become thick in their centres, and thin in the edges and when scud begins to fly off the gale is about to commence.

Rain is to be expected if clouds become watery in appearance or if they take very defined outlines. Scud driving in a direction different from that of the clouds is a sure precursor of rain. When heavy cumulus

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appears, and increases, and settles down with a hazy horizon rain is seen to follow. A dark bank of cloud with white clouds on it marks heavy rain, and the breaking off from the mass of such detached clouds is evidence that much rain will fall.

The *Colours* of the sky, caused chiefly by the moisture in the air, are sure indicators of weather. Speaking generally, delicate quiet tints and colours in the sky indicate fine weather, whereas strong or unsual hues indicate wind and rain. The chief effects of colour are at sunrise and sunset. At other times the blue will be dull and cold for stormy weather, and bright and warm for fine weather. At sunrise a grey sky or low dawn indicates fine weather, but wind and rain are seen to follow on a red sky or high dawn. At sunset a rosy sky in the west foretells fine weather. But any orange or bright yellow or coppery colours foretell wind ; and dark Indian red and sickly greens and blues foretell much rain. If ever the rose colour extend to the east gales are to be looked for.

Other phenomena.—At sea are frequently to be witnessed to perfection two phenomena of much interest, the Aurora and the Zodiacal Light. The former the passenger should carefully record, especially in regard to its movement.

The *Zodiacal light*, that well-known illumination of the heavens, shaped like a half lozenge on end, has given rise to endless controversy as to its origin or cause. Some have supposed it to be an excrescence of the sun itself, or a nebulous ring surrounding it. Others consider it has an immediate connection with the earth itself. It is at all times difficult to see and observe, and it has what in the present state of knowledge must be termed capricious qualities. There are variations in the strength of its light ; also in its length, position, and form. The cones or lozenges show a half-yearly period of greatest elongation. It participates in the daily movement of the earth, and it is visible from the most opposite parts of the earth. It inclines along the Ecliptic. It is outside our immediate atmosphere. Some have simply set it down as an optical effect of matter in the air—of fine dust or gas. Others have suggested that we have a ring like Saturn, and that this light is all we see of its faint presence. It can be watched better in the Tropics than in high latitudes ; and merits close observation whenever visible.

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Lastly, concerning the air, we may remark that *Ozone*, called "the active form of oxygen," is found largely in the air at sea. It is most interesting to make observations of this Ozone in sea compared with Ozone in shore air and to mark the difference. "Ozone papers" are sold for this purpose, and merely require exposure and comparison with a set scale of colour. The record is of much interest and importance; men by thus watching find out for themselves whether much or little Ozone in the air suits them best.

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PART III.

CHAPTER X.—The Mother Country.

We may begin our account of the principal places visited by the ships of the Orient Line with a few words about our mother country. If this book was intended only for Australians, it might be necessary to point out the advantages of a visit to England; but even Australians hardly require to be reminded of them. So far, it has been acknowledged very widely. "Rich Australians" are becoming known in Europe as well as "rich Americans." The effect of travel on the mind as well as on the body is recognised as wholesome. True, sometimes what is wholesome is not very pleasant; and an Australian does not always like to be told, as he sails into the Bay of Naples, for example, that the city before him is larger and more populous than all the capital cities in Australia put together. If however he is determined to persevere in what, with reference to such a country as Australia, it seems absurd to call "insular" pride, he may well reply that in no town of his native land is the annual death-rate so high, or the poverty of the people so great. So too as he nears the end of his voyage, and is taunted with the verdure and fertility of the English soil, he may well reply that millions of Australian cattle and sheep are annually sent to feed the people of this fertile country. It is better to avoid these comparisons in our conversations, however we may feel them in our minds, and let the Australian who visits England for the first time awake gradually to the knowledge of what may be disagreeable, while he is impressed from the first by the hearty welcome he receives in the land of his forefathers.

