SECOND EDITION

Adelson's THE PATHOLOGY OF HOMICIDE

JAMES R. GILL

Adelson's

THE PATHOLOGY OF HOMICIDE



Lester Adelson, M.D.

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THE PATHOLOGY OF HOMICIDE

A Guide for Forensic Pathologists and Homicide Investigators

SECOND EDITION



By

JAMES R. GILL, M.D.

With a Foreword by

James L. Luke, M.D.



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To my Mother and Father & My wife, Raffaella

FOREWORD

In 1952, a revised curriculum at the Western Reserve University School of Medicine,* supported by the Commonwealth Fund, was implemented as a demonstration project for medical education nationally. With the new curriculum, exposure to clinical medicine was initiated in the first year of medical school. In terms of teaching, basic science was combined with clinical medicine, and course material was taught by organ system, not as individual scientific disciplines. As part of these innovative and positive changes, forensic pathology was a required course for second year students.

In a series of Saturday morning lectures, Dr. Lester Adelson, Cuyahoga County Chief Deputy Coroner and Professor of Pathology, presented a systematic overview of forensic pathology and discussed its relevance to us as future physicians. It was a popular and well-received course, and for good reason. Dr. Adelson was an excellent teacher, and what he said resonated.

His scholarly pursuits were as creative and articulately expressed as we have seen in our specialty. His bibliography consists of over 100 publications, with titles such as The Anatomy of Justice (his virtual dialogue with the victim, 1971), Slaughter of the Innocents (his study of 46 homicides in which the victims were children, 1961) and The Coroner of Elsinore: Some Reflections on Hamlet (1960). His textbook, The Pathology of Homicide, remains a classic in the field nearly 50 years after its publication in 1974.

What I kept rediscovering about Dr. Adelson over the years was his preternatural (his word, and a good one) lack of pretentiousness, and his ability to capsulize a concept in a very few words, an effective and arresting teaching method. There are few of us who spent time with him who didn't come away with an appreciation for the well-crafted aphorisms he introduced into his conversations and lectures, and richer by far for the experience.

He leaves as his legacy a generation of medical students, pathology residents and justice system participants fortunate enough to have been introduced by him to forensic pathology and its role in the public health and the justice system. I would have known practically nothing about forensic pathology without his course. I would not have considered the field as a career choice without his personal example.

After completing my pathology residency in 1963, I wanted to look into full-time research and was able to find a position in the Laboratory of Experimental Pathology at the NIH. However, in late 1964, I recall waking up in the middle of the night on a trip to San Francisco wondering what I was going to do with the rest of my career as a pathologist. By then, full-time research was beginning to seem a bit artificial, given the real-world alternatives. Forensic pathology came to mind as a way to combine academic pathology with the pathology of the streets, so to speak.

^{*}Since 1967, Case Western Reserve University.

I spent the next two years at the New York City medical examiner's office. Dr. Milton Helpern, with thirty years' experience in the office at the time, was the chief medical examiner. The diverse caseload provided diagnostic and interpretive challenges on a daily basis. Dr. Helpern's availability added greatly to the experience.

With this as background, from 1967–1971, I put together the recently established Oklahoma medical examiner's office. From 1971–1983, I implemented the changeover from a coroner system to a medical examiner's office in the District of Columbia.

In 1987, I was asked to direct the Connecticut medical examiner's office, an assignment that began with the dedication of a beautiful new facility and an expanded capability. It also necessitated a commuting relationship for my wife, which we tried for two years. I left the office in mid-1989 to rejoin my wife and our children in the Washington area. However, Jim Gill reminds me that earlier that year, as a medical student finishing his first year at the University of Connecticut, he spoke with me in my office about doing a summer internship research project with us. He attributes the internship as having given him his start in forensic pathology. Be that as it may, it's been my experience, too, that instruction, Dr. Adelson's required course and perspective, and Dr. Helpern's availability, all "can payoff in the long term."

Fast forward 30 years. Dr. James R. Gill is the Chief Medical Examiner of Connecticut. He is also the immediate past president of the National Association of Medical Examiners and, in that capacity, continues to be actively involved in innovative ways to increase teaching and training opportunities in forensic pathology for medical students and pathology residents, in an effort to ameliorate the long-term, critical shortage of forensic pathologists in this country.

In that regard, Dr. Gill has taken on the responsibility of updating Dr. Adelson's *The Pathology of Homicide*, one of the most comprehensive and well-written textbooks in the specialty. He is adding some 700 updated photographs, six new sections or chapters and references, while, at the same time, attempting to retain Dr. Adelson's voice and wisdom.

Best wishes to my friend and colleague Jim Gill on this major commitment.

> James L. Luke, MD July 2022

FOREWORD TO THE FIRST EDITION

The author, Lester Adelson, M.D., my friend and co-worker for more than two decades in the Coroner's Office of Cuyahoga County, Ohio has introduced a new look into the field of forensic pathology. Writing incisively, he takes the reader step by step through the role of the pathologist in the investigation of homicide from the discovery of the victim to expert testimony in court.

