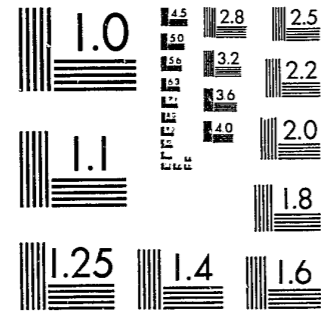


National Criminal Justice Reference Service



This microfiche was produced from documents received for inclusion in the NCJRS data base. Since NCJRS cannot exercise control over the physical condition of the documents submitted, the individual frame quality will vary. The resolution chart on this frame may be used to evaluate the document quality.



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Microfilming procedures used to create this fiche comply with the standards set forth in 41CFR 101-11.504.

Points of view or opinions stated in this document are those of the author(s) and do not represent the official position or policies of the U. S. Department of Justice.

National Institute of Justice
United States Department of Justice
Washington, D. C. 20531

9/24/84

DEATH INVESTIGATION AND EXAMINATION

MEDICOLEGAL GUIDELINES/CHECKLISTS



93433
COPY 1

THE FORENSIC SCIENCES FOUNDATION, INC.

225 S. ACADEMY BOULEVARD • COLORADO SPRINGS, COLORADO 80910 • (303) 596-6006

THE FORENSIC SCIENCES FOUNDATION, INC.

225 S. ACADEMY BOULEVARD • COLORADO SPRINGS, COLORADO 80910 • (303) 596-6006

DEATH INVESTIGATION
AND
EXAMINATION

MEDICOLEGAL GUIDELINES/CHECKLISTS

EDITORS

Beth Ann Lipskin, B.A.

Kenneth S. Field, M.B.A.

CONTRIBUTORS

George E. Gantner, M.D.
Kurt M. Dubowski, Ph.D.
Mary F. Ernst, B.S.
Jerry T. Francisco, M.D.
Lowell J. Levine, D.D.S.

Anthony Longhetti, B.A.
Gerald Reichardt, M.S.
Oliver Schroeder, Jr., J.D.
Clyde C. Snow, Ph.D.
William B. Sullivan, Jr.

U.S. Department of Justice
National Institute of Justice

This document has been reproduced exactly as received from the person or organization originating it. Points of view or opinions stated in this document are those of the authors and do not necessarily represent the official position or policies of the National Institute of Justice.

Permission to reproduce this copyrighted material has been granted by
Public Domain/Off. of Justice Assistance
Research & Statistics/NIJ/US Dept. of
Justice
to the National Criminal Justice Reference Service (NCJRS).

Further reproduction outside of the NCJRS system requires permission of the copyright owner.

Prepared under Grant Number 80-IJ-CX-0074 from the National Institute of Justice, Office of Justice Assistance, Research and Statistics, U.S. Department of Justice.

Points of view or opinions in this document are those of the editors and contributors and do not necessarily represent the official position or policies of the U.S. Department of Justice.

CONTRIBUTING AUTHORS

Kurt M. Dubowski, Ph.D.
Director, Toxicology Laboratories
U. of Oklahoma College of Medicine
Oklahoma City, Oklahoma

Beth Ann Lipskin, B.A.
Assistant Executive Director
Forensic Sciences Foundation
Colorado Springs, Colorado

Mary Fran Ernst, B.S.
Medicolegal Investigator
Medical Examiner's Office
St. Louis County, Clayton, Missouri

Anthony Longhetti, B.A.
Deputy Chief
Sheriff's Scientific Investigation
San Bernardino, CA Bureau

Kenneth S. Field, M.B.A.
Executive Director
Forensic Sciences Foundation
Colorado Springs, Colorado

Gerald Reichardt, M.S.
Police Technician II
Dade County Public Safety Dept
Miami, Florida

Jerry T. Francisco, M.D.
Chief Medical Examiner, Tennessee
University of Tennessee
Memphis, Tennessee

Oliver Schroeder, Jr., J.D.
Director, Law Medicine Center
Case Western Reserve University
Cleveland, Ohio

George E. Gantner, M.D.
Prof. of Forensic & Envir. Pathology
St. Louis University School of Medicine
St. Louis, Missouri

Clyde C. Snow, Ph.D.
Forensic Anthropologist
Norman, Oklahoma

Lowell J. Levine, D.D.S.
Consultant in Forensic Dentistry
Huntington Station, New York

William Sullivan, Jr.
DeKalb County Coroner
DeKalb, Illinois

PREFACE

Birth and death are the only two universal human experiences.

Birth is the most important biological event in the life of any human being. If it does not occur, there is no being. If there is no person, no legal rights and duties arise, for the law relates to the rights and duties of living people, not inanimate objects.

Death, on the other hand, is the most important legal event for all human beings. When it occurs, all legal rights and duties devolving upon the person during his life span in a civilized jurisdiction are terminated. All persons with whom the deceased had legal relations at that moment in time are also directly affected by the occurrence of death. Moreover, both the decedent and the survivors may be greatly affected legally by how death occurred, what actually happened, why it occurred, and precisely when it occurred. Above all, who died must be absolutely determined, and where death occurred is positively required for legal jurisdiction over the decedent is based upon a geographical location.

The law becomes extremely active when a person dies. Wealth is redistributed. Contracts are altered. A wrongful death may give rise to tortious claims. Tax obligations are always present. Public social benefits and private insurance policies are paid. Criminal laws may be involved. Creditors must be satisfied, and debtors located. Spouse and children, heirs and next-of-kin have their attachments rearranged. It is not surprising that for centuries the sovereign state has had an overriding interest in the death of its subjects or citizens. The ancient office of Coroner, or the

modern office of Medical Examiner, along with the state-licensed physician is legally charged with significant duties in answering the pertinent questions relating to death: Who, Where, When, What, How, Why. Only when these questions have been answered correctly can all the proper legal issues arising at death be effectively handled for the proper administration of justice.

Although the legal aspects of death are most important, certainly the religious and humanitarian heritages of a civilized society also command a deep concern over the death of a human being. The spiritual faith in a religion as well as the humanitarian concern for a fellow human being demand correct answers to the questions of death: who, where, how, when and why? Human death obligates the living to acquire accurate facts on which to apply just laws for each deceased member of the human race.

The obligation for proper death investigation is mandatory for legal and religious/humanitarian satisfactions in the human society. Let those responsible for death investigations take heed, that they labor not only for the state but also for God.

ACKNOWLEDGEMENTS

This comprehensive set of guideline/checklists for the investigation of death has been prepared as a result of the vision of the NIJ Program Manager John O. Sullivan (deceased).

The authors and project staff wish to thank Joseph Kochanski, current NIJ Program Manager for his continued support in the development of this ambitious effort.

Without the support of law enforcement agencies, medical examiner offices, and criminalistics and toxicology laboratories from across the nation, we would not have been able to make comparative analyses of the myriad death investigation procedures and checklists used in the United States. In this regard, special thanks are extended to those who so generously provided us with detailed accounts and follow-up discussions of their operations:

H.H. Karnitschnig, Maricopa County Medical Examiner and Ruben B. Ortega, Chief of Police, Phoenix, Arizona; Norman W. Propst, Chief of Police, Pocatello, Idaho and Ann R. Bradley, Criminalist - Idaho Department of Health & Welfare; Robert J. Stein, Cook County Medical Examiner, Robert Brzeczek, Superintendent of Police and Robert A. Boese, Police Department Criminalistics Division - Chicago, Illinois; Donald D. Pomerleau, Commissioner of Police, Baltimore, Maryland; Richard A. Gleason, Chief of Police, Lansing, Michigan; Cordell G. Brown, Colorado Bureau of Investigation, Pueblo, Colorado; Milo S. Tasky, Chief of Police, Duluth, Minnesota; Henry F. Ryan, Chief Medical Examiner of Maine and Major William S. Brown, Main State Police, Augusta, Maine.