In this chapter, and those which immediately follow it, an attempt is made to interest the reader in what, for want of a better word, is called among us "topography." Where a country is newly settled, and has, so far, figured but little in history, topography includes geography, geology, and zoology, but little more. In Europe, on the other hand, it comprises all these sciences, and many besides. We want to see where great events have taken place, plains

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where fierce battles have been fought, cities that have sustained long sieges, houses where mighty men were born, and to visit the famous galleries and museums and libraries, where works of art, and relics and records, older perhaps by thousands of years than the civilisation of our own country, are to be seen. Such sights open the mind. The intelligent traveller who has used his eyes abroad, goes home wiser and better. He has seen much that he could admire—much too, it is to be feared, that must serve to warn him; but a day in one of the capital cities of Europe has taught him more, not only in art, history, and politics, but in social science, than he could learn in years of reading at home. Mere geographical facts put into words will give him but little idea what the cradle of his race is like. When he has seen it, he goes back impressed with the knowledge of what that race has done and can do, and with the greater determination to uphold in another hemisphere the credit it has won. There is no need to dwell any further on the advantages of a visit to the mother country. Her history is cherished by every Australian colonist as his own, and her islands are loved by many who never saw them. London, her capital, is the capital of the world.

The Australian who would receive the fairest impression of London cannot do better than sail up the Thames, say by one of the regular Gravesend steamers. A more complete idea of the magnitude of the great City and its trade is thus afforded than any other method of approach can give.

London viâ the Thames.—On leaving Gravesend there is little of immediate interest along the distant banks until Greenhithe and Erith are passed on the left, and Purfleet, with its peculiar chalk cliffs and great powder magazine, is passed on the right hand. After this, however, manufactories and works of one kind and another become more frequent, and to the left stretch away the flat Plumstead Marshes, chiefly known as the locality for every kind of gunnery experiment. On the right hand will next be noticed the entrance to the Albert Docks where the vessels of the Orient Line lie. On the opposite side of the river to these docks Woolwich is seen with its great arsenal. The dockyard, with its building-sheds, is now practically deserted. Immediately after passing Woolwich, away inland on the right, is seen the beginning of a forest of masts, which mark the presence of the vast docks and shipping of the Port of London. These docks, on both sides of the Thames, occupy an area which can only be measured in miles. On the right

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hand is presently passed the historic Blackwall, where, in the old sailing-ship days, so many a parting and arrival has taken place. Here is the entrance to the East India Docks. A sharp bend to the south carries us up Blackwall Reach to Greenwich, and when Greenwich appears on the left we may be said to be in London, for Greenwich, although five miles from Charing Cross, is now joined to it by a continuous street. The first important public building that meets our eyes is Greenwich Hospital, once a royal palace, now the Royal Naval College. It is a larger building than any palace in England except Windsor Castle, the front towards the river being 290 yards long, and the square in the centre, of which we get a passing sight through a vista of coupled pillars, 190 yards wide. The Hospital, a monument of the virtues of Mary II., was established by her husband, William III., and on the forfeiture of the adherents of the Old Pretender, the estates of the Earl of Derwentwater were assigned for its maintenance. It was opened in 1705 to admit 100 seamen. During Nelson's victories, as many as 2,700 seamen, many of them maimed, were supported here. In 1869 the Hospital was abolished, pensions being preferred by most sailors. The buildings bear the mark of many minds and many hands, but the whole design, one of the most successful for picturesqueness and stateliness combined, is to be attributed to the genius of Sir Christopher Wren.

Before Greenwich is out of sight, it may be worth while to recall the fact that Henry VIII., Queen Mary, and Queen Elizabeth were born, and Edward VI. died, in the old palace here; and to look up, through the park, to the famous Observatory, from which longitude is reckoned as east and west of Greenwich.

On the opposite shore is the Isle of Dogs, once a kind of delta, formed by the Essex river Lea, which here fell into the Thames. It is now a network of docks. These form the Port of London, though not a single dock is in the City itself, the nearest being St. Katharine's, made in 1828, with the moderate size of 24 acres, which at that time was thought enormous. It is now completely surpassed by many others, and especially by the new Albert Docks and their extensions, which are two and a half miles long. St. Katharine's is on the site of an ancient hospital of that name which was removed to Regent's Park, while the ground on which it stood was dug out and carried to Pimlico, some miles higher up the river, where it was employed to fill up and raise a marsh, on which streets and squares, some of them now most fashionable, were built.

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There are few of us who have not read with interest the memoirs written in his diary by John Evelyn, in the reign of Charles II. As, about one mile from Greenwich, we pass Deptford we are reminded of him, for he lived at Sayes Court, where we still see, among masts and chimneys, a few green trees. They mark the site of a public garden and museum given to the place by the present representative of the Evelyn family. It was here that Peter the Great lived for three months when he was studying shipbuilding in the adjoining dockyard. Many are the complaints made by Evelyn at the ill-treatment his gardens received from the Czar and his half-civilised servants. Among the Treasury Minutes there is one recording the payment to him of £162 7s., in recompense for the damage done to his house, goods, and gardens at Deptford, "by his Csarizes Majestie and his retinue."