He shows by example, repeatedly, the vital importance of the pathologist in the laboratory investigation of deaths resulting from violence or from unusual or suspicious causes. Since proof is essential in the determination of homicides, both the medical and legal aspects of evidence are reviewed in detail. The learned doctor points out the primary lesson that . . .

"Until the pathologist has demonstrated that death was produced directly or in-directly by some kind of violence or culpable negligence, there is no homicide to investigate. . . . If he misdiagnoses a non-existent homicide, he may place an innocent person in jeopardy. . . . Conversely, if he fails to give adequate weight to the part played by violence and concludes that death resulted *entirely* from natural causes, a murderer goes free, and a crime goes unpunished."

Yet this is not the only lesson to be found in this book, for it is a primer or a series of lessons that will serve as an invaluable guide both to the expert and the beginner in the field of forensic pathology. For example, the doctor concerns himself not only with the expertise of the pathologist but also with the skills and methodologies of the other professional and technical experts who become regularly or occasionally involved in the examination of known or suspected homicides. He stresses the importance of establishing the *mode* and *manner* of *death* as well as the *cause* of *death*. He pointedly indicates the need of the "team concept" and reviews how each expert can complement the work of another to complete the entire picture of the cause or manner of death. He confirms the necessity of positive and continued cooperation with the police and other law enforcement offices. As a background for his work, Dr. Adelson cites statistics relating to homicide by various categories, causes, and methods. He wisely explains the many avenues of life which cause persons to become involved in homicide, and then stops to point out the necessity to differentiate the homicidal death from deaths from suicide, accident or natural causes.

The author, out of his vast background of experience, deals extensively not only with the importance of the autopsy but also with its methodology. Because of his desire to inform the pathologist with little or no forensic experience in the field, he dwells particularly on the absolute necessity of proper performance in observation in the examination of a dead body. The pathologist, he suggests, has the duty not only of determining the cause of the death but "the manner and mechanism" and find such evidence, if possible, that will "stand up in court."

His coverage of the nature of the autopsy is truly a check list of valuable knowledge for one to follow. He discusses what to look for, how the evidence must be recognized, acquired, and then preserved against misuse or abuse. In this respect, he outlines the scheme for submitting evidence to the FBI laboratory, and how to make use of its facilities.

Again, realizing from his many experiences in court the importance of the right kind of evidence, Dr. Adelson concludes his treatise with guidelines as to the handling of evidence for use in court, and then refers to points to be considered when the pathologist is to be called as a witness.

It is a distinct pleasure to be asked to introduce this work of Dr. Adelson because it reveals his expertness not only in this special field of medicine but as a lucid and accomplished writer. What he has put down on these pages will prove to be invaluable to men now in, or entering, the new field of forensic pathology.

Samuel R. Gerber

PREFACE

I n 1974 Dr. Lester Adelson published the first and only edition of *The Pathology of Homicide*. Dr. Charles Hirsch said it was the "best-written book of its type in the English language." How could it be improved? The writing cannot, but much has changed in forensic pathology in the ensuing nearly fifty years since it was first written. When Juan Rosai was tasked with updating *Ackerman's Surgical Pathology*, he noted that all of it was written by one person in the hope that whatever may be missing has been compensated for by what he described as "the ultimate simplicity of one voice speaking."¹ I too have attempted to preserve a voice, vision, and wisdom, while updating the forensic pathology material. Despite any lapses in this update, I hope it will be viewed as a tribute to a "preeminent, renowned forensic pathologist who was instrumental in the development and refinement of forensic pathology."² Dr. Adelson died in 2006 at the age of 91.

The "aging" of the book has made it less appealing to the new generation of forensic pathologists and Dr. Adelson's important contribution to forensic pathology was at risk of being lost to them. As the original photographic plates were gone, all new color images (over 700) have been added. In addition, the references have been updated with over 4,400 citations. Six new chapters and sections have been added, including death certification, elder abuse, pediatric head injury, drugs of abuse, histopathology, and bereavement. Although the title of the book is *The Pathology of Homicide*, one must be able to recognize natural, accidental, and suicidal deaths; therefore, these topics are interspersed in the text to give the appropriate context.

In 1974, there was no "excited delirium" terminology, DNA testing, board-certified forensic anthropologists, or fentanyl (cocaine was mentioned once in the book); *Roe v. Wade* was just decided; Caffey had just published about the whiplash shaken infant syndrome; elder abuse was poorly recognized; toxicology testing was less advanced; and drugs of misuse (then "drugs of abuse") were different (e.g., barbiturates are now rarely encountered). Presently, we have CT scanners; we routinely test vitreous fluid; people drown in swimsuits (not "bathing costumes"); cars have safety airbags; and no longer can we rely on the accumulation of milk bottles on the doorstep as an indicator of the postmortem interval. Finally, it should be recognized that forensic pathologists are not just men, so the standard syntax of the day using male pronouns ("The pathologist must decide $his \ldots$ ") also has been updated.