The Editors

TABLE OF CONTENTS

PREFACE	ii
ACKNOWLEDGMENTS	iv
CHAPTER ONE "INTRODUCTION"	
I. INTRODUCTION	I-1
II. ILLUSTRATIVE CASE	I-3
CHAPTER TWO "PHYSICAL SCENE INVESTIGATION"	
I. INTRODUCTION	II-1
II. JURISDICTION	II-3
III. PHYSICAL SCENE INVESTIGATION	II-4
IV. PROTECTION OF THE SCENE	II-6
V. RECORDING THE SCENE	II-9
VI. DEATH SCENE SEARCH PATTERNS	II-13
VII. COLLECTION & PRESERVATION OF EVIDENCE	II-14
A. Purpose	II-14
B. List of Collection & Preservation Equipment	II-14
C. Death Scene Search Area/Objects	II-15
D. Fingerprints	II-16
E. Trace Evidence	II-18
1. Biological Fluids	II-18
2. Fiber, Hair, Rope, String & Thread	II-22
3. Rock and Soil	II-24
4. Dust and Debris	II-24
F. Firearms	II-25
G. Tool and Tool Mark Evidence	II-27
H. Questioned Documents	II-27
I. Fatal Automobile Accident	II-28
J. Fire and Explosion	II-29
VIII. THE TEAM APPROACH TO DEATH INVESTIGATION	II-29
APPENDIX II-A. GUIDELINE CHECKLIST	II-A-1
APPENDIX II-B. UNIVERSAL TRANSVERSE MERCATOR MAP LOCATION SYSTEM	II-B-1

TABLE OF CONTENTS

CHAPTER THREE . . . "BODY AT THE SCENE"

I.	RESPONSIBILITY AT THE DEATH SCENE.	III-1
II.	INITIAL DEATH NOTIFICATION	III-2
III.	RESPONSE	III-2
IV.	LOCATION WHERE BODY FOUND.	III-2
V.	DESCRIBE THE VICTIM.	III-4
	A. Victim's Clothing.	III-4
	B. Victim's Jewelry & Valuables	III-4
	C. Postmortem Changes.	III-5
	D. Body Temperature	III-5
	E. Rigor Mortis	III-6
	F. Livor Mortis	III-7
	G. Decomposition.	III-7
	H. Victim's Injuries.	III-8
VI.	ESTIMATION OF TIME OF DEATH.	III-9
VII.	TRANSPORTING VICTIM TO MORGUE.	III-10
VIII.	PRONOUNCEMENT OF DEATH	III-11
IX.	ESTABLISHING VICTIM'S IDENTIFICATION	III-11
X.	NOTIFICATION OF NEXT OF KIN.	III-12

APPENDIX III-A1 BASIC MEDICAL EXAMINER DEATH SCENE INVESTIGATION

ADDED GUIDE LINES

A-2	Burns & Fire	A-13	Perioperative & Peritherapeutic
A-3	Carbon Monoxide	A-14	Poison
A-4	Child Abuse or Neglect	A-15	Sudden Infant Death Syndrome (SIDS)
A-5	Drowning	A-16	Stabbing & Cutting
A-6	Drug Overdose	A-17	Vehicular Accident
A-7	Electrical	A-18	Apparent Natural Cause
A-8	Falls	A-19	Apparent Suicide
A-9	Gunshot	A-20	Apparent Violent Death
A-10	Hanging	A-21	Alcohol Related
A-11	Job Related	A-22	Illicit Drug Related
A-12	Pedestrian/Auto	A-23	Sex Related

TABLE OF CONTENTS

CHAPTER FOUR . . . "EXAMINATION OF THE BODY"

PART ONE . . . "EXTERNAL EXAMINATION"

I.	GENERAL	IV-2
II.	ILLUSTRATIVE CASE	IV-3
III.	EXTERNAL EXAMINATION - TUTORIAL	IV-6
	A. Records.	IV-6
	B. Trauma Classification.	IV-7
IV.	EXTERNAL EXAMINATION ROUTINE.	IV-16
	A. Systematic Examination	IV-16
	B. Identification	IV-16
	C. Clothing & Valuables	IV-17
	D. "Description" - Defined.	IV-18
	E. Skin Surface Examination	IV-20
	F. Special Examinations	IV-21
	G. Next Phase - Autopsy ?	IV-23

PART TWO . . . "THE AUTOPSY"

I.	GENERAL	IV-24
II.	AUTOPSY HISTORY	IV-24
III.	AUTOPSY PHASES.	IV-26
	A. Gross Autopsy.	IV-26
	B. Laboratory Analyses.	IV-26
	C. Conclusions.	IV-27
IV.	MEDICO-LEGAL AUTOPSY.	IV-28
	A. External Examination	IV-28
	B. Internal Examination	IV-28
	1. Incision.	IV-28
	2. Organ Examination	IV-28
	C. Special Procedures	IV-30
	1. Mass Disaster	IV-30
	2. Skeletal Remains	IV-31
	3. Burned Remains.	IV-32
	4. Disinterred Remains	IV-33
	5. Decomposed Remains.	IV-33
	D. Decision Making	IV-33

TABLE OF CONTENTS

V.	ADMINISTRATIVE MATTERS	IV-34
A.	Attendance at the Autopsy	IV-34
B.	Facility, Equipment, & Instruments.	IV-34
APPENDIX IV-A GUIDELINE CHECKLISTS		
A1	- Basic External Examination	
A2	- Basic Internal Examination	
B.	- ADDED GUIDELINE CHECKSISTS	
B1	- Alcohol, Medication, Poison, Drug Overdose Related Death	
B2	- Burned, Charred, Skeletal Remains	
B3	- Child Abuse -- Neglect	
B4	- Decomposed Remains	
B5	- Drowning	
B6	- Falls	
B7	- Gunshot Deaths	
B8	- Lightning - Electrocution	
B9	- Perioperative or Peritherapeutic	
B10	- Sex Related Death	
B11	- Vehicular Fatality	
CHAPTER FIVE . . . "TOXICOLOGY"		
I.	INTRODUCTION	V-1
II.	TOXICOLOGY IN DEATH INVESTIGATIONS	V-1
A.	INTERPRETATION OF RESULTS	
B.	THE PRACTICE OF FORENSIC TOXICOLOGY	V-9
C.	INFORMATION EXCHANGE.	V-13
D.	SPECIMEN SELECTION/COLLECTION	V-15
1.	Blood.	V-16
2.	Urine.	V-16
3.	Gastric Content	V-17
4.	Other Fluids	V-17
5.	Body Organs.	V-17
6.	Special.	V-18
E.	QUANTITIES OF SPECIMENS	V-18

TABLE OF CONTENTS

F.	SPECIMEN HANDLING	V-20
1.	Collection	V-20
2.	Preservation	V-20
3.	Chain of Custody	V-21
G.	EMBALMING	V-24
APPENDIX V-A-1 TOXICOLOGY SPECIMEN SUBMISSION GUIDELINES (To the Laboratory)		
APPENDIX V-A-2 TOXICOLOGY ANALYSIS GUIDELINES		
APPENDIX V-B HISTORICAL ASPECTS OF FORENSIC TOXICOLOGY		
APPENDIX V-C STAGES OF ACUTE ALCOHOLIC INFLUENCE/INTOXICATION		
CHAPTER SIX . . . "DENTAL EVIDENCE"		
I.	INTRODUCTION	VI-1
II.	IDENTIFICATION	VI-2
III.	DENTAL TRAUMA	VI-6
IV.	BITEMARK	VI-7
A.	COLLECTION OF EVIDENCE	VI-7
B.	BITEMARK ANALYSIS	VI-10
APPENDIX VI-A BASIC ANTEMORTEM DENTAL RECORDS		
APPENDIX VI-B DENTAL IDENTIFICATION		
APPENDIX VI-C BITEMARKS		
CHAPTER SEVEN . . . "PHYSICAL EVIDENCE-ANTHROPOLOGY"		
I.	INTRODUCTION	VII-1
II.	FORENSIC ANTHROPOLOGISTS	VII-3
III.	SCENE INVESTIGATION	VII-5
A.	Types of Scenes	VII-5
B.	Surface Findings	VII-5
C.	Burials	VII-11
D.	Locating Burials	VII-12

