Contents

	Section 1: Descriptive	
1.	Famous Ophthalmologists Frank Joseph Goes	3
	Famous Ophthalmologists 4; The Hall of Fame 8	
2 .	Anatomy of the Human Eye Frank Joseph Goes	14
	Function of the Eye 15; Detailed Anatomy of the Eye 16 ; The Retina 22	
3 .	Accommodation Henk Weber	25
	History 26; Presbyopia 27	
4.	Daltonism Color Blindness Frank Joseph Goes	34
	Color Cones 34; Types and Degree of Color Vision 35; Cause—Genetics 37; Red-Green Color Blindness 38; Detection and Classification Test 38; Occupations and Restrictions 41; Misconceptions and Compensations 42; Famous Color-blind People 43	
5 .	How We See? Frank Joseph Goes	44
	In Ancient Times 44; The Process 45; Visual Pigments 47; Vision Development in Children 48; Chemistry of Vision 49; Psychology 50; Reflection and Scattering 50; Refraction 51	
6.	Animal Eyes: The Evolution of the Eye Frank Joseph Goes	53
	The Evolution Different Eyes 53; The Daily Life of Some Animals 62; Inside the Mind of Animals 68	

SECTION 2: THE HISTORY

73

86

7. Nature of Light

Leo Gijsels, Frank Joseph Goes

Electromagnetic Radiation 73; Speed of Light 76; Light Sources 78; Theories about Light 78; Wave-Particle Duality 83; Quantum Electrodynamics 84

8.	Anatomy	and	Function	of	the	Eye
----	---------	-----	----------	----	-----	-----

Frank Joseph Goes

Ophthalmology in the Ancient Civilizations *86*; The Greek Period *88*; Ophthalmology in India and China *92*; Arabian Ophthalmology *94*; The Renaissance in Europe *96*; The Early Modern Period:1600–1900 *99*; The 20th Century *100*

xvi The Eye in History

9.	Anatomy of the Central Visual System Frank Joseph Goes	105
	The Early Period—The Problem of the Relation of the Eye to the Brain 105; The In Between Period 105; The Modern period of Detailed Anatomy 107	
10.	The Collyria Eye Drops Henry Chibret	110
	Over Time 110; The XIXth Century 111; The XXth Century 111; The XXIst Century 114; Evolution in Packaging 114	
11.	Ophthalmoviscosurgical Devices: From Simple Liquids to Surgical Instruments Sibylle Scholtz, Gerd U Auffarth	120
	History 120; The Materials 122	
12 .	Invention of Spectacles Frank Joseph Goes	126
	Origin 126; Details 129; Representation in Art 131	
13.	Visual Aids—From Reading Stones, Glasses, Contact Lenses, Intraocular Lenses, and Ophthalmic Lasers Sibylle Scholtz, Gerd U Auffarth, Frank Joseph Goes	134
	Visual Aids in the Antique World <i>134;</i> The First Spectacles <i>135;</i> The First Contact Lenses <i>136;</i> Surgical Methods <i>13</i> 7	
14.	Contact Lenses Nicole Olboeter, Sibylle Scholtz, Gerd U Auffarth	146
	Contact Lenses as a Visual Aid 146; The Early Decades—First Steps to an Idea 147; The Idea of a Contact Lens is Born 148; Upcoming Revolution: The First Real Contact Lens 149; Beginning of the Industrial Century in Contact Lens History 150; Report of a Contemporary Victim 150; New Moulding Techniques for Successful Contact Lens Fitting 152; New Materials for Better Lenses 152; Corneal Lenses 153; Hard Gas Permeable Lenses 154; The Soft Men 155; Present Evolution of Contact Lenses 155	
15.	Glass-spectacles—Spectacle Optics Frank Joseph Goes	159
	History of Glass 159; Optical Quality Lenses in Antiquity 162; History of Spectacles 163; Making of Optical Glass 168; Optical Quality of Spectacle Lenses 168; Spectacle Optics 172	
	Section 3: BIOMETRY OF THE EYE	
16.	Growth of the Eye Hans Fledelius	179
	Early Vision 179; Anatomy of the Eye, Biometry and Refractive Aspects 180; The Anlage and Growth of the Eye 181; Special Conditions Apply to Preterms 181:	