A little beyond Deptford we pass Millwall with its docks on the right, and the western entrances to the enormous West India Docks, which cover 295 acres. From the time we passed the Albert Docks, we have in fact, been moving along parallel with an almost continuous line of dock walls. At Shadwell we come to the London Docks, of about 120 acres Immediately opposite is Rotherhithe, or as it is often pronounced Redriff, a place which looks unsavoury enough now, but which was a fashionable watering-place in the reign of Henry IV., who lived here for four months in 1412, for the sake of the fine air. Here are now the Commercial and Surrey Docks, covering together about 350 acres.

We are now over the Thames Tunnel, an undertaking which forty years ago was looked upon as one of the wonders of the world. It cost half a million sterling, and was eighteen years in course of construction, owing to the difficulties encountered by the engineer, Brunel. At one time the works were abandoned, but eventually the tunnel was completed, and long struggled on under a load of debt. A bazaar was held in it at first, a railway runs through it now. Its place, for foot passengers, has been supplied by what is called the Tower Subway, which was constructed by Mr. Barlow in less than a year for about £16,000. The tunnel connects Wapping with Rotherhithe, though Wapping has changed its name, and is now generally called St. George's-in-the-East. But Englishmen will never forget the song of "Wapping Old Stairs."

From this point we have one of the most interesting views in England, or perhaps, to an Englishman, in Europe. The group of buildings to the

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right looks familiar, though we may never have seen it before. For a moment we do not realise that these turrets and vanes, that large staring white house with small windows, the long and embattled wall and terrace by the riverside, with the quaint arched gateways, are the Tower of London.

And a little further on, rising more than four hundred feet from the river's level, above a perfect forest of houses and steeples great and small, is the scarcely less familiar form of the vast dome of St. Paul's. Before us is London Bridge. We are in London.

London.—Rightly to understand London, we must remember that it consists of a small central "City," and of suburbs which make it, taken altogether, the largest and most populous town in the world. It is usual to speak of it as the Metropolis, or the Metropolitan Area, but, except that it may now be said to have been authorised by frequent use in Acts of Parliament, this is an ecclesiastical term, and properly belongs, not to London, but to Canterbury. So, too, it is common, in enumerating the English counties, to say that London is in Middlesex. This again is an error. London is not and never was in Middlesex. London was where it is, a Roman city, before Middlesex existed. A great part of the widely spreading suburbs are in the county of Middlesex, but not the City of London, which has never been included in any county, although for a time it belonged to Essex, one of the kingdoms of the so-called Heptarchy.

The eastern boundary between Middlesex and London passes through the part we have just passed; the outer gate of the Tower is in the City, but the White Tower, and all east of it are in the county. The city is surrounded by other cities or boroughs. To the east are the "Tower Hamlets," comprising the ancient parish of Stepney. To the west is the city of Westminster, which is five times larger and more populous than the city of London. To the north are Finsbury and Hackney; to the north-west is the borough of St. Marylebone; to the south-west is Chelsea, which includes Kensington. All these return members to Parliament, as do Greenwich, Southwark, and Lambeth.

The population is so scattered at the edges of the great area that it is not possible to define exactly what we are to call London and what not, but we may safely assert that fully four millions of people live within twelve miles of London Bridge. Of this enormous number, about 50,000 only inhabit the City, and about five times that number are occupied in it daily

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with business. There are 25,000 houses in the City, and the rateable value is three millions and a half sterling. Over London Bridge alone not fewer than 150,000 persons pass every day, and 20,000 vehicles of all kinds. Of the ring of parliamentary boroughs enumerated above, Finsbury is the most populous, as it contains more than half a million of inhabitants, and even Greenwich has more than two hundred thousand. In addition to the nine boroughs, more than sixty district villages have been absorbed by London and its suburbs, and the streets, if laid end to end, would reach from London to Naples and back again.