TABLE OF CONTENTS

IV.	ANALYSIS & INTERPRETATION	VII-11
A.	Skull	VII-15
B.	Teeth	VII-16
C.	Hyoid Bone	VII-17
D.	Clavicles, Ribs, Sternum, Vertebrae	VII-17
E.	Scapulae	VII-18
F.	Innomimates	VII-18
G.	Long Bones	VII-19
APPENDIX VII-A BASIC ANTHROPOLOGICAL REMAINS SCENE SEARCH		
APPENDIX VII-B ANTHROPOLOGICAL ANALYSIS & INTERPRETATION		
CHAPTER EIGHT . . . "DEATH CERTIFICATE"		
I.	TERMINOLOGY	VIII-1
II.	INTRODUCTION.	VIII-2
III.	HISTORY	VIII-2
IV.	PURPOSE & USES	
A.	General	VIII-6
B.	Proof of Death	VIII-7
C.	Cause of Death	VIII-7
D.	Correlation	VIII-11
V.	PLACE OF DEATH CERTIFICATE	VIII-12
APPENDIX VIII-A DEATH CERTIFICATE ELEMENTS		
CHAPTER NINE . . . "EVIDENCE MANAGEMENT"		
I.	CHAIN OF CUSTODY	IX-1
II.	PRESERVATION OF EVIDENCE	IX-3
CHAPTER TEN . . . "JURISDICTION"		
I.	INTRODUCTION	X-1
II.	MILITARY INSTALLATIONS	X-2
III.	MILITARY AIRCRAFT ACCIDENTS	X-3
IV.	FEDERAL OFFICIALS	X-3
V.	MASS TRANSPORTATION DISASTERS	X-3
VI.	OTHER FEDERAL JURISDICTION CASES	X-4
VII.	LOCAL & STATE JURISDICTION	X-4
SELECTED BIBLIGRAPHY		

CHAPTER ONE

INTRODUCTION

AND

ILLUSTRATIVE CASE

CHAPTER ONE

I. INTRODUCTION

It is universally accepted that a first class investigation of a death requires the services of a team of experts -- experts who not only have the proper training and tools for their portion of the task at hand but who also have authority and an organization by which to accomplish the needed teamwork.

Most jurisdictions in the United States that use the multi-disciplinary approach to death investigations do so by informal coordination and cooperation. Regrettably, some cities and counties rely on luck -- having no organizational structure by which to delineate who does what and in what sequence.

It is the basic tenet of these guidelines that organized medicolegal death investigations are critical to the true determination of the cause of death, the circumstances of death, and the eventual adjudication of wrongs.

No formulae are offered for the structuring of team responsibilities within the thousands of agencies concerned with the investigation of a death. The statutes governing these agencies are too varied throughout the United States to warrant such an effort on our part. Rather, in the chapters to follow, comprehensive checklists are provided in the hope that they not only will aid in the accomplishment of thorough death investigations, but will also suggest areas in which responsibilities should be carefully coordinated.

The chapters of this book are organized to reflect the general order in which an average death investigation is accomplished, i.e., the inspection and documentation at the death scene is essentially accomplished before the body is removed, etc. Obviously, several aspects of an investigation logically should be accomplished simultaneously...by individuals from several departments.

It is the mark of good planning and organization when all parties concerned know who has what authority and under what circumstances.

The guidelines which follow are presented in checklist form rather than as reports because each local jurisdiction in the United States has its own policies and procedures pertaining to report formats.

Each chapter begins with a description of the investigation in question and concludes with a checklist that serves two purposes. The checklist can be used as the basis for a report form and, whether or not it is so used, it can serve as a clipboard memory jogger for the investigator.

The remainder of this chapter is an illustrative case depicting a plausible death. It is offered as an aid to understanding the coverage in succeeding chapters of the contributions made by each member of a death investigation team.

II. ILLUSTRATIVE CASE

At 4:40 PM on Wednesday, May 5, 1982, Investigator Mary Fran Ernst, of the Golden City, Kansas Medical Examiner's Office, was contacted by Pettid County Police Officer Whitney Ford, Badge #798, reporting that a 34 year old white female was found dead at her residence. Investigator Ernst was requested to respond to 2449 Adams Court, the scene of the death.

Investigator Ernst arrived at 5:05 PM and was met by Officer Ford and Detective Jerry Reichardt of the County Crime Scene Unit. The scene is a single family, three bedroom, single story, brick residence, facing west, located in a residential-only area. It was a clear, cool spring afternoon with an outside temperature of about 55° F.

The victim was identified as:

CAROLYN ANN MORRIS (nee Dowle)

DOB 02-28-48

residing at 2549 Adams Court

Golden City, Kansas 89098

married to John F. Morris

Employed by the XYZ Corporation in a
clerical capacity.

She was identified by her husband at her residence at the time of this investigation. She had been found by her husband at approximately 4:00 PM this date when he returned home from work. He last spoke with her during breakfast this morning at which time there was only the usual conversation. He left for work at 6:00 AM. At 6:00 AM, she had been dressed in a pink knee-length nylon nightgown, slippers and a cotton print snap-front housecoat. She was scheduled to be at her place of employment at 8:00 AM, her normal working hours.

She was found lying across the double bed in the master bedroom. Her head was north and her feet south. She was lying on her back and her arms were lying adjacent to her sides. Her legs were outstretched and her ankles were touching each other. The bed on which she was lying was made but the pillows were not in place. They were located on the floor to the east of the bed. The blankets and blue nylon bedspread were somewhat in disarray; but it appeared that at one time, the bed had been "made" prior to her resting on it this final time. A blue zipper-front wind breaker was apparent on the floor next to the pillows.

The victim was dressed in a pink, nylon, knee-length pullover nightgown. She was not wearing any underwear, shoes or socks. To the east of the bed on the carpeted floor, under the pillows, was a multi-colored cotton print, knee-length housecoat. The snaps on the front opening of the housecoat were unfastened.

At 5:20 PM, her liver body temperature was calculated to be 92° F in a bedroom environment of 72° F. Rigor mortis was well established throughout her extremities (3+). Unblanching liver mortis was noted on her back, buttocks and posterior portions of both legs.

At 6:40 PM, her liver body temperature was calculated to be 91° F in a bedroom environment of 73° F. Rigor mortis was well to firmly established (3+ to 4+). The unblanching liver mortis was present in the above stated body regions. Temperature calculations were made by use of the telethermometer operated by Investigator Ernst. The furnace in the residence was on and the thermostat was set at 72° F.

Close inspection of the victim's well-manicured, polished, medium-long fingernails revealed that there was one nail broken off. This nail was located on the ring finger. It was broken off at the level of the finger-tip. This nail had not been filed/smoothed off since it had been broken. Red fibers were noted

clinging to the jagged edges. Her hands were placed in paper bags secured with tape at the wrist for evidence safeguard during transportation to the morgue.

She did not appear to have any major trauma; however, one small (½" long) linear "scratch-like" area was found on her neck, about 2 inches to the left of the center front. No other scratch-like areas were seen. Conjunctival hemorrhages were noted in both of her eyes which were blue in color.

No blood was seen on or near the victim. On the inner aspect of the victim's left thigh, about 6 inches from her perineal area was found a dried, whitish-gray, cloudy appearing smear. A cloudy, whitish-gray substance was seen coming from her vagina.