The Anlage and Growth of the Eye 181; Special Conditions Apply to Preterms 181; The Demand of Clear Imaging 182; The Normal Growth of the Eye—Variation and Correlation 182

17. Refractive Errors

Frank Joseph Goes

Epidemiology 187; Myopia 188; Pathological Myopia 191; Astigmatism 193; Hypermetropia 196 186

	Section 4: Varied Eyes	
18.	Do Women See Differently from Men? Magda Rau	205
	Satisfaction Degree after Lens Implantation 205; Gender Specific Habits 206; Color Vision 208; Color and Psychology 209; Men and Women Eyes in History 210	
19.	Beauty is in the Eye of the Beholder Johan de Lange	212
	Literacy 213; Religion 214; War 215; Crime 215; Fashion 216	
20.	Windows on the World: The Powerful Symbolism of Light Serge Coopman	219
	A Mythical Alliance 220; Divine Illumination 222; The Age of Enlightenment 224	
	Section 5: Blindness	
21.	Blindness—The Problem in Ancient and Modern Times Frank Joseph Goes	231
	Definition 231; Epidemiology 232; Prevention of Blindness—Actions 232; Prevalence— Significance 233; Other Causes of Blindness 234; Management 234; Adaptive Techniques and Aids 234; Metaphorical Uses 236; Consequences Socially 236	
	Section 6: The Art of Painting and the Eye	
22.	The Artist and the Eye Frank Joseph Goes	241
	Eye Diseases and the Artists 241; Eye Diseases-Spectacles-Blindness in Art 241	
23.	The Influence of Eye Diseases on the Works of Painters Philippe Lanthony	247
	Historical Study 247; Inflammatory Disorders 249; Inherited and Acquired Dyschromatopsia 250; Chorioretinitis Pathology 251; Age-related Macular Degeneration 251; Senile Ophthalmological Pathology 251; Neuro- ophthalmology 252; Loss of Binocular Vision 253	
24.	Ametropia and Painting Philippe Lanthony	255
	Painters' Portraits 255; The Presbyopia Problem 256; Bifocal Lenses and Self- portrait 257; Ametropic Painters 258; Classical Painting 258; Impressionism 260; Symbolism 261; Fauvism and Expressionism 261; Realist Painters of the 20th Century 262	
25.	Accommodation and Painting Philippe Lanthony	264
	15th Century: Flemish Landscapes 264; 17th Century: Camera Obscura 265; Diffusion Circles in Painting 265; 18th Century: Self Portraits 266; 20th Century: Divisionism and	

Pointillism 266; Presbyopia and Pointillism 267

26 .	William Turner Sibylle Scholtz, Gerd U Auffarth	269
	His Life 269	
27 .	Claude Monet Sibylle Scholtz, Gerd U Auffarth	272
	His Life/His Work 272	

