Contents

1. Forensic Sciences: The Historical Perspective and Branches 1

Nitul Jain

- **Identification Parameters 2**
- **Historical Aspects 3**
- **Events and Advances 6**
- **Most Famous Contributors to Forensic Sciences 7**
- **What is a Forensic Dentist? 8**
  - *Importance 8*

2. Forensic Odontology and its Applications 10

Hemanth M, Anil Pandey

- **Dental Identification 10**
  - *Types of Identification 10*
- **Bite Marks 11**
- **Identification 11**
  - *Why a Dentist for Identification? 11*
- **Comparative Dental Identification 11**
- **Principles and Phases of Dental Identification 12**
  - *Phases 14*
- **Reconstructive Postmortem: Dental Profiling 18**
  - *Age 18*
  - *Sex 19*
  - *Role of Skull and Mandible 20*
  - *Classification of Methods 21*
  - *Race 24*
- **Opinion from Forensic Anthropologists 29**
  - *Other Methods of Dental Identification 30*
- **Role of DNA Molecule in Identification 31**
  - *The DNA Molecule 33*

3. Dental Records and Forensic Photography 43

Nitul Jain, Gaurav Atreja

- **Introduction 43**
  - *What is a Patient Record? 43*
  - *Creation and Maintenance of a Patient Record 45*
  - *Radiographs Keeping 47*
  - *Retention of Patient Records 48*

- **Long-term Storage of Dental Records 49**
  - *Access to Patient Records 49*
  - *Forensic Uses of Patient Records 50*
  - *Confidentiality of Records 50*
  - *Indian Scenario and Lacunae in the System 51*
- **Forensic Photography 52**
  - *Need for the Photography 52*
  - *The Technical Considerations 52*
  - *The Basic Optics of Photographic Process 53*
  - *Types and Techniques 54*
  - *Handling of Photographic Evidence 63*

4. Oral and Maxillofacial Radiology: An Approach to Forensic Aspects 64

Vishal Saxena

- **Radiology and Forensic Sciences 64**
  - *Historical Perspectives 65*
  - *Dental Radiology and Forensic Sciences 65*
- **Scope of Forensic Radiology 67**
  - *Oral and Maxillofacial Radiology in Person Identification 68*
  - *Radiographic Anatomic Landmarks of the Jaws 68*
  - *Radiological Anatomical Features and the Spatial Relationship of the Teeth 70*
  - *Radiology in Reconstructive Dental Identification 72*
  - *Another Aspect of Radiology in Identification-frontal Sinuses 72*
  - *Radiography in Mass Disaster Victim Identification (DVI) 73*
  - *Age Estimation and Dental Radiology 74*
  - *Pitfalls and Drawbacks in Age Determination 74*
  - *Evaluation of Cranial Trauma Using Radiological Methods 75*
  - *Fraud, Claims and Dental Radiology 75*
  - *Contemplating Human Judgment 76*
- **Limitations of Dental Radiography 77**

5. Age Estimation and Dental Methodology 78

Nitul Jain, Sohail Lattoo

- **Historical Perspective 79**
- **Need for Age Estimation 79**
- **Age Changes in Oral Cavity 80**
  - *Soft Tissue Changes 80*
  - *Dental Changes 80*
  - *Hard Tissue Changes 81*
- **Terminologies 81**
- **Chronology of the Human Dentition 82**

- **Various Methods for Age Estimation 82**
  - *Estimation of Age by Skeletal Means 83*
  - *Estimation of Age by Teeth 84*
- **Steps of Age Estimation 97**
  - *Visual Assessment 97*
  - *Radiographs 97*
  - *Extraction and Preparation of Single Teeth 97*
  - *Dental Age Estimation by Means of Commonly Used Developmental Surveys 98*
- **Commonly Used Dental Developmental Surveys 99**
  - *Schour and Massler Method (1940) 99*
  - *Moorees Method (1963) 100*
  - *Demirijian Seven-tooth System for Age Estimation 104*
  - *Gustafson (1966) Mehod for Estimation of the Age 107*
  - *Other Less Commonly Used Methods for Estimation of Dental Age 108*

6. Bite Marks 110

Nitul Jain, Soniya Adyanthaya

- **Historical Aspects 112**
- **The Legal Admissibility 113**
- **Skin as Registration Materials for Bite Marks 114**
- **Classification of Various Bite Mark Systems 115**
- **Typical Presentation and Composition of Bite Marks 117**
  - *Component Injuries Seen in Bite Marks 117*
  - *Location of Bite Marks 118*
  - *The Classic Appearance 118*
  - *Variations of the Prototypical Bite Mark 119*
- **Bite Mark Recognition 120**
  - *Aging/Changes Over Time 120*
  - *Variables Affecting Appearance of Bruises 120*
  - *Range of Bite Mark Severity—The Bite Mark Severity and Significance Scale 121*
  - *Distortion in Human Bite Marks 121*
  - *General Principles Behind Identification of Bite Marks 125*
  - *ABFO's Recommended Procedure and Guidelines: Bite Mark Analysis Guidelines 126*
  - *Forensic Physical Comparison of Exhibits 134*
  - *Biological Techniques for Bite Mark Comparisons 135*
  - *Experimental Marks 139*
  - *Bite Marks in Inanimate Objects 139*
  - *Preservation and Collection of Inanimate Evidence 140*
- **Differences in Bite Patterns of Child and Adults 143**
  - *Non-accidental Injury to Children 143*
- **Bites, Bite Wound Infections, Prevention and Management 145**
  - *Prevalence of Bites 145*
  - *Nature of Bites 145*
  - *Diagnosis of Infection 148*
  - *Complications 148*

