

Contents

1



THE DAWN OF SCIENCE PREHISTORY TO 1500

| | |
|----------------------------|----|
| Introduction and Timeline | 12 |
| Fire Power | 14 |
| Early Metalworkers | 16 |
| Evolution of the Wheel | 18 |
| Elements of Life | 20 |
| Early Medicine and Surgery | 22 |
| The First Astronomers | 24 |
| Ancient Number Systems | 26 |
| ■ PYTHAGORAS | 30 |
| | 32 |

Greek Mathematics and Geometry

34

■ ARISTOTLE

36

Ancient Ideas of the World

38

Simple Machines

40

How Gears Work

42

■ "EUREKA!"

44

Floating and Sinking

46

Algebra

48

Water and Wind Power

50

Alchemy

52

■ ZHANG HENG

54

Gunpowder and Fire Weapons

56

The Printing Revolution

58

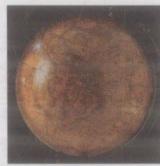
■ ALHAZEN

60

East Meets West

62

2



RENAISSANCE & ENLIGHTENMENT 1500–1700

64

Introduction and Timeline

66

Birth of Experimental Science

68

Renaissance Medicine and Surgery

70

The Human Body Revealed

72

■ THE SUN-CENTRED UNIVERSE

74

Planetary Motion

76

Magnetic Fields

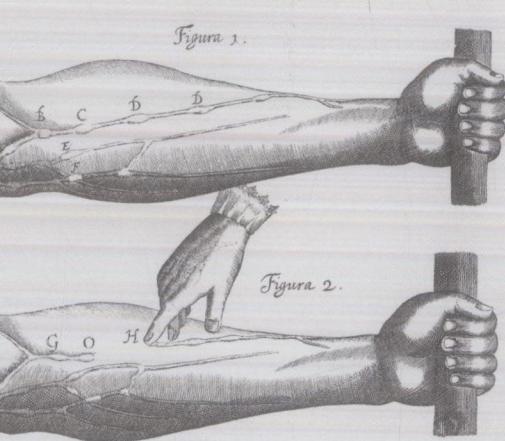
80

■ GALILEO GALILEI

82

Exploring the Skies

84





| | |
|-------------------------------|-----|
| Motion, Inertia, and Friction | 86 |
| Methods of Calculating | 88 |
| Circulation of the Blood | 90 |
| ■ ROBERT HOOKE | 92 |
| Microscopic Life | 94 |
| Discovery of the Vacuum | 96 |
| ■ ROBERT BOYLE | 98 |
| The Behaviour of Gases | 100 |
| Graphs and Coordinates | 102 |
| Newton's Laws of Motion | 104 |
| ■ NEWTON'S IDEA OF GRAVITY | 106 |
| Gravitational Force | 108 |
| ■ ISAAC NEWTON | 110 |
| Speed and Velocity | 112 |
| The Nature of Light | 114 |
| Splitting and Bending Light | 116 |
| Comets and Meteors | 118 |
| Measuring Time | 120 |
| Classification of Species | 122 |

3



THE INDUSTRIAL REVOLUTION

1700–1890

| | |
|-----------------------------|-----|
| Introduction and Timeline | 126 |
| ■ THE NEWCOMEN ENGINE | 130 |
| Steam Power to Steam Engine | 132 |
| ■ HARRISON'S CHRONOMETER | 134 |
| Navigating the Oceans | 136 |
| The Nature of Matter | 138 |
| States of Matter | 140 |
| Liquids under Pressure | 144 |
| The Discovery of Gases | 146 |

| | |
|--------------------------------|-----|
| ■ JOSEPH BLACK | 148 |
| Organic Chemistry | 150 |
| Plant Life Cycles | 152 |
| How Plants Work | 154 |
| ■ THE FIRST VACCINATION | 156 |
| Static Electricity | 158 |
| ■ BENJAMIN FRANKLIN | 160 |
| ■ THE FIRST BATTERY | 162 |
| Electric Current | 164 |
| Electromagnetism | 166 |
| The Electric Motor | 168 |
| ■ MICHAEL FARADAY | 170 |
| Accurate Measurement | 172 |
| Calculating and Computing | 174 |
| Energy Conversion | 176 |
| The Nature of Heat | 178 |
| Laws of Thermodynamics | 180 |
| The Solar System | 182 |
| How Rocks Form | 184 |
| The Fossil Record | |
| ■ FINDING ARCHAEOPTERYX | |
| Dating the Earth | |
| Shaping the Landscape | |
| Probability and Statistics | |
| ■ DARWIN'S THEORY OF EVOLUTION | |
| How Evolution Works | |
| ■ CHARLES DARWIN | |
| Laws of Inheritance | |
| Atmospheric Movement | |
| Predicting the Weather | |
| Structure of the Atmosphere | |
| Studying the Oceans | |
| Animal and Plant Cells | |
| Digestion | |
| Food and Health | |
| The Nervous System | |
| The Brain | |