7. E

C -----

	SECTION 7: EYE DISEASES	
28.	Famous Historical Persons Frank Joseph Goes	277
	Famous People Who Lost One or Both Eyes 277; Spectacles of Well-known Historical People 291; World Leaders in Surprisingly Bad, Surprisingly Similar Eyewear 294; Famous Persons with Refractive Eye Problems 295	
29 .	Bach: When the Angels Play for God, They Play Bach Sibylle Scholtz, Gerd U Auffarth	298
	His Life 298	
30 .	Gustav Adolf Sibylle Scholtz, Gerd U Auffarth	300
	His Life 300	
31.	Saint Odilia Sibylle Scholtz, Gerd U Auffarth	302
	Patron Saint of Eye Diseased and Sightless People 302; Her Life 302	
32.	Saint Lucia and Other Patron Saints of the Blind Frank Joseph Goes	305
	The Story 305; Her Life 306; Relics 307; Similar Saints are Venerated in Orthodox and Christian Religion 307; Life of Saint Paraskevi 307	
33.	The Eye of the Sovereign Igor Viktorovic Zimin	310
	A Brief History of Ophthalmology at the Court of the Tsar	310
	The Lorgnette's of the Tsar 310; The Eye-Sight of the Tsar 312	
	Ophthalmologists at the Court of the Tsar	316
	Empress Alexandra Fedorovna 316; Ophthalmologists at the Court of the Tsar 317; Court "Emeritus Ophthalmologist" 318; Opticians Suppliers to the Imperial Court 318	
34 .	Arthur Conan Doyle Sibylle Scholtz, Gerd U Auffarth, Frank Joseph Goes	320
	His Life 320; Dr Watson and a Cataract Knife 321	

		Contents	XIX
35.	Myopia of the Rulers of Nations Frank Joseph Goes		323
	The Myopia of Napoleon Bonaparte Emperor of the French		323
	History 324; Waterloo 324; Napoleon's Military Campaigns 325; Physical Condition 326		
	The Hereditary Myopia of the Medici		328
	Invention Spectacles 328; Historical Context 328; Origin of the Medicis 329; The Family 329		

SECTION 8: MAJOR IMPORTANT STEPS BY A SINGLE **P**ERSON IN THE IMPROVEMENT OF THE FUNCTION OF THE EYE 36. Abu Ali al-Hasan ibn al-Hasan ibn al-Haytham: Madman or Brilliant Physicist? 335 Sibylle Scholtz, Gerd U Auffarth His Life 335 37. Antonie van Leeuwenhoek 338 Frank Joseph Goes His Life 338; Early Involvement with the Microscope 339; Replica of Microscope by Van Leeuwenhoek 339; Recognition by the Royal Society of London 340; His Discoveries— Secrets—The Microscopes 340; Religious Interpretations of Van Leeuwenhoek's Discoveries 340; Possible Vermeer Connection 341 38. Louis Braille 343 Frank Joseph Goes Early Life 1812: The Accident 343; Louis Braille: His Education 343; Development of the Braille System 344; Death and Honors 345; The System 345; Writing Braille 345; Braille Literacy Statistics—Braille Reading Techniques 346 39. John Dalton 348 Luc Missotten The Maiden Speech 348; Young was Right/Dalton was Wrong 350; Death and Legacy 350 40. Otto Wichterle 352 Sibylle Scholtz, Gerd U Auffarth His Life 352 41. Gerhard Meyer Schwickerath and His Story of the "Trapped Sun" 356 Swen Christmann, Sibylle Scholtz, Gerd U Auffarth Importance of the Sun 356; Gerhard Re Meyer Schwickerath 357