A snag-type defect was found in the nylon nightgown in the region of the left breast. Several of the gown's fibers were broken/disarrayed. Beneath this gown area, 8 indentations, rectangular in shape were found in her left breast region, adjacent to her left nipple. The 8 indentations formed a semi-lunar type configuration.

The victim's feet were clean and the soles of her feet did not appear to have any substances adhering to them. She was not wearing any jewelry. She had no healed surgical scars. She appeared to weigh approximately 130 pounds and was measured to be 5'4" tall. Her long brown curly hair was clean and dry but appeared to be somewhat disheveled.

Because of the possible significance of the left breast area of the gown, the left breast and the dried smear found on the victim's thigh; she was encased in the blue nylon bedspread after it was closely searched by Detective Reichardt, who collected several strands of head hair from it. The bedspread was secured with tape so that no possible trace evidence would be lost during transit to the morgue facility.

Southeast Ambulance Service responded to the scene and ambulance attendants James Walters and Kathleen Kaufman conveyed the victim to the Golden City Medical Examiner's Office. The victim had been pronounced dead at the scene at 5:07 PM by Medical Examiner's Office Investigator Ernst. Upon arrival in the morgue, full body x-rays were taken by Mr. Joseph Lebb of the morgue radiology staff while the victim was still encased in the bedspread.

No fluids or other materials were found on the double bed after the victim and the bedspread were removed by the ambulance attendants.

Investigator Ernst interviewed Mr. John F. Morris at the scene, after his wife's body had been removed to the morgue by the ambulance attendants. He stated the following to her at approximately 7:15 PM on 5-5-82.

His wife has no medical problems whatsoever. She has no documented medical illness and takes no medication routinely. She last saw her gynecologist, Dr. Stuart Brockstein, about 6 months ago for her routine pap smear and examination. She does have an Intrauterine Device in place. She does not take diet pills of any kind. She has not made any complaints of illness recently. She was not currently having a menstrual cycle and does not use intravaginal tampons.

She has no known psychiatric disorders and has never to his knowledge seen a psychiatrist. She has not been recently depressed and in fact has no known problems at work or within her family. She is not known to be undergoing any type of emotional stress at this time by her husband. She has not recently been involved in any accidents or falls to his knowledge.

She has not changed her activity pattern in the past six months. She sleeps well and has not changed weight significantly in the past year. She has no previous history of suicidal threats or attempts. She does not take any prescription medication or alcoholic beverages.

Her husband last saw her at 6:00 AM this morning when he went to work. She was to go to work today also. She was scheduled to be working at 8:00 AM. Her normal routine would be to "straighten up the house" after he left for work, change to her street clothing for work and then leave her house at about 7:30 AM. She normally drove by herself to work. (Her 1981 Ford Mustang, Kansas license #KRP-373, for 1982, was found still parked at the curb in front of her residence.)

The husband stated that when he arrived home from work at about 4:00 PM, the lights were on in the kitchen, bathroom and bedroom. The breakfast dishes were washed but were still in the dish drainer. (Her usual habit would be to dry the dishes and place them in the cabinet immediately after washing them in the morning.) The radio in the kitchen was on. Cold, dirty dishwater was still in the dishpan located in the kitchen sink. The frying pan which she had used to fry bacon was still located on the kitchen stove with a small amount of bacon grease in the pan. (The victim normally "makes the bed" in the master bedroom as soon as she gets up and before she prepares breakfast.)

When the husband arrived home at 4:00 PM, he found the front entrance door closed but not locked. (He did not recall if he locked this door when he left for work this morning.) The house did not appear to be in its usual "tidy" condition. Several items that had been located on the four-drawer dresser in the master bedroom were found on the floor.

Concurrent with Investigator Ernst's investigation, Detective Reichardt conducted his crime scene investigation. The scene and body were well recorded in color photography. Projection sketches of the primary scene (the master bedroom) and the entire residence were accomplished. Exact measurements were included.

During the scene search, a point of forced entry was discovered at the side kitchen door. The intruder(s) had apparently taped the pane of glass adjacent

to the door knob with masking tape and struck it with a blunt tool. The subject(s) then reached in and turned the knob, unlocking the push-button lock. Small drops of blood were collected intact for submission to the Crime Laboratory, along with the lengths of tape.

Other processing included: the collection of standard carpet fibers and the examination of the entire scene for latent prints. Elimination prints were taken of Mr. Morris and arrangements were made to have the victim printed. The blue jacket from the master bedroom floor was collected. While it was being packaged, Detective Reichardt observed several short gray hair, possibly animal, clinging to it.

A search of the exterior disclosed a tennis shoe (Converse Allstar) impression in the flower garden soil below the master bedroom window. Black and white photographs of the impression were taken using a tripod, line level, ruler and oblique lighting.

Several miles from the scene, while on patrol, uniform personnel stopped a vehicle for a routine traffic violation. A check of the tag through NCIC revealed that the car was stolen from a nearby community. The officers observed a pair of women's panties on the right front floor along with a roll of masking tape and a hammer. A small short-haired gray dog was standing on the back seat.

The driver, a W/M, was clad in a red Banlon sport shirt, jeans, and Converse Allstar tennis shoes. He had a band-aid on the back of his left hand and a woman's gold chain around his neck.

The dog was taken by an Animal Control Unit for safe keeping; the vehicle was towed to an impound garage for processing, and the driver arrested for grand theft auto. Investigation continues.

CHAPTER TWO

PHYSICAL SCENE INVESTIGATION

CHAPTER TWO

PHYSICAL SCENE INVESTIGATION PROCEDURES

KEY WORDS

Automobile Accidents . . . Chain of Custody . . . Collection . . .
Control . . . Death Scene . . . Documentation . . . Entry and Exit . . .
Equipment . . . Field Notes . . . Fingerprints . . . Fire and Explosions . . .
Firearms . . . First Officer . . . Jurisdiction . . . Measurements . . .
Perimeter . . . Photography . . . Physical Evidence . . . Preservation . . .
Processing . . . Protection . . . Questioned Documents . . . Search
Patterns . . . Sketches . . . Tools and Toolmarks . . . Trace Evidence.

I. INTRODUCTION

A. Description of Death Scene:

Before an officer or investigator can thoroughly understand his responsibility in protecting and preserving evidence, he must be fully aware of what constitutes a death scene. He must be able to recognize the extent of the area involved during the events leading up to the death and realize the necessity for protecting the entire area. What is a Death Scene?

A death scene is not limited to that area where the death actually

occurred. Rather, it includes any portion of the area adjacent to the actual scene, over which the suspect or victim might have passed, and where evidence might be located.

The primary duty of the first investigator to arrive at the scene is to determine, if possible, the suspect's or victim's direction of approach, and the direction in which the responsible person left the scene.

If a crime was committed within a building, it would be important for the officer to determine the point of entry of the suspect, as well as the point of exit and to determine how the suspect approached the point of entry and direction taken by the suspect on leaving the building.

B. Processing a Death Scene:

Processing a scene refers to the methods used by investigators to recognize, identify, preserve, and collect, as far as possible, all facts and items of evidentiary value that may assist in reconstructing what actually happened. The area processed should extend far enough to insure the inclusion of all direct traces of the death's occurrence and the presence and actions of the offender(s) immediately before and after the commission of the act.

To be successful in recognizing and collecting pertinent facts and evidentiary items essential to the completion of the investigation, the investigator must be thorough, painstaking, and systematic in his methods of processing. Many items of evidence require special handling and/or collection techniques, for example: gunshot residue, blood, and biological fluids. Death Scene Investigators should be familiar with collection methods required by the analyzing laboratory and be properly equipped to collect and handle such specimens.