Although much has changed, much also has stayed the same. The approach to death investigations and the expressed opinions are largely unchanged. Dr. Adelson's book is still a treasured text among many forensic

^{1.} Ackerman's Surgical Pathology. Rosai, J. Mosby. St. Louis. 8th edition, 1996.

^{2.} Dolinak, D; Balraj, EK. In Memoriam: Lester Adelson, MD (1914–2006), *The American Journal of Forensic Medicine and Pathology*. 2006; 27(3): 283–284.

pathologists, and I hope to help get it to the next generation of forensic pathologists. To paraphrase an anonymous quote: "I have gathered a posy of another man's flowers, and nothing but the thread that binds them is mine own."

> James R. Gill Old Saybrook, CT

PREFACE TO THE FIRST EDITION

I n his day-to-day work, the forensic pathologist deals with a broad variety of natural and violent deaths. He is constantly reminded and repeatedly impressed with the age-old truth which tells him that although there is only one way in which to be born, there are many ways in which to die.

The major portion of the forensic patholgist's case load is made up of persons of all ages who have died suddenly and unexpectedly from natural causes, i.e., diseases, whether they be degenerative, infectious, metabolic or neoplastic. The remainder of his "patients" have died as a result of suicide, accidents of all types, and violence of undetermined origin as well as from homicidal trauma.

Every unnatural death represents a tragic waste of human life and human resources. For those of us who have a high regard and a deep respect for the sanctity of human life and for the meaningfulness of human existence, the unending stream (indeed, it often seems like a torrent) of bloody, broken and poisoned victims of lethal violence is a recurring, distressing spectacle which is simultaneously deeply disturbing emotionally and strongly challenging professionally.

Although any violent death is deplorable, those wherein a life has been taken by the malicious, purposeful act of another are generally of the greatest concern to the law enforcement authorities and, if we can believe the news media, of greatest interest to the community generally.

The current trend toward the utilization of violent means to provide "solutions" to all types of controversies and disagreements, whether they be public and political or personal and private, is an inescapable fact of contemporary life. The increased propensity toward the employment of lethal violence in connection with such "ordinary" crimes as armed robbery and burglary, and the mounting frequency of assassinations (and attempted assassinations) involving prominent and obscure citizens alike gives any consideration of homicide an immediacy matched by comparatively few other aspects of day-to-day life on today's current scene.

This volume represents a distillation, as it were, of my experience with the medicolegal aspects of homicide investigation, acquired by more than two decades of active personal involvement in the daily activities of the Cuyahoga County Coroner's Office which serves Cleveland, Ohio and its suburbs. I believe that the self-evident importance of the pathologist's role in and his contributions to successful homicide investigation will be apparent to the reader as he thoughtfully peruses these pages and reflects on their life and death implications for the persons immediately concerned and for society as a whole.

The social, historical, judicial, moral, economic, and humanitarian

ramifications of the constantly mounting number and rate of homicides provide a more than adequate justification for the appearance of this volume. Certainly the acquisition of sound medical evidence to aid in the adjudication of this most serious of crimes deserves the best efforts of the laboratory physician.

In addition to addressing myself to the task of imparting the critical aspects of the "know how" of the medical phases of homicide investigation, I have dwelt at some modest length on the equally important aspect of "know why." As a thoughtful, skilled and key participant and operator in this highly complex area, the "occasional" forensic pathologist should be acutely and sensibly aware of the rationale underlying the various facets of his professional responsibilities and duties. Only when he is thus thoroughly informed does his work take on the significance and relevance which are the hallmarks of his truly crucial contributions to the correct solution to these threats to the peace, safety and dignity of his community.

Finally, the ultimate justification for my writing this volume is the respect and regard which all of us owe to the importance of every human life. The untimely, unnatural and unjustified termination of *any* human life is a challenge and a threat to the basic moral and ethical values which form the bedrock of what we choose to call our "human and humanitarian society." When murder screams her alarms, they cry out for a valid response. This volume hopefully provides part of that response.

L.A.

ACKNOWLEDGMENTS

A lthough I am solely responsible for the updating of this volume (and all its faults and shortcomings), the task of completing this could not have been accomplished without the patience and support of my wife, Raffaella.

My forensic pathology knowledge and writings are indebted to Dr. Charles Hirsch with whom I trained under and worked for over 12 years. He worked with Dr. Adelson and Dr. Alan Moritz in Cleveland. As I consider Dr. Hirsch my forensic pathology father, I will adopt Drs. Adelson and Mortiz as my forensic pathology grandfather and great grandfather.

My other pathology parent was Dr. Juan Rosai. I did an oncological fellowship with him at Memorial Sloan-Kettering Cancer Center. His diagnostic ability and recall of the pathological literature were astounding. I have been lucky to have trained, in my opinion, with the best forensic pathologist and best anatomic pathologist of my professional life.