	Section 9: Eye Surgery	
42 .	Cataract Frank Joseph Goes, Ashok Garg, SK Das, Marcela Escobar-Gomez, David J Apple, Richard Packard	363
	What is Cataract? Frank Joseph Goes	365
	Causes 365; Epidemiology 366; Cataract Surgery 367; Prevention 367; Recent Research 368; Type of Cataracts 368	
	History of Cataract Surgery Ashok Garg, SK Das	371
	Classification 371; Cataract Surgery in Antiquity 371; Duke Elder 372; Cataract Surgery in the 18th Century 374; Cataract Surgery in the 19th Century 375; Cataract Operation in the 20th Century 377; Sinskey's Method 383; Richard Kratz 383; Capsular Surgery 384; Cataract Surgery in the 21st Century 390; Future of Cataract Surgery 391	
	Jacques Daviel: The First Extracapsular Cataract Surgery Frank Joseph Goes	393
	His Life 393; The New Extracapsular Technique 395	
	Sir Nicholas Harold Lloyd Ridley: The First Intraocular Lens Marcela Escobar-Gomez, David J Apple	399
	Medical Training and Early Professional Years <i>399</i> ; A Realization that Became a Revolution <i>400</i> ; The Birth of the Intraocular Lens <i>400</i> ; The First IOL Implant <i>401</i> ; A Storm of Reaction <i>402</i> ; Turn of the Tide: Slow Acceptance <i>403</i> ; Belated Recognitions and Accolades <i>404</i> ; A Pioneer in the Field of Bioengineering <i>405</i> ; Beyond the IOL: Other Advances and Services <i>405</i> ; Humanitarian Services <i>407</i> ; Death <i>408</i>	
	Charles Kelman: Inventor of Phacoemulsification Richard Packard	409
	Beginnings 409; Controversy 411; Recognition 412; Last words 413	
43.	Corneal Surgery van Dooren BTh, van Rij G	414
	Importance of the Cornea Transplants <i>414</i> ; History of Keratoplasty <i>415</i> ; Recent and Current Developments in Penetrating and Lamellar Keratoplasty <i>416</i> ; The Future: Tissue Engineering <i>419</i>	
44.	Refractive Surgery Khristo P Takhchidi, Viktoria V Agafonova, Eckhard Schröder, Dan Z Reinstein, Timothy J Archer, Marine Gobbe, Frank Joseph Goes	422
	The History of Radial Keratotomy: A Tribute to Svyatoslav Fyodorov Khristo P Takhchidi, Viktoria V Agafonova	423
	The Creator 423	
	The Excimer Laser Eckhard Schröder	427
	Laser Light 427; The Excimer Laser Characteristics 428; Photoablation Tissue	

Effect 429; The Complete Unit for Corneal Surgery 430

		Contents	xxi
	Birth of LASIK		431
	Keratomileusis 431; Barraquer-Krumeich-Swinger Technique 433; In-situ Keratomileusis 433; Automated Lamellar Keratoplasty 433; Excimer Laser 434; LASIK 436		
	History of the Refractive Surgery Frank Joseph Goes		439
	Corneal Inlays and Corneal Onlays 439; Clear Lens Extraction: The Removal of the Clear natural Lens 440; Refractive Lens Exchange: Clear Lensectomy 440; Phakic IOL's 441; Correction of Hyperopia with Thermal Procedures 442; Progress in Ophthalmic Surgery 443; Onward to Phaco Modern Cataract Surgery 443; Modern Refractive Surgery: Barraquer the Start 444; Radial Keratotomy—The PERK Study 445; Making the Leap to PRK Photorefractive Keratectomy and the Excimer Laser 446		
45 .	Posterior Eye Segment Surgery Staffan Stenkula, Berndt Ehinger		45 1
	Vitreous Retinal Surgery		45 1
	Retinal Detachment 454; Proliferative Diabetic Retinopathy 455; Macular Pucker 456; Macular Holes 456; Vitreous Diseases 457		
16 .	The Bionic Eye, Where are the Limits? Lindy Yow		46 :
	Function of the Eye 462; Methods Available 462; Results 465		
17 .	The Future of Nanotechnology in Ophthalmology Marco A Zarbin, Carlo Montemagno, James F Leary, Robert Ritch		469
	Nanomedicine 469; Some Applications of Nanotechnology to Ophthalmology 470; Prosthetics 474		
18 .	Gene Therapy in Ophthalmology Bart P Leroy		48 4
	Advancements 484; Current Status of Gene Therapy for Inherited Retinal Dystrophies 485; Towards More Widespread Use of Gene Therapy 487		
49 .	Future Trends of Anterior Eye Segment Surgery Thomas Neuhann		49 :
	Cornea 491; Refractive Surgery 492; Cataract Surgery 492		
50.	Future Trends of Posterior Eye Segment Surgery Carl Claes		49 4
	Future 494		
	Index		000