London, to judge by its name, which is a relic of the language of the ancient Britons, and means "the fort of the waters," was in existence when the Romans came. They built a bridge over the Thames, and made a strong castle at either end of it. A vast ring of suburbs grew up about these forts, and after they had been repeatedly plundered and burnt in various rebellions and wars, Constantine, or one of his immediate successors, built a wall round them. The old "pretorium" had stood close to where Cannon Street Terminus stands now: and we must suppose that it continued to be the head quarters of the Roman soldiers. But when they were withdrawn, the Britons could not defend London, and it is believed that for a long time the city lay empty and desolate. King Alfred saw its value as a defence against the Danes, and rebuilt the broken wall. William the Conqueror burnt Southwark, but approached London cautiously. He was at Berkhampstead, a few miles to the northward, when a deputation of the citizens came out and offered him the crown. William in return gave them a charter confirming to them the old English liberties, of which so little remained to the conquered Saxons in other parts of England. Under his successors London flourished. The trade with the Kings' foreign possessions was immense: and the government of the city, which Richard I. intrusted to a mayor, was carried on in such a way as to foster commerce, secure liberty and maintain order. By the time of King John, London was so powerful, that she obtained a special clause in Magna Charta, and her liberties were the model on which the new constitution of England was moulded. The city was much oppressed by Henry III. In the reign of Edward I., the office of alderman became elective, and the still subsisting division into wards was made. A little later the old semi-religious trade guilds were superseded by companies which still exist, every freeman of the city being enrolled in their ranks. At first they regulated trade, each in its own department; and the

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Goldsmiths and some other companies still discharge functions of the kind. The majority, however, are only engaged in the distribution of charitable and other funds, and in supporting schools. In the Wars of the Roses, the city took the Yorkist side, and contributed largely to the ultimate success of Edward IV. Henry VII. was unpopular with the citizens, from whom on various pretexts he obtained vast sums of money. Henry VIII. was always liked in London, and his suppression of the religious houses was highly approved of by the people who, especially within the walls, had many causes of complaint against the monks and friars. The persecution of the reformers under Queen Mary was particularly ruthless in London, and the fires of Smithfield turned the people more and more against the old religion, so that under Elizabeth, who was always very popular in the city, they went into an opposite extreme, and by the end of the reign of James I., the majority were puritans. After the execution of Charles I., whose fall is in great part attributable to his illegal oppression of the citizens, a reaction set in, and the interference of Cromwell and the Long Parliament in city affairs was so much resented that, at the restoration of Charles II., London was completely loyal. Charles and his successor James II. found their tyrannical schemes much impeded by the civic privileges, and London was for a time deprived of its charter. The advent of William III. was therefore joyfully hailed, and in his reign, and that of Anne, the wealth of the merchants increased rapidly, the foundation of the Bank of England in 1694 being one of the greatest commercial events in London History.

The city from the time of the Great Fire in 1666 diminished in population, though it increased in wealth; and in the reign of George II., even the old walls and gates disappeared. The suburbs had spread in all directions, and had become greater by far than the city itself. As far back as the reign of Henry I., the citizens obtained the royal rights in the county of Middlesex from the crown; and very soon houses and monasteries began to spring up outside the walls. In the reign of Henry III. the Strand formed a continuous street towards Westminster, where the abbey was rebuilt by the King with great magnificence. Henry endeavoured to curtail the privileges of the citizens in Middlesex in favour of the abbot, but only alienated their affections, and they soon succeeded in obtaining from him an acknowledgment of their ancient rights. Holborn on the west, and Stepney on the east became thickly inhabited by the end of the reign of Edward III., and Westminster was rapidly increasing, especially when the law courts were permanently fixed in the King's palace.

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Richard II. built Westminster Hall, one of the first great events in which was the King's formal deposition and the accession of Henry IV. At the dissolution Westminster Abbey became a deanery, and the dean still occupies the abbot's place. Meanwhile, the suburbs have spread in all directions, and the city of London itself has become a mere place of business, with but few inhabitants, the houses consisting for the most part of magnificent offices, often situated in narrow lanes and courts, which still bear witness to the crowded state of old London.

The Great Fire which consumed the city in the reign of Charles II. had a remarkable effect on its healthiness. The plague, which had been almost constantly raging in some form or other, and was especially severe the year before the fire, now ceased wholly. We still see the effects of the fire in the almost complete absence of the old-fashioned Gothic churches, which are so common in other parts of England. But London justly prides herself on the churches built by Sir Christopher Wren, whose towers and spires form such beautiful features when seen from the river, the magnificent dome of St. Paul's standing out among them as the central and principal object of the view.