II. JURISDICTION

Jurisdiction is established by statutes, customs and/or local agreement of community agencies. Certain types of death, (e.g. air crashes and deaths on Indian reservations), are the responsibility of special investigation groups, such as the FAA and National Bureau of Indian Affairs. Pre-established Standard Operating Procedures should be developed to insure notification of concerned special investigative agencies, and coordination and cooperation between death investigative agencies. (See Chapter X, JURISDICTION).

In many jurisdictions, the deceased's BODY is the responsibility of the Medical Examiner/Coroner and the death SCENE is the responsibility of the law enforcement agency. The Medical Examiner/Coroner has the legal authority to take charge of the body and is responsible for determining the CAUSE and the MANNER of death which was the result of violence, suspicious circumstances or which occurred suddenly and/or unexpectedly.

Medical Examiner/Coroner responsibilities at the death scene are stated in the Revised Statutes for each state. The law varies from state to state regarding this matter. A common pitfall for the new investigator is to arrive at the death scene and be unsure as to what he can or cannot legally do regarding the body and the evidence relative to the death. It is, therefore, imperative that all death investigation team members be knowledgeable of the statutes in their jurisdiction.

Cooperation between the Medical Examiner/Coroner representatives and members of the law enforcement agencies is mandatory for conducting a thorough, timely, scientific death inquiry.

In those jurisdictions where the Medical Examiner/Coroner has no scene investigator, a member of the agency responsible for the overall death

investigation must also assume the Medical Examiner/Coroner's responsibilities.

III. PHYSICAL SCENE INVESTIGATION

A. General:

1. The police officer on patrol normally will be the first on the scene. If a law enforcement officer is weak in his knowledge of scene investigation he can do great harm to the investigation by inadvertently destroying the evidence.
2. When investigating deaths apparently due to homicide, suicide, accident, or an unattended death, check department policy as to how far the patrol division can proceed in the investigation prior to the arrival of a special investigator.
3. Always investigate an apparent suicide as though it is a homicide.
4. Do not remove a dead body until all required investigation steps have been taken.
5. If the body must be moved (advancing fire, etc.) record in all ways possible the location and position of the body.

B. Approaching the Death Scene:

The investigation should begin as soon as the officer becomes aware of the death--put all senses to work--and most of all use common sense. BE ALERT! BE CURIOUS! Be complete in what is recorded.

1. Observe vehicles (moving or parked)
2. Observe persons
3. Observe unusual conditions

C. Arrival At The Scene:

1. The first duty is always to the injured. If the victim(s) shows any sign of live, he should be afforded all possible lifesaving measures.

2. Notation should be made regarding:

- a. Date
- b. Time
- c. Weather conditions
- d. Lighting conditions

3. The next duty is to establish a perimeter and secure the scene.

Be observant for:

- a. Suspicious vehicles and persons at or around the immediate scene.
- b. Possible witnesses near or around the immediate scene (Be able to identify them for subsequent investigation--name, address, business, phones).
- c. Open doors, windows, unattached objects which could be associated with the offense.
- d. Points of entry and exit.

4. If Death is within a closed area such as a house, be careful that your path of entry and exit does not destroy evidence.

Look for:

- a. Footprints in oil
- b. Dusty prints on shiny floors
- c. Empty cartridges - projectiles
- d. Broken glass that could have latent fingerprints
- e. Cigarette/cigar butts, other smoking paraphernalia

5. Try to enter and exit by the same path, carefully keeping in mind all conditions as they existed upon your arrival.

6. Observe odors which may be lingering at the scene of the offense.

The odor may be present upon arrival only, and may dissipate rapidly

depending upon its chemical makeup. Examples include:

- a. Perfume -- which may or may not be a link between male and female suspects.
- b. Cooking Gas -- which may or may not be the attempt to cover up a possible homicide.
- c. Gasoline -- indicative of arson or possible coverup of homicide.
- d. Any other unusual odors which would not otherwise be normally associated with the existing surroundings.

D. Calling for additional help:

Evaluate the condition at the scene and call for whatever additional help is indicated, such as:

1. Extra Police Personnel, e.g., Uniform and/or Investigative.
(This would depend upon: the size of the department; the nature of the death; the layout of the buildings or terrain to be protected.)
2. Ambulance
3. Fire Department (In some jurisdictions, fire departments handle rescue and ambulance services.)
4. Other Agencies, e.g., Medical Examiner/Coroner

IV. PROTECTION OF THE SCENE

The value of the scene rapidly deteriorates; therefore, the police officer must arrive at the scene of the incident as soon as possible, since the scene is the source of the most productive evidence. The principals were there or may still be present. Physical evidence in the form of weapons, tool marks, fingerprints, footprints, tire marks and fibers may also be waiting for the scrutiny of the investigator and technician.

Swift arrival prevents the destruction or contamination of evidence and

also prevents the loss of witnesses. Under no conditions should anyone be permitted to leave the scene until they have been interviewed and their full name, date of birth, home address, phone number and their working hours have been recorded.

Preserving the scene means keeping the site in the same physical condition as it was left by the perpetrator (if applicable). This is done by first determining the limits of the perimeter of the scene and then protecting that area by the use of ropes, barricades, pre-existing barriers such as fences, ditches, roads and so forth.

All unauthorized persons must be kept from entering the area. The officer must prevent anyone, including himself, from picking up or moving objects which appear to be in disarray. Too often the owner of a business or residence will be in a hurry to clean up. This must be prevented until the scene has been thoroughly processed for evidence.

A. Protection - Preservation - Control of the Death Scene:

1. Protective measures are required:
 - a. To record all persons present at the scene.
 - b. To prevent removal, destruction, rearrangement or concealment of physical evidence.
 - c. To preserve the scene in its natural state until such time as photographs have been taken and measurements, sketches and notes are made.
 - d. To keep out unauthorized persons who may unwittingly or purposely do some act which may interfere with the successful conclusion of the investigation and prevent the identification and apprehension of the perpetrator(s).

2. Protection of areas adjoining or surrounding the exact spot where an offense was committed is vital.
 - a. In buildings, evidence may be present to show how the victim/perpetrator entered or left the premises.
 - b. In an open area, evidence may be present showing the route of travel.
 - c. Physical evidence may have been dropped accidentally or hidden in adjacent areas.
 - d. Fences, gates, bushes or other shrubbery may contain fibers accidentally torn from clothing.
 - e. Soft ground may contain foot, heel or tire marks.
 3. The following is suggested scene protection equipment -- to be carried as standard equipment in all police vehicles.
 - a. 300 feet of rope or suitable material to rope off the scene.
 - b. Emergency lighting (when practical).
 - c. Flags easily visible at night to mark specific points of interest for overall pictures of out-of-door crime scene.
 - d. 100 foot tape measure
 - e. Chalk or crayon
 - f. "Keep Out" signs
 - g. Street closure barricade
- B. Protection of the Death Scene:
1. Open Scene -- that area that is generally in open terrain and could be affected by the elements.
Methods include:
 - a. Roping off

- b. Barricading
 - c. Use of existing barriers -- fences, ditches, roads
 - d. Use of natural barriers, such as hills, woods, and streams
 2. Closed Scene -- that area generally not affected by the elements, e.g., buildings, houses. Methods include:
 - a. Roping off
 - b. Closing doors, windows, stress security measures for lengthy crime scene operations
 - c. Security personnel
 3. Skeletal Remains -- in some cases, human remains will be found in a skeletonized or semi-skeletonized state; in such cases the bones may be scattered over considerable area. Recovery of the skeleton requires special techniques which are covered in Chapter VII, PHYSICAL ANTHROPOLOGY.
 4. Buried Bodies -- in certain situations, death scene investigators are provided information by an informant giving the general location of a buried body. When several months or years have elapsed since the burial, obvious signs of the grave may no longer be discernible. Methods and techniques useful in locating and recovering (excavating) a buried body will be dealt with in the chapter on Anthropology.