– *Management 149*
– *Facial Bites 150*
– *Psychological Aspects of Bite Marks 152*

7. Cheiloscopy and Palatoscopy 155

Gaurav Atreja

- **Cheiloscopy 155**
  – *Historical Review of Cheiloscopy 156*
- **Anatomical Aspects 156**
  – *Analyzing and Recording Lip Prints 158*
  – *Problems with Cheiloscopy 160*
  – *Future Prospects of Cheiloscopy 161*
- **Palatoscopy 161**
- **Historical Review 161**
- **Anatomical Aspects 162**
- **Palatal Rugae Classifications 163**
  – *Cormoy System 165*
  – *Correia Classification 165*
  – *Palatoscopy in Edentulous Cases 165*
- **Analyzing and Recording Palatal Rugae 166**
  – *Genetic Influence on Palatal Rugae 167*
- **Problems with Palatoscopy 167**
- **Future Prospects 167**

8. Forensic Facial Reconstruction 169

Nitul Jain, Sohail Lattoo, Vishwas Bhatia

- **Daubert Standard 170**
- **Theoretic Foundations 171**
- **Types of Identification 172**
- **Types of Reconstructions 172**
  – *Two-dimensional Reconstructions 172*
  – *Three-dimensional Reconstructions 173*
  – *Superimposition 173*
- **History 173**
- **Technique for Creating a Three-dimensional Clay Reconstruction 174**
- **Currently Used Methods 176**
  – *Requirements for a Forensic Reconstruction of Soft Facial Parts 176*
  – *Classic Manual Methods 176*
  – *Graphic Methods 177*
  – *Computer Aided Reconstruction of the Soft Facial Parts 177*
- **Problems with Facial Reconstruction 179**
  – *Insufficient Tissue Thickness Data 179*
  – *Lack of Methodological Standardization 179*
  – *Subjectivity 180*
- **Facial Reconstruction and the Media 180**

9. Mass Disaster Victim Identification and Dentist's Role 182

Ajay Telang, Anil Pandey

- **What is a Disaster and a Mass Fatality Incident? 182**
- **Kinds of Disaster 182**
- **Need for the Preparedness 184**
  - *The Historical Perspective 185*
- **The Ways a Dentist can be of Help in Case Need Arises in Disaster Management 187**
  - *How Dental Auxiliaries can Help 189*
- **Preparation for Unfortunate Disasters and Protocols 190**
- **Role of Dentists in Mass Disaster Forensics 190**
  - *Evidence Protocols 191*
- **Phases of Response 191**
  - *1st Responder 191*
  - *Stabilization 192*
  - *Resolution 192*
  - *Resolution of Site to Normal 192*
- **The Standard Operating Procedure 193**
- **Chain of Custody 193**
- **Evidence Collection and Preservation 194**
- **Dental Records and Mass Disasters 194**
- **Man Made Disasters 195**
  - *Forensic Techniques and Evidence Sources in Specific Scenarios 195*
  - *Chemical Scenario 196*
  - *Biologic Agents 197*
  - *Nuclear/Radiologic Event 198*
  - *Explosive Events 199*
- **Dental Radiography in Mass Disasters 202**
  - *Field Equipment for Mass Disasters 202*
  - *Commingled, Skeletonized, Carbonized, and Mutilated Remains 202*

10. Child Abuse, Neglect and Domestic Violence: Role of a Dentist 204

Abhishek Singhania, Shikha Atreja

- **Child Abuse in India and Indian Statistics 205**
  - *Physical Abuse 206*
  - *Sexual Abuse 206*
  - *Emotional Abuse and Girl Child Neglect 207*
- **Bruises 207**
- **Pathogenesis of Contusions and Factors Affecting the Development and Appearance of a Bruise 207**
- **Characteristic Bruises 209**
- **Conditions that may be Confused with Abusive Bruising 210**
- **Legal Matters Regarding Child Abuse and Neglect 212**
  - *The Constitution of India 212*
  - *International Conventions and Declarations 213*

- **Recognizing Child Abuse/Neglect 214**
- **Detecting Child Abuse in the Dental Office 214**
  - *Case History 214*
  - *General Physical Findings 216*
  - *Findings on Dental Examination 216*
  - *Typical Oral Lesions 216*
  - *Bruises Resulting from Physical Child Abuse 219*
- **Reporting Child Abuse or Neglect 221**
- **Critical Steps in Investigating and Interviewing the Possible Victim 221**
- **Photo Documentation 222**
- **Techniques to Help Visualize Bruising 223**
- **Dating Bruises and Associated Misconceptions and Limitations 224**
- **Domestic Violence and Battered Women 225**

Annexures 227

Annexure I 227
Annexure II 228
Annexure III 229

Index 231