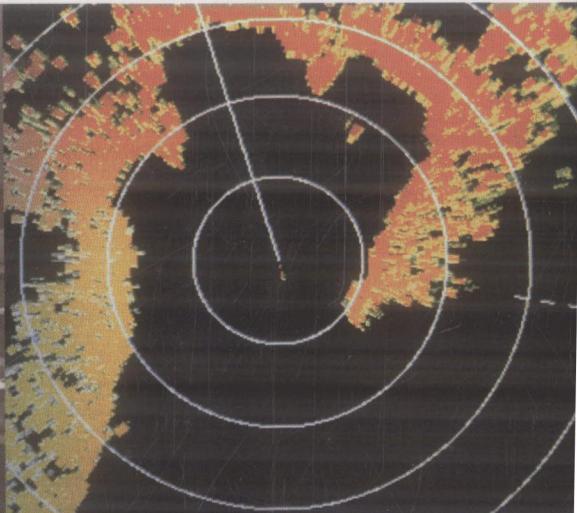


4



THE ATOMIC AGE 1890–1970

| | | | | | |
|---------------------------------------|-----|----------------------------------|-----|--|-----|
| Muscles, Bones, and Movement | 224 | The Nature of Sound | 256 | How Cells Divide | 306 |
| Human Reproduction | 226 | Electromagnetic Spectrum | 258 | Chromosomes and Inheritance | 308 |
| Safer Surgery | 228 | Telegraph to Telephone | 260 | ■ THE DISCOVERY OF PENICILLIN | 310 |
| ■ MENDELEEV'S TABLE | 230 | Photography | 262 | The Development of Medicines | 312 |
| The Periodic Table | 232 | ■ THOMAS EDISON | 264 | Quantum Revolution | 314 |
| Chemical Reactions | 234 | Capturing Sound | 266 | ■ THE EXPANDING UNIVERSE | 318 |
| Speeding Up Reactions | 236 | Radio and Radio Waves | 268 | The Big Bang | 320 |
| Acids and Bases | 238 | Breathing and Respiration | 270 | ■ THE FIRST ATOM BOMB | 322 |
| Mass Production of Chemicals | 240 | The Five Senses | 272 | Fission and Fusion | 324 |
| The Spread of Disease | 242 | Regulating the Body | 274 | ■ RICHARD FEYNMAN | 326 |
| Bacteria and Viruses | 244 | Animal Behaviour | 276 | The Life Cycle of Stars | 328 |
| Natural Defences | 246 | Cycles in the Biosphere | 278 | Ecology and Ecosystems | 332 |
| Immunization and Vaccination | 248 | | | Conservation Biology | 334 |
| Artificial Light | 250 | | | The Age of Plastics | 336 |
| Generating Electricity | 252 | | | Rocket Propulsion | 338 |
| The Internal Combustion Engine | 254 | | | Galaxies, Clusters, and Superclusters | 340 |





| | |
|-----------------------------------|-----|
| Codes and Ciphers | 342 |
| ■ ALAN TURING | 344 |
| ■ THE STRUCTURE OF DNA | 346 |
| The Genetic code | 348 |
| Chaos Theory | 350 |
| The Structure of the Earth | 352 |
| ■ MOVING CONTINENTS | 354 |
| Plate Tectonics | 356 |
| Active Earth | 358 |
| Agriculture | 362 |
| Lasers and Holograms | 364 |
| Microchip Technology | 366 |
| Artificial Satellites | 368 |
| ■ MOON LANDING | 370 |
| Manned Space Travel | 372 |

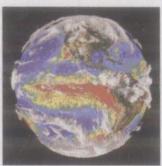
5

THE INFORMATION AGE

1970 ONWARDS

| | |
|---|-----|
| Introduction and Timeline | 376 |
| The Internet | 378 |
| Artificial Intelligence and Robotics | 380 |
| Subatomic Particles | 382 |
| ■ DOROTHY HODGKIN | 384 |
| Gene Technology | 386 |
| ■ IN VITRO FERTILIZATION (IVF) | 388 |

| | |
|-----------------------------------|-----|
| How Cloning Works | 390 |
| Nanotechnologies | 392 |
| Inside the Solar System | 394 |
| Spaceprobes and Telescopes | 396 |
| Dark Universe | 398 |
| Grand Unified Theory | 400 |
| String Theory | 402 |
| Body Imaging | 404 |
| Modern Surgical Procedures | 406 |
| Disease Challenges | 408 |
| The Human Genome | 410 |
| ■ JAMES LOVELOCK | 412 |
| Global Warming | 414 |
| Renewable Energy | 416 |
| Tackling Climate Change | 418 |
| Measurement | |
| Astronomy | |
| Earth Science | |
| Biology | |
| Chemistry | |
| Physics | |
| Mathematics | |
| Who's Who | |
| Glossary | |
| Index | |
| Acknowledgments | |



REFERENCE