V. RECORDING THE SCENE

Comprehensive notes, photographs and sketches are a prerequisite to the future reporting, evaluation and presentation of the information developed in the course of an investigation.

A. Field Note Taking:

Notes serve as a repository for details, a basis for the report and a supplement to sketches and photographs. The scene notes serve as

documentary evidence for the investigator, especially in court. Portable cassette tape recorders are of great assistance in note-taking. In fact, both audio and video tapes are gaining increasing acceptance in court as a means of documentation.

Notes are gathered in chronological order corresponding to the investigator's steps or receipt of information.

1. Information to be noted:

- a. Date and time call received
- b. Time of arrival
- c. Weather and light conditions
- d. Names of officers present
- e. Names and complete demographic information of witnesses present
- f. Officers' actions and activities
 - (1) Anything touched, moved and altered
 - (2) Any statements made by witnesses to officers present
- g. Exact geographic locations of death scene. (It is recommended that the Universal Transverse Mercator Grid System (UTM) be employed. Instructions for its use are found in Appendix II-B.)
- h. Overall scene conditions
- i. Photograph taken
 - (1) Photographer's name
 - (2) Time photos taken
 - (3) Scene depicted by photos
 - (4) Setting, speed, film, etc.
- j. Evidence
 - (1) Description

- (2) Identification marks
- (3) Date, time and exact location found
- (4) By whom found
- (5) Custodian of evidence

B. Photography:

A permanent record of a scene is indispensable to a successful presentation of the case in court. The first step in the investigation of any scene is to photograph completely and accurately all aspects of the scene before any objects of evidence are removed or otherwise disturbed.

General photographs should be sufficient in number to permit visualization of the overall death scene area from a number of perspectives. It is far better to take too many photographs than too few. Using an Instamatic is better than not photographing the scene. These views should overlay so that some landmarks or identifiable objects included in the various photographs can be used to orient later viewers (e.g., other investigators, judge, and jury) who will not be able to visit the original death scene. Video tape recordings of the scene, when available, are highly desirable.

Close-up photographs of scene features should also be taken so that they can be readily oriented in directional (North-South) and vertical reference to the overall scene photographs and sketches. Where appropriate, they should include a scale reference (ruler or tape) so that the viewer can make an accurate estimate of the object's size.

C. Sketching Techniques:

1. Purpose

A Death Scene sketch is usually prepared for all violent death investigations. The sketching begins as soon as the investigating officer

has attended to the essential task of aiding the injured, protecting the scene, securing witnesses and making arrests. The sketch should be made after a preliminary search of the scene but before the removal of evidence. Where objects must be removed from the scene before the sketch is completed, the exact location of those items should be outlined with a marking device.

Typical uses of sketches include:

- a. To refresh memory of investigator.
 - b. To record exact location of evidence found in relationship to pieces of furniture or fixed objects.
 - c. To provide a permanent record.
 - d. To assist all persons concerned in understanding facts.
 - e. To supplement photographs and notes.
2. Rules for Drawing the Rough Sketch
- a. Decide what is to be sketched -- the key features.
 - b. Indicate North on the sketch. (Use compass if necessary.)
 - c. Control all measurement by using measuring tape or ruler.
 - d. Have another officer verify all measurements. (Do not estimate distance by pacing.)
 - e. Take two separate sets of measurements when noting the position of the body; one set from the head...another from the feet.
 - f. Locate all objects accurately and identify all objects drawn in sketch either by numerals or letters. Draw "stick" figures to represent bodies.
 - g. Include all essential items in the drawing.
 - h. Make all sketch corrections at the death scene.

- i. Record date, time, by whom drawn, case number and names of persons that assisted with measurements.
 - j. Use legend (drawing and charting symbols).
3. Rules for Measurements
- a. Indoor measurements: should be taken from fixed objects:
 - (1) Walls
 - (2) Room corners
 - (3) Door and window frames
 - (4) Bathroom fixtures
 - b. Outdoor measurements: should also be taken from fixed objects:
 - (1) Corners of buildings (record address).
 - (2) Light poles (record pole number).
4. Finished Drawing (Formal Drawing or Plat)
- This drawing is usually prepared for the courtroom presentation and is based upon the information recorded in the rough sketch. Unlike the rough sketch, the formal drawing is drawn to scale and embodies all the fine points of accepted drafting techniques. The finished sketch can be as simple or complex as the need requires. Items pertaining to the investigation may be added to the drawing by means of transparent plastic overlays. (Do not draw evidence items on the drawing until admitted as evidence by court.) Different color inks may be used to attract attention to certain locations or items.

VI. DEATH SCENE SEARCH PATTERNS

The most important aspect of any search is organization...to ensure that a systematic, thorough search is accomplished. When any item of evidence is located, the search stops, the item is photographed, measured, location marked

on the sketch and the search continues.

VII. COLLECTION AND PRESERVATION OF EVIDENCE

A. Purpose:

The method and manner in which evidence is collected and preserved will in many instances determine the results of subsequent scientific examinations pertaining to that item of evidence. Extreme care should be taken to insure that each item is safeguarded from contamination and destruction. At the completion of the death scene examination there should be no doubt as to what the item is, where the item was located in the death scene, or from whom the item was collected. This information is essential to assure that the chain of custody has been maintained. Chapter IX, EVIDENCE MANAGEMENT, discusses issues pertaining to evidence collection and preservation.

An itemized list of all evidence collected at the scene should be kept by the scene investigator and shown on a sketch.

B. List of Collection and Preservation Equipment:

1. Evidence Receipts
2. Supply of paper bags in various sizes
3. Supply of plastic bags in various sizes
4. Various small containers such as vials, pill boxes and test tubes for the collection of trace evidence
5. Envelopes of different sizes
6. Tweezers, spoon, razor blades, knife, scissors, stapler, tape and string
7. Sterile gloves
8. Any other instrument that will enable the officer to retrieve, preserve and package evidence in order to prevent loss, contamination or destruction.

C. Death Scene Search Areas/Objects:

1. INDOOR

- Alcohol -- Bar/Containers/Glassware
- Appliances -- Entertainment/Food/Work/Other
- Ashtrays -- Condition/Content
- Basement
- Bathrooms -- Medicine Cabinets/Water Containers-Traps
- Bloodstains -- Liquid/Smears/Splatters/Spots
- Body Fluids -- Liquid/Stains
- Cleaning Equipment
- Clocks -- Time/Working
- Closets
- Containers -- Baskets/Bowls/Boxes
- Doors -- Condition/Open/Closed
- Drugs/Narcotics/Paraphenalia
- Firearms -- Weapon/Ammunition/Spent Bullets/Casings
- Fireplace -- Debris/Temperature
- Footwear -- Prints/Dragmarks
- Foreign Objects
- Furniture -- Disarray/Missing/Condition
- Garage -- Vehicles/Marks
- Heating Systems
- Kitchen -- State of Food/Liquids
- Laundry -- Soiled Articles
- Lighting -- Ambient/Switches
- Mail/Newspapers

- Pets
- Storage
- Telephones
- Weapons -- Other than Firearms
- Windows -- Condition/Open/Closed

2. OUT-OF-DOOR

- Animals -- Present/Traces
- Birds -- Activity
- Buildings -- Other than death scene/Exterior
- Drag Marks
- Drains
- Extraneous Material -- Objects/Debris/Trash
- Flora -- Snags/Damage
- Gardens -- Digging/Damage
- Insects -- Activity
- Neighbors
- Routes -- Alleys, Driveways, Paths, Roads, Sidewalks
- Soil
- Tracks -- Shoe/Tire (Marks & Impressions)
- Utilities -- Poles/Cables

D. Fingerprints:

1. The discovery of latent finger, palm and hand prints requires a high degree of imagination on the part of the investigator. Prints potentially critical to a death case may not be in view or in obvious places.
2. Any surface which could retain a print is a candidate for inspection. The investigator must consider plausible deeds performed by the victim,

criminal(s) or other relevant parties and then visualize the body and hand movements necessary to accomplish those deeds. Thus, if a document was burned in a fireplace, the investigator must consider all the actions necessary to accomplish that deed and to then inspect surfaces the hands might have touched, e.g., matchbox, fireplace screen handles, floor in front of fireplace, fireplace tools, mantel, damper handle, etc.