Among the public buildings of the city, the Guildhall, in which the citizens have assembled for more than six centuries; the Royal Exchange, where the business of half the world is transacted; the Bank of England, the Mansion House, the General Post Office, and, not far from it, the old prison of Newgate, should be seen by the visitor; who will also be interested by St. Giles's Church, Cripplegate, where John Milton is buried, and where a bastion of the ancient wall is still standing; by Crosby Hall in Bishopsgate Street, where Richard III. resided for a time, and which Shakespeare mentions in several places; by St. Paul's, where Nelson, Wellington, Wren, Turner the painter, and other great men are buried; but above all, by the Tower of London, the great Norman fort which William the Conqueror built to overawe, and at the same time to defend the city, and which became in after years alternately the palace and the prison of so many English kings and queens, and the death-scene of so many of the personages who figure in our history.

Beyond the city limits the visitor will find even more that is interesting. Westminster Abbey will delay him longest, and cannot be exhausted in a day, or in many days. In the royal chapel of Edward the Confessor, where so many Kings are buried in the little mound of holy earth which Henry III. imported from Palestine; in Henry the Seventh's Chapel, with its wonderfully carved

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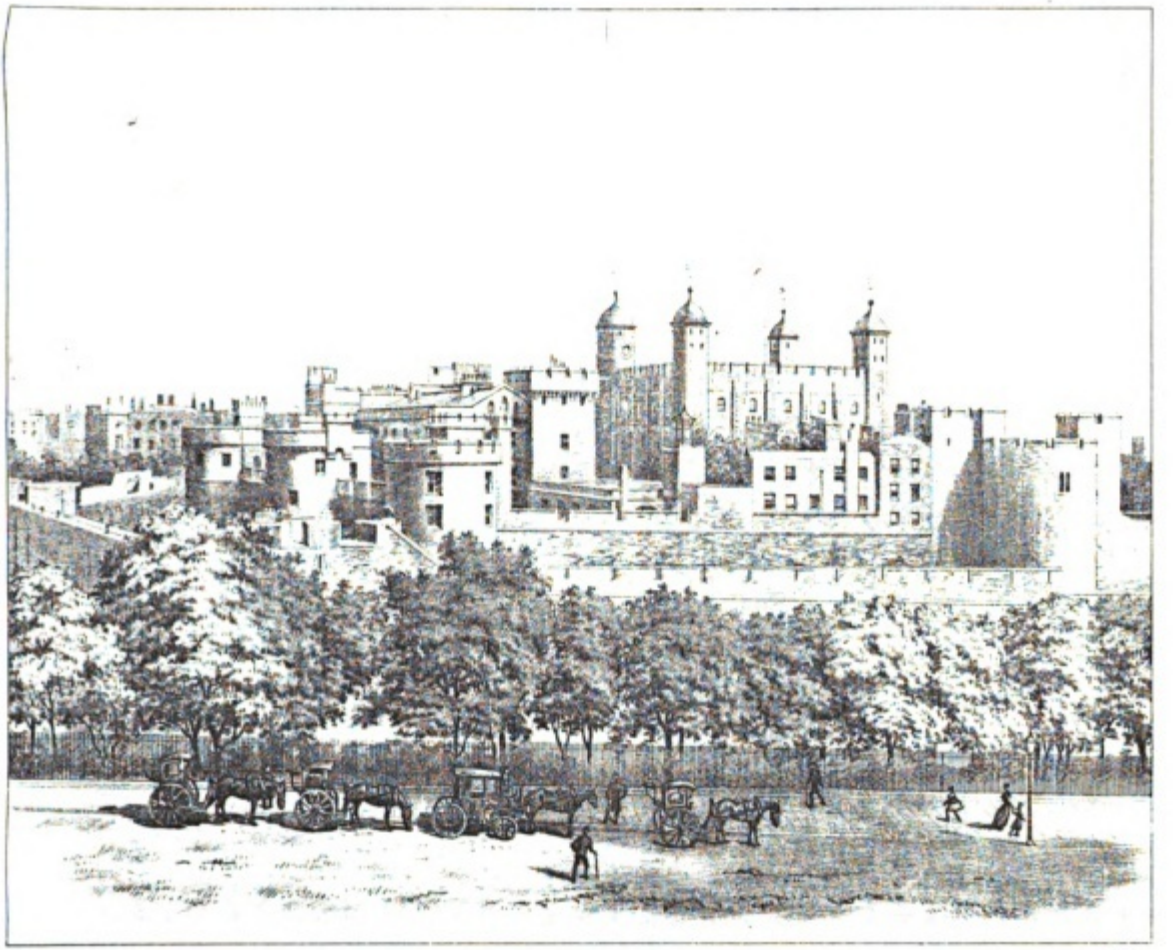

THE TOWER OF LONDON.