The Connecticut OCME and its staff have been a welcome respite from this writing as I look forward each day to coming into the office, working with my colleagues, and seeing (as Dr. Hirsch would say) "what God and the Devil left on my doorstep last night." Maura DeJoseph is the best Deputy Chief that one could wish for and I thank her for her support and dedication. Drs. Kristen Hartnett-McCann, Declan McGuone, Ross Reichard, Dan Davis, Rebecca Hamilton (WWBD), and Emily Duncanson continue to teach me about their areas of expertise and I hope some of their expertise has filtered into the book. Special thanks to Linda Sylvia, Nancy Izquierdo, and Sabrina Shelby for always keeping me on track. Forensic textbooks would not be possible without professional photographers and histologists: Julie Lee, Mary Catherine Sonntag, Linda DeMilla, Dale Rio, and Cindy DeRiso. And of course the expert techs behind the scenes: Al Grady and Renay Schlereth and their teams. Medicolegal death investigators are a vital component of any medical examiner office and I thank Dennis Cavalli, Christina Schock, and their teams.

During my time at the New York City OCME, there were many colleagues who not only taught me forensic pathology but generously shared teaching images and many pearls. These include my forensic pathology cofellows: Susan Ely, Margaret Prial, and Eric Peters (plus Carolyn Kappen, our forensic neuropathology co-fellow at the time). Susan and I have written much together, she has improved my writing, and the lack of her input in this work (my fault, not hers) was certainly missed. Yvonne Milewski, Jonathan Hayes, Luz Alandy, Monica Smiddy, Mark Flomenbaum, Corrine Ambrosi, Stephen deRoux, Hernando Mena, Vernon Armbrustmacher, Barbara Sampson, Bradley Adams, and Marina Stajic all taught me so much. There are many colleagues who have shared their material with me over the years and who may recognize some of these images. I am not able to accurately acknowledge them individually, but I thank them here for their trust, generosity, and courtesy.

My early forensic exposure came through the Connecticut State Police lab under the direction of Dr. Henry Lee who allowed me to be a summer college intern in the serology lab. Dr. James Luke, then Chief ME, opened the forensic pathology door for me at the Connecticut OCME for a summer internship during medical school. The ME staff at the time included: Drs. Wayne Carver, Edward McDonough, Arkady Katznelson, Malka Shah, Ira Kanfer, Kurt Nolte (just out of fellowship), and Dean Uphoff.

My pathology residency at Yale with Drs. Jose Costa, Daryl Carter, Maria Luisa Carcangiu, Stuart Flynn, Giovanni Tallini, Robert Homer, Jon Morrow, and Brian West were instrumental in my anatomic and autopsy training.

My fellowship year at Memorial-Sloan Kettering was certainly one of the most enjoyable learning experiences that I have had (except perhaps college). Drs. Michael Goldfischer, Roy King, David Bryant, Cristina Antonescu, Katy Gallagher, and Marc Rosenblum (and Lon) made it unforgettable.

I also thank Michael P. Thomas, President of Charles C Thomas Publisher, and his team for the guidance and support to bring this new edition to life.

Finally, I must thank Dr. Adelson's daughter, Nadine Bendycki, for having the confidence and trust in me to pursue this work. She shared stories about her father including some of his famous aphorisms. I wished that I had known him.

> J.R.G. July 2022

ACKNOWLEDGMENTS TO THE FIRST EDITION

A lthough I am solely responsible for the authorship of this volume (and for its faults and shortcomings), the task of completing it could not have been accomplished without the unstinting help of many of my colleagues and dedicated co-workers at the Cuyahoga County Coroner's Office whose contributions I am delighted to acknowledge.

Dr. Charles S. Hirsch, Deputy Coroner and Associate Pathologist, is responsible for the major portion of the photomicrographs, and Messrs Sidney J. Pancner, Michael F. Walsh and Frank J. Kukla, the staff of the Photographic Department at the Cuyahoga County Coroner's Office, took many of the gross photographs and processed all of the illustrations in this monograph. A special word of appreciation is extended to the memory of the late Lawrence Johnson, who worked with me early in my association with the Coroner's Office in launching the photographic library which is now so valuable an asset to this institution.

The roentgenograms were taken by Messrs. James E. Roberson and Ernest C. Duncan, who also provided highly skilled assistance in the Autopsy Room with the anatomic dissections on which much of this volume is based. The roentgenographic diagnoses and interpretations were made by Dr. Benjamin Kaufman, Consulting Roentgenologist to the Cuyahoga County Coroner's Office.

The chemical data originated in the Toxicology Laboratory of the Cuyahoga County Coroner's Office, where the analyses were carried out under the supervision of Dr. Irving Sunshine, Chief of the Toxicology Department.

Non-anatomic aspects of homicide investigation including such features as the grouping of known and suspected blood stains, investigation of known and suspected seminal stains, and the scrupulous study of the clothing of homicide victims and their alleged assailants were performed by Miss Mary E. Cowan and her associates in the Trace Evidence Department of the Cuyahoga County Coroner's Office.