3. Every effort should be made to ascertain the normal location of all objects in the area of the death scene and to closely examine any object not in its normal place. This, normally, would require the cooperation of someone familiar with the setting.
4. Photographic coverage of fingerprints is especially useful if, by lifting the print, it would be destroyed or in cases where high contrast, visible prints are found. Photography also helps to orient the print in relationship to the scene.
5. Guidelines for the Search for Latent Prints.
 - a. Objects within the death scene area should not be touched or disturbed prior to being screened for latent prints.
 - b. The screening should be so organized as to allow earliest possible access to areas or objects requiring further investigation by other members of the death scene investigation team.
 - c. The fingerprints of all persons who have authorized access to the area of the death scene should be obtained as "Elimination Prints".
 - d. All lifted and visible prints must be accurately recorded as to location and orientation.

e. Visible prints (those found on or made with a substance requiring no further image enhancement) must be treated in a manner similar to any evidence object.

(1) The print must be protected.

(2) The entire object containing the print should be transported to the laboratory. If not the entire object, the effected surface should be so transported.

f. Each photograph should include a scale for comparative measurement.

E. Trace Evidence:

Materials that are small and therefore not obvious are categorized as trace evidence. Trace evidence, in addition to its obvious property of being identifiable, has the valuable characteristic of being easily transferred...by direct contact, static action, or air current. The literature is replete with trace evidence recovery techniques and the investigator should be thoroughly familiar with these collection methods. Following are examples of the most common forms of trace evidence:

1. Biological Fluids

a. General

(1) Collection Equipment must be adequate to collect and preserve liquid or dry evidence in a sterile manner.

(2) Biological fluids deteriorate rapidly. Therefore, rapid delivery to the laboratory is critical.

(3) Know the laboratory's capability to analyze body fluids and the specific effect of its analytical methods on your collection procedures.

(4) Recognize that body fluids change color with time and are dependent on the surface on which they are found.

(5) Photography and sketching should be completed before any effort is made to remove the biological fluid evidence. Field notes should augment the photos and sketch. The laboratory considers the above material to be vital to their analyses.

(6) The shapes, sizes, and patterns of body fluid (especially blood) give insight into human positions and activity or motion, as well as the velocity of the forces involved.

(7) Biological fluid evidence is not necessarily confined to the site of death. Hands may be washed or wiped, noses blown, surfaces scrubbed, clothing discarded.

b. Summary Collection Guidelines for Blood

(1) Dried bloodstains on small movable objects:

(a) Submit all objects (weapons, glass, wood) to the lab with stain intact.

(b) Label the object in such a manner that identifying marks do not interfere with the stain.

(c) Protect stain so that it is not rubbed off.

(d) Guard against contamination.

(e) Seal, label and transport as soon as possible (even though the blood is dried, it should not be exposed to extremes of heat since proteins in the blood deteriorate rapidly when heated).

(2) Bloodstains on large immovable objects:

- (a) Record the bloodstain by photography. Include a measuring device in the photo.
- (b) Note size, shape and location.
- (c) Any stain larger than 3mm in diameter should be slowly and carefully scraped or flaked off the object with a clean, sharp instrument, like a scalpel or knife. A clean paper tissue held in the palm of the hand shrouds the stain so that all scraped particles are captured. Once the stain is completely scraped onto the paper, carefully fold the paper to completely trap all particles of blood, then place the paper in a container (envelope), which will prevent the paper from unfolding.
- (d) Seal and label
NOTE: DO NOT scrape blood directly into envelopes and/or plastic boxes. Neither of these procedures prevent the loss of small particles from the so-called "sealed" edges.
- (e) Collect blood stains (wet or dry) smaller than 3mm in diameter with a swab or threads moistened with a drop of normal saline. When this method is used, a control swab from an unstained area adjacent to the stain must also be collected. The same technique can also be employed to collect larger stains on a porous surface such as concrete.

(3) Liquid Blood

Liquid blood can be collected with an eye dropper or a clean spoon and stored in glass vials. These whole blood samples should be refrigerated as soon as possible. The analyzing laboratory will instruct the investigator what, if any, preservative should be added to the whole blood sample prior to its submission.

c. Summary Collection Guidelines for Seminal Stains:

(1) Dried Semen

- (a) The stains may appear as an opaque gray-white substance, similar in appearance to dried starch.
- (b) Follow the collection guidelines cited for blood in paragraph E.1.b. above. Semen is just as susceptible to deterioration as blood and more fragile. Therefore, photograph the site of the stain and the stain itself.
- (c) In collecting seminal stains care must be taken to preserve any hair, fiber or other trace evidence which may be present. (In combination, trace materials and seminal stains strengthen the value of the evidence.)
- (d) Bedding (sheets, mattress covers, blankets, spreads) containing stains should be marked as to head and foot before removal from the bed.

(2) Liquid Semen (See Liquid Blood)

d. Other Biological Fluids

(1) Urine

The collection procedures for urine samples at a death scene

are similar to the collection procedures for previously discussed dry or liquid blood or semen.

(2) Remaining Body Fluids (saliva, sweat, tears, etc.)

They are rarely encountered by the death scene investigator. Yet, when the occasion arises to recover and preserve such fluids, few investigators are prepared to do a flawless job. Therefore:

- Determine the laboratory's capabilities to handle each such body fluid.
- Devise a collection kit and procedures for recovering these fluids that is compatible with the laboratory's analytic methods.
- LEARN to recognize the appearance of each fluid in all plausible environments.
- Respect the fragile nature of these forms of evidence and their rapid perishability: transfer them -- gently and urgently -- to the laboratory.

2. Fiber, Hair, Rope, String and Thread

a. Each of these items of physical evidence has different utility value but the basic guidelines for their collection and preservation are the same.

- (1) Because of the previously discussed characteristics of trace evidence, the search for individual items of hair, fiber, etc. must be accomplished early in the investigation.
- (2) Despite their seeming impervious nature, these small items are susceptible to contamination and thus must be packaged separately.

(3) Vacuuming to recover these samples from the floor and other surfaces must be scheduled as a concluding act in the death scene investigation. Vacuuming, by its very nature produces contamination. Accordingly, to hold contamination to a minimum and to aid in the analyses of what came from where, the vacuum filter and bags should be changed for each new area or object vacuumed.

b. Fiber sample recovery procedures include three steps:

- (1) The collection of individual fibers from clothing, etc. and non-fibrous surfaces.
- (2) The bulk collection of fibers via vacuuming of the death scene.
- (3) The selective collection of control samples of possible fiber sources, e.g., rugs, drapes, bedding, upholstery.

c. Hair is the most fragile of this class of samples. It can break easily and each hair is coated with a fine lubricant which must be preserved because it may contain airborne trace evidence.

d. Rope is not only useful as evidence because of its composition but also because of the characteristic of its end cut. Rope is also capable of trapping trace evidence via direct transfer or by air-borne means.

e. String should be treated in a manner similar to rope.

f. Thread has two basic sources: as a ravel from a cloth or as a length from a sewed item. Knowledge of the normal appearance of both will aid in the follow-up search for the source object or garment.