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roof, and the tombs of the founder, of "Bloody Mary" and Elizabeth, and of the ill-fated Mary, queen of Scots; in the Statesman's Transept and the Poets' Corner; by the graves of Newton and Livingstone, of Dickens and Lytton, of "rare Ben Jonson," and Geoffrey Chaucer, Clerk of the Works to the abbey, and father of English poetry, he will find it impossible to hasten his steps, even though he is not arrested at every turn by the beauty and solemnity of "the long drawn aisle and fretted vault," and the beautiful vistas of column and arch and portal. Nor must he neglect the cloister with its green garth, where the old monks were buried, nor the library with its ancient buildings, nor the chapter room, where for centuries the English Commons were wont to assemble. But it is worth making the voyage to England to see Westminster Abbey alone for those who love ancient architecture and historical associations. For those whose interest lies more in what is modern, there is at Westminster another building to which in their minds even the abbey will yield. The old palace is gone, but already enough of association has gathered about the Houses of Parliament to render them well worth a visit even to those who do not care for splendid architecture, gorgeous decorations, fresco paintings by great artists, mosaics and stained glass. The ancient hall, with its fine oak roof, forms an appropriate vestibule to the parliamentary precincts, and now that the shabby buildings in which for many years the chief courts of law were seated have been pulled away, we are able to see the western side with its long roof and its buttresses.

The new Courts of Justice are situated at Temple Bar, and stand partly within the old city boundary. The visitor whose time is limited will perhaps be contented with a view of the exterior, and will hasten on to the National Gallery, a mean-looking building on a fine site, furnished with a marvellous collection of beautiful pictures, almost all accumulated during the reign of our present gracious queen; or to the British Museum, where ancient books, Greek sculpture, Egyptian and Assyrian monuments, majolica, ivories and many other objects of curiosity, or beauty will contend to detain him; or to the South Kensington Museum, where only art and not mere curiosity is admitted, and where the principal institution is flanked by the India Museum, the National Portrait Gallery, the Museum of Natural History, and other shows, more or less interesting; or to the Albert Hall, or out to the Crystal Palace, to hear good music; or,—and to my mind this is the most wonderful sight of all—to the Park on a fine afternoon in the season, that is between the 1st May, and the

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end of July, to see the carriages and horses, and the gay throng of the fashionable world, with perhaps a glimpse of the Princess of Wales, and even, as a piece of very good fortune, of the Queen herself.

The stranger in London is naturally bewildered at first by its size, but when once a few geographical facts about it are mastered, it is found that there is no place easier to get out of in every direction, and thus it therefore forms one of the most convenient of possible headquarters during an English visit. We can run down to the south coast in a single hour by railway. It is not a quarter of a day's journey to Oxford, or Cambridge, or Stratford-on-Avon; it is not half a day's journey to Portsmouth or Bristol; it is a short day's journey to Liverpool, or a long one to Glasgow and Edinburgh. The smallness of England, the frequency of large towns, the inclosures everywhere, the almost complete absence, except in remote places, of wide open spaces, are the features of the country which, even more than its antiquity, impress one most on fresh arrival from the Colonies. That from so small a mother so great an offspring should have gone forth to people the earth, and that the English language should be more widely spoken than any other, are the results of causes which began to work in this island some fourteen centuries ago, causes which some have endeavoured to classify as Truth and Liberty, but which are the ideas implanted in every Englishman's mind, whether he be born in the Mother Country or in one of her Colonies.

The visitor from the Antipodes finds the foggy atmosphere of London oppressive, except in the height of summer; but he should endeavour to time his visit so as to see the great city in what is locally called "the season," that is, during the session of Parliament. The country visit should be made before or after, but no one can be said to know what London is like who has not stood in Hyde Park on a fine afternoon in May or June, and watched the display of wealth and taste there exhibited; and every one will wish to attend a sitting of the Houses of Lords and Commons, to see the judges on the bench, to hear the great speakers and preachers of the day, to visit the Royal Academy, and to make a pilgrimage to the tombs of the mighty men of old time who lie buried in Westminster Abbey and St. Paul's. In the autumn you may attend cattle shows and the congresses of learned societies in the country; but London at that time of year is "out of town," and though as full in reality as ever of people, does not offer to a

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