The numerical data are based largely on figures taken from the annual statistical reports of the Cuyahoga County Coroner's Office, veritable treasure houses of accurate and painstakingly accumulated information, prepared by the Statistical Department of the Office.

It is a pleasure for me to express my gratitude to the law enforcement agencies in Cuyahoga County, including the several municipal police departments, the Sheriff's Detective Bureau, and the Ohio State Highway Patrol, with whom I have worked constantly and intimately during my years of association with the Coroner's Office. A special word of appreciation is richly deserved by the members of the Homicide Unit, the Scientific Investigation Unit, the Accident Prevention Bureau and the Hit-Skip Unit of the Cleveland Police Department. All are staffed by true professionals who answer the challenges of homicide investigation with exemplary displays of skill, ingenuity, imagination and dedication.

I am deeply indebted to Mr. John T. Corrigan, the Prosecuting Attorney of Cuyahoga County and his predecessor, the late Mr. Frank J. Cullitan, and to their many Assistant Prosecutors, too numerous to name individually, with whom I have been associated in the courtroom phases of homicide adjudication. They have been excellent teachers, and extremely patient and understanding in helping me to learn to become a "good witness." In this same context, I should like to express my appreciation to the Judiciary of the Court of Common Pleas of Cuyahoga County and to the Judges on the various municipal court benches in whose courtrooms I have testified for their many courtesies over the years. Not the least of my respected mentors in courtroom technique and comportment have been the members of the Defense Bar who have cross-examined me during my numerous appearances in the forensic arena. They, too, have my gratitude.

To Dr. Samuel R. Gerber, Coroner of Cuyahoga County since 1936 and my highly esteemed superior at the Coroner's Office, I am indebted for the scholarly and thoughtful Foreword which graces this volume. He also enhanced the accuracy of the manuscript by his meticulous proofreading, a task truly above and beyond the call of his duties.

A word of deep and most sincere appreciation to my respected teacher, loyal friend and former Chief in the Department of Pathology at Case Western Reserve University School of Medicine, Dr. Alan R. Moritz, now Professor Emeritus, for his constant encouragement and invaluable suggestions.

Dr. John R. Carter, my current Chief in the Department of Pathology, has also provided me with encouragement and many ideas which have aided immeasurably in the production of this volume. I am deeply in his debt for his repeated acts of kindness and his patience during the years I have labored on this opus.

My thanks to the W.B. Saunders Company, Callaghan & Company, and the Williams and Wilkins Company for their permitting me to use previously published photographic material as noted in the legends of the appropriate figures.

Dr. Gordon Stairs, Entymologist at Ohio State University, identified the maggot in Fig. IV-14. Mr. Carl Paulits, Senior Medical Photographer at the Institute of Pathology of Case Western Reserve University School of Medicine supplied Figures VIII-26A and VIII-26B.

Although there is no specific reference to them as such in the bibliographic citations at the end of each chapter, I have drawn heavily on in-formative outlines prepared by my predecessors and successors at the now defunct Department of Legal Medicine at Harvard Medical School. Here I spent a most rewarding fourteen-month Fellowship, being exposed to the challenges and initiated into the gratifications of a career in Forensic Pathology. The outlines were prepared to guide the students attending the Seminars on Homicide Investigation, organized by the late Mrs. Frances Glessner Lee, the benefactress of the Department. They have been invaluable to me in the \cdot writing of this volume.

Mrs. Barbara E. Burtch, my faithful amanuensis over the years of my association with the Cuyahoga County Coroner's Office, has been most helpful in assisting me with many of the tedious details which are an inescapable feature of writing a volume of this type, and Mrs. Marlene J. Orlando has been a model of patience, persistence and accuracy in typing and retyping the many drafts of the manuscript. Miss Lucille Smith and Mrs. Mary Ellen Laycock also contributed to the secretarial efforts.

To all those whom I have named and to the others whose names I may have inadvertently overlooked, many, many thanks.

L.A.

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Adelson's

THE PATHOLOGY OF HOMICIDE



The Teatro Anatomico in Bologna, Italy.

Chapter 1

THE FORENSIC PATHOLOGIST

The right to search for the truth implies also a duty one must not conceal any part of what one has recognized to be true.

Albert Einstein

The term *homicide* (literally, the killing of a L human being) embraces every mode of violent death by which one person's life is taken by another. It is defined legally as the destruction of human life by the act, agency, procurement, or culpable omission of some other person(s). It can result from an act or from failure to perform an act where the duty to act is imposed by law. Thus, where the law places on the parent or guardian the responsibility for looking after the child's health and well-being, failure to provide essential food or medical care that results in death is homicide.¹⁻⁹ Included in these homicides are deaths from starvation and from medically treatable diseases whose obvious presence was willfully ignored by the adult in charge of the child. This also applies to the vulnerable adult (e.g., elderly person with dementia) who is dependent upon another (a form of elder abuse).^{10–20}

Homicide is the most serious crime committed against persons, and its grave implications make its detection, solution, and adjudication matters of vital importance to every citizen and to the entire community as well as to law enforcement authorities, judiciary, and the bar.²¹⁻³⁰ Civilized society has always reacted with a mixture of horror and macabre fascination to the unlawful taking of a human life while paradoxically accepting with comparative equanimity the wholesale slaughter on the battlefield. Confronted by a criminally violent death, society demands that the assailant be promptly identified and apprehended.³¹ After taken into custody and tried for the crime, punishment is usually severe if found guilty. The forensic pathologist plays a vital and changing role in the investigation and adjudication of homicides.32

Forensic pathology is a subspecialty of pathology that requires an additional fellowship year of training and passing of two national examinations by the American Board of Pathology.³³ Just as all physicians do not have the same medical expertise, all pathologists do not have the same pathological expertise. In addition to the subspecialty of forensic pathology, there are recognized experts in neuropathology, pediatric pathology, dermatopathology, etc. There is much overlap, but all pathologists must know when to defer to or consult with a specialist.

This updated volume is designed for the forensic pathologist-in-training, criminalists, attorneys, law enforcement agents, and those in the early stages of their forensic careers.

Homicide Defined

The crime of homicide in all its various forms (murder, felony murder, manslaughter) and degrees is defined by statute, inasmuch as a crime must be clearly designated by a formally enacted law. Homicide, however, has been condemned from time immemorial, even in cultures where human life has not been considered especially sacred or valuable.

Criminal, Justifiable, and Excusable Homicide

Homicides can be criminal or non-criminal. The *criminal* encompasses violent deaths which are legally classified as murder, felony murder, or manslaughter. Justifiable or excusable homicides constitute the non-criminal group. Homicides are *justifiable* when they are carried out by law enforcement officers legally performing their duties when acting under competent authority.^{34,35} Examples include preventing the commission of a felony, protection of the public, selfdefense, homicides arising in the course of retaking fleeing felons, or making legal arrests.

For the medicolegal death certifier, the demonstration of intent usually is not needed to certify a death as homicide (intent is used in the legal system to distinguish murder from manslaughter). There are some instances, however, in which the medicolegal death certifier requires evidence of intent to certify a death as a homicide. For example, most pedestrians struck by motor vehicles (even if operated by an intoxicated driver who left the scene) are certified as accidents. This convention does not prevent the prosecutor from pursuing charges against the alleged perpetrator. If a driver, however, uses the motor vehicle as a weapon and intentionally strikes a pedestrian, the death would be certified as homicide. The manner determination by a medicolegal death investigator is an opinion given for vital statistical purposes and does necessarily indicate criminal action. For example, a police officer legally shooting an armed bank robber in selfdefense also would result in a determination of homicide as the manner of death.

Persons not professionally involved in law enforcement may commit *justifiable* homicides in resisting attempts of serious harm to themselves or to someone else, or in defending their homes or property.³⁶ In taking some other person's life in selfdefense, the individual must truly believe that there is imminent danger of death or serious injury and that the only salvation is to kill the assailant. The slayer must not have provoked the quarrel or been the aggressor in creating the danger that one seeks to overcome by self-defensive acts.

A homicide is *excusable* when accident or mishap results in the unanticipated and unintended death of some other person. Deaths falling into this category must have occurred as a result of a lawful act carried out in a lawful way with lawful means. A commonly cited example would be a gunshot wound death due to a bullet ricochet at a licensed shooting range.

The fact that police authorities are unable to prevent a large proportion of these lethal crimes derives from the circumstances and motives surrounding the fatal incident. Unlike other serious criminal offenses (e.g., burglary, robbery, and kidnapping), criminal homicide is, to a large extent, an intimate, personal crime as demonstrated by the fact that most homicide victims are killed by close relatives, friends, and acquaintances.^{37–42} One may kill one's wife, husband, child, brother, fiancé, or best friend but one rarely robs them at gunpoint or burglarizes their homes.

Some Dimensions of the Homicide Problem in the United States

The Federal Bureau of Investigation's (FBI) Uniform Crime Reporting (UCR) Program collects data of homicide victims and offenders; the types of weapons employed; the relationships of the victims to the offenders; and the circumstances.^{43,44} The most recent statistics demonstrate:

- The estimated number of murders in the nation was 16,425 in 2019. This was a 0.3% decrease from 2018, a 3.4% increase from 2015, and a 11.6% increase from 2010.⁴⁴
- There were 5 murders per 100,000 people in 2019. The murder rate in 2019 was down from the rates in 2018 (0.2%). However, the murder rate was up 1.1% when compared to the 2015 rate and 5.1% from 2010.⁴⁴
- Most (77%) of the 15,129 murder victims were male. Of the offenders for whom gender was known, 88% were male.⁴³
- Of the murder victims for whom race was known, 54.7% were Black or African American, 42.3% were White, and 3.1% were of other race.
- When the race of the offender was known, 55.9% were Black or African American, 41.1% were White, and 3.0 percent were of other race.⁴³
- More than 73% of the homicides for which weapons data was received involved firearms. Handguns comprised 62.1% of murder and non-negligent manslaughter incidents.⁴³
- Of homicide victims, 28.3% were killed by someone they knew, outside of their family (ac-

quaintance, neighbor, friend, boyfriend, etc.), 13% were killed by family members, and 9.9% were killed by strangers. The relationship between murder victims and offenders was unknown in 48.9% of murder and non-negligent manslaughter incidents.⁴³

 Circumstances were known in 58.8% of murders in 2019. Of those, 43.2% of decedents were killed during arguments. Felony-type murders (i.e., murders that occurred in conjunction with the commission of another felony crime such as rape, robbery, burglary, etc.) accounted for 24.6%.⁴³

 Law enforcement reported 726 justifiable homicides including the death of 340 felons. Private citizens justifiably killed 386 people during the commission of crimes against them.⁴³

ENTER THE FORENSIC PATHOLOGIST

Our science and art are useful tools in the larger patchwork of investigation that ultimately is stitched into a quilt of truth.

Charles Hirsch, MD

The word *homicide* carries a double connotation: biological (or medical) and legal. The *medical* criterion of homicide is conclusive demonstration that death was violent, i.e., caused by injury, or by neglect. This constitutes the *manner of death*. Demonstration that the lethal violence or neglect arose from an (unlawful) act, agency, procurement, or culpable omission of another person satisfies the *legal* requirement.

The importance of determining the *cause of death* brings into sharp focus the major though not sole function of the physician involved with the homicide investigation. The very nature of this key responsibility—lucid, incontrovertible exposition of lethal physical or chemical damage—indicates that the physician best suited for this assignment is the board-certified forensic pathologist.³³

To discuss a physician's role in homicide investigation appears to be a bold-faced contradiction in terms. *Here* is medicine, a humanitarian and scientific discipline concerned with observation, study, and treatment of persons who are ill or hurt. *There* stands homicide with its glaring connotation of criminally violent death. Yet murder and medicine come into intimate contact in the person of the forensic pathologist who helps investigate any death in which violence is known or alleged to have been involved. Establishment of the cause of death is but one facet of the forensic pathologist's overall contribution to the solution of the case. One must simultaneously search for, recognize, acquire, and preserve evidence *in* or *on* the body which may bear upon the apprehension and conviction of those who committed the crime. Objective data which exonerate an innocent suspect are sought for and accurately documented with equal vigor and zeal.

From these observations, study, and analysis of the fatal end-result, the forensic pathologist can often deduce critical facts and opinions which are uniquely valuable for reconstructing the circumstances surrounding the lethal incident and for recreating the incident itself.^{32,45-47} This latter portion of the forensic pathologist's contribution can be regarded as helping to elucidate the pathogenesis of the homicidal incident (i.e., what happened). As Joseph Davis noted, the "need for circumstantial details bears an inverse relationship to the severity of disease alterations revealed by autopsy." It must be remembered that determinations and opinions cannot transcend the information upon which they are based, and one must render a diagnosis on everything observed and not on isolated findings.

Death in all its forms and guises is found in the professional realm of the forensic pathologist. Sudden and unexpected death from disease at all ages and from an extremely wide variety of disorders, congenital, and acquired constitute the forensic pathologist's practice. In a sense, the forensic pathologist is the last true generalist in pathology and in medicine.⁴⁸ The forensic pathologist must be knowledgeable about surgical pathology, neuropathology, pediatric pathology, and the various surgical and medical specialties. Forensic examinations are best handled by a physician due to the oath taken to uphold morals and ethics and to do no harm, thereby making physicians well-suited to objective work. The additional forensic training taken by these pathologists further imparts emphasis on observation, synthesis, neutrality, and rationality.

Forensic Pathology Workforce Challenges

Currently, the number of physicians in the United States who practice forensic pathology as their sole or primary professional activity is insufficient to cover all of the jurisdictions of the United States.^{33,49–59} Since 1959, over 1,800 physicians have become board certified in forensic pathology by the American Board of Pathology (the recognized national certification authority). There are approximately 500–700 practicing, full-time forensic pathologists; however, it is estimated that more than 1,500 are needed to cover all the jurisdictions of the United States.^{49,56,57} At the same time, the number of deaths which require skilled medicolegal anatomic study is large and constantly growing.⁶⁰⁻⁶⁷ These deaths are too numerous and too widely scattered to permit all decedents to be autopsied by the current number of career forensic pathologists.

Accordingly, some hospital pathologists place their professional skills at the disposal of the law enforcement authorities in their own communities. Interestingly, the original edition of this text was "designed to serve as a *vade mecum*⁶⁸ for the 'occasional' forensic pathologist, the practicing hospital pathologist for whom the performance of a medicolegal autopsy is a relatively infrequent event." Despite countless articles demonstrating the continued benefits of the autopsy, in the past 40 years, the number of autopsies performed at hospitals has plummeted.⁶⁹⁻⁸⁰ As the saying goes about a skill or expertise, "if you do not use it, you lose it." Approximately 75 percent of boardcertified anatomic pathologists perform fewer than five autopsies per year (communication from the American Board of Pathology, 2020) which

is concerning for the maintenance of autopsy competency in the hospital setting.

Because of a decrease in autopsy practice, lack of a broad background of experience in the anatomy of violent death, and the unfamiliarity with the non-medical laboratory disciplines commonly utilized in these investigations, even the best-trained and best-intentioned hospital pathologist will probably commit serious errors of observation, omission, documentation, or interpretation while going about this occasional duty. Such errors will, all too often, interfere with the proper adjudication of the forensic issues, an eventuality which carries the frightening possibility of accusation (and conviction) of an innocent person as well as the unfortunate and erroneous acquittal of one who is guilty. If critically demanding specialized work of this type (homicide investigation) is permitted to fall into the hands of persons who are not truly "experts," tragic miscarriages of justice must inevitably occur.³³

The Pathology of Homicide

The phrases *pathology of homicide* and *pathology of trauma* though related, are not synonymous. The latter is concerned with the cellular, tissue, organ, and total bodily responses to injury, whatever the modality of violence responsible for the injury (e.g., mechanical, thermal, chemical, electrical, etc.), the *manner* of its origin (i.e., homicidal, suicidal, accidental, or undetermined), and whether the victim *survived*. The former, pathology of homicide, includes the foregoing biological phenomena and responses plus such essential criteria as:

- 1. The injured person *died* from trauma/neglect.
- 2. The violence was inflicted ("at the hand of another") by another person(s).
- 3. Judicial proceedings are required to adjudicate the innocence or guilt of the person(s) responsible for death.

The pathology of trauma is taught to the forensic pathologist through didactics, texts, and observations. The pathology of homicide, however, now shifts the scene of professional activities from an accustomed workplace, the autopsy room, and microscope bench to the less familiar locale of the courtroom.

The Corpus Delicti

The term *corpus delicti*, literally the *body of the offense* or the *body of the crime*, is often used erroneously to designate the physical body of the victim of homicide. The *corpus delicti* of homicide is *the fact* that a person died from unlawful violence. Proving a charge of homicide involves proof of two propositions: first, an unlawful lethal act was performed, and second, it was done by the person or persons charged with the crime and none other.

The Homicide Investigation Team and Roles

The forensic pathologist, who performs an autopsy in an instance of known or suspected homicide, is a component of an expert group, each of whom should regard the investigation as a challenge involving a series of problems requiring solutions and a series of questions requiring answers.⁹¹ An old poem summarizes the multifaceted queries posed by homicides (and other grave offenses):

- Quis, quid, ubi, quibus, auxilis, cur, quomodo, quando?
- Who, what, where, with what, with whose help, why, how, when?
- What was the crime, who did it, when was it done and where?
- How done and with what motive; who in the deed did share?

Close teamwork is essential for solving any complex crime, and every homicide is a complex crime. Some are merely less complex than others. "Simple" homicides are non-existent.

Every member of the homicide investigation group must know not only what is expected but also why they must carry out their portion of the investigation in a particular way. The forensic pathologists are independent medicolegal investigators not under the authority of law enforcement or prosecutors.^{57,92}

The Detective

The detective faces the difficulties, frustrations, and dangers of tracing and apprehending suspects, finding reliable witnesses, and attempting to get valid information from people who do not want to talk because of fear, ignorance, or complicity. The detective must deal simultaneously with cranks and crackpots who seemingly always have a ready and rich supply of wild tips and misleading information, none of which can be ignored without "checking out" lest it have some grain of truth or value.

Interrogation without intimidation is the working rule. Interviewing techniques are employed to ascertain facts, to sift truth from untruth, and to probe cautiously without impairing the ultimate forensic value and validity of the facts and data that is elicited.⁹³ Evidence suitable for presentation and acceptance in court is the soughtafter goal.

The Trace Evidence Expert

The trace evidence expert grapples with such problems as finding and identifying peculiar stains, establishing the source of paint chips, recognizing and comparing hairs and fibers, and contending with a variety of items ranging from a "bacillus to a battleship" and "DNA to a destroyer."^{94–111}

The Crime Scene Technicians and Other Forensic Specialist

The crime scene specialist methodically documents and photographs the scene of the incident with emphasis on documentation of physical evidence. This investigator may also observe the forensic autopsy systematically photographing the victim, the injuries, and whatever other features may have ultimate evidentiary value as well the vouchering of evidence.

The crime scene specialist searches for and documents obvious fingerprints, "dusts" for latent fingerprints, and then attempts to match them against known prints.¹¹²⁻¹³⁵ Computerization of fingerprint profiles allows for rapid searching and identification and there are various