3. Rocks and Soil

- a. Rock particles and soil are another class of trace material that are valuable as comparative evidence. At a minimum, these types of evidence can be analyzed to determine if the samples were transported into the death scene area or if samples of the indigenous rocks and soil were transported out of the death scene. In some instances such evidence can be identified as to unique geographic areas of origin.
- b. Guidelines for the collection of rock particles and soil include the following:
 - (1) Search for unusual rock particles and soil on walking or riding surfaces.
 - (2) Inspect car fender wells, splashed areas, tire treads and passenger compartments for rocks and soil.
 - (3) Inspect clothing such as shoes, stockings and trouser cuffs for this type of evidence.
 - (4) Inspect all of the deceased's clothing and body for rock particles and soil.
 - (5) Obtain control samples of rock particles and soil indigenous to death scene area.
 - (6) If possible, bag the entire article containing the particles of rock and soil and transport to the laboratory.

4. Dust and Debris

- a. Dust is normally an airborne product. Its origin may be soil or it may be a composite of many other things; natural and man-made.

- b. Debris, as opposed to dust, is larger in size. It is the remains (usually scattered) of something broken or destroyed.
- c. In the investigation of a death scene, dust and debris should be treated in the same manner as rocks and soil -- with this added caution: prior disturbance of dust and debris may be more evident than the disturbance of rocks and soil.

F. Firearms:

1. Field Notes

The initial task in the processing of firearms found at a death scene is the preparation of written notes on any firearms found.

Examples of such notes include:

- a. Weapon location and orientation
- b. Make, model, caliber, serial numbers
- c. State of the safety and hammer (if weapon has one, i.e.: hammer-cocked/half cocked/down; safety-on/off)
- d. Exact location and orientation of each spent cartridge
- e. Live rounds; location (one in chamber?)

2. Weapon Location

The exact location of the weapon and related material should be recorded in all three modes: written notes; sketch; photograph.

3. Weapon Handling

In handling the weapon (to check the above details) care must be taken to preserve fingerprints or other evidence present (blood, tissue, trace elements or gunshot residue) and to avoid accidental discharge of the weapon.

- a. Weapons should be picked up at points where no useable finger-

prints will be found, i.e., at or on rough areas and edges.

- b. Carefully plan the handling of firearms to minimize the possibilities of destroying gunshot residue.
- c. Companion to the careful handling of the weapon is the need to safeguard the victims hands and any clothing in the vicinity of the hands (garment sleeves). Gunshot residue may be present -- as well as gunpowder burns. See Chapter Three BODY--AT THE SCENE for the safeguarding of the body at the death scene.

4. Damaged Weapons

Do not attempt to unload a damaged firearm. Carefully place the weapon in an evidence container and mark "LOADED FIREARM".

5. Other Evidence on Firearms

Examination for latent prints, blood or other substances should be accomplished at the laboratory.

6. Firearms Identification

An agency procedure should be established for marking weapons, ammunition, fired cartridge cases, and spent bullets in non-interfering places. The code should identify the department, the investigator, and where possible--the case in question.

7. Control Standards

Essential to answering the question, "How far away was the weapon from the point of impact?" is the need for live ammunition--to be subsequently fired in the laboratory so as to create a control standard by which to determine firing distances and for use in comparison with other spent bullets of unknown origin. Accordingly, the scene search guidelines must include provision for the search for live ammunition.

G. Tools and Tool Mark Evidence:

1. In the investigation of a death scene, the possibility of forced entry is always present. Such entry need not have been made in the immediate vicinity of the dead victim: it may occur at any place between the points of entry and exit. Tool marks may also be found on objects not necessarily associated with forced entry, e.g., the forceful striking of a surface with a hammer.
2. Guidelines for the collection of tools and tool mark evidence include:
 - a. Record, sketch and photograph all tools and tool mark impressions before placing I.D. markings thereon or moving the item to the laboratory.
 - b. If possible, send the entire object containing the tool mark impression to the laboratory. If not, send the affected section. If this is impossible, make a three dimensional cast of the tool mark.
 - c. Since tools and tool mark impressions may contain vital trace evidence, care must be taken to properly package the evidence against loss or contamination of the trace material.
 - d. Under no circumstances should an effort be made to fit a recovered tool with the discovered tool marks. That is a task only the laboratory should perform.

H. Questioned Documents:

1. The role of the physical scene investigator, as it pertains to documents, writing implements, or reproduction tools, is to detect suspicious items and to then record, mark, and package them in a manner discussed for other categories of evidence. The examination of

questioned documents is accomplished at the laboratory.

2. The death scene investigator should be especially alert for apparent suicide notes, document fragments, burned or discarded documents, or writing indented on another surface. Prior to removal of any fragile document a qualified document examiner should be advised of the situation.

I. Fatal Automobile Accidents:

The scene of an automobile accident is somewhat unique as a death scene and required special consideration in terms of physical evidence collection.

1. Since much of the physical evidence potentially pertinent to a fatal auto accident may be highly perishable, it is necessary to gather essential data rapidly, i.e., skid marks will erode once traffic movement commences, etc.
2. Sketches should be made and photographs taken, as soon as possible, of: body locations, skidmarks, debris, the surrounding site, obstructions to view, detailed close-ups of damage, liquid trails or pools, vehicle exterior (from all possible angles), headlights and lenses.
3. Measurements are critical to the reconstruction of the events leading to the accident and the events following the moment of impact. As noted earlier, such measurements should be accomplished with a calibrated measuring device or tape and all measurements should be verified as to direction and distance.
4. As in other death scenes, all other forms of physical evidence should be sought, e.g., alcohol, drugs, weapons, finger prints, trace evidence, etc.
5. The accident may, in fact, be a cover-up for another crime. Department

Guidelines should accommodate this possibility.

J. Fire and Explosion:

As with fatal automobile accidents, the investigation of fatal fires and explosions can involve some unique physical evidence collection problems.

1. The primary concern in the initiation of an investigation of a fire or explosion is to determine the origin of the fire or explosion.
2. Collect samples of accelerants or combustible materials which appear to have been used to initiate and prolong the fire, and to move the fire from one area to another.
3. Initiation devices such as timers, candles, etc. should be carefully recorded as to location, photographed and transported to the laboratory for analysis.
4. All containers found in the debris or in the vicinity of the scene should be preserved for laboratory analysis as possible carriers of ignition, accelerant or explosives.
5. Since the majority of fires and explosions are accidental, normal causes must be sought, e.g., furnace, stove, fireplace, heater, appliances, open fire out-of-doors, gas leaks, electrical wiring, etc.

VIII. THE TEAM APPROACH TO DEATH INVESTIGATION

It should be evident from reading this chapter that the first activity in a death investigation--the physical scene search--is as critical to a successful case closing as any other activity in the process. Medical examiners and coroners rely heavily on the evidence and information produced by death scene searches in their determination of the manner and cause of death.

It should be equally evident that a properly trained and rehearsed team is essential to thorough, accurate death investigations.

The team includes: the first patrolman at the scene...the site investigator...the support elements...the criminalists...the medical examiner personnel...the toxicologists...and the many supporting forensic scientists.

APPENDIX
II - A
PHYSICAL SCENE INVESTIGATION
GUIDELINE CHECKLIST

Guideline Checklist

VICTIM NAME _____ CASE # _____
LOCATION (occurrence) _____ CASE # _____
EXAMINER _____ DATE/TIME (other agencies) _____

PHYSICAL SCENE INVESTIGATION

These guidelines are presented in logical sequence for the investigation of a Medicolegal Death Scene. The individual check list items are structured in conformation with normal department policy -- recognizing that contingencies present in any particular death scene case may require compliance with other established rules and regulations not reflected here.

Do not alter the position of the victim or crime scene evidence until after documentation, measurements, fingerprinting and photographing are complete.

1. ARRIVAL AT DEATH SCENE

- ___ a. Jurisdiction/Responsibility Established
- ___ b. General Death Mode/Recorded
- ___ c. Added Investigation Equipment Requested (as needed)
- ___ d. Arrival Date/Time Recorded
- ___ e. Vehicles/People in Area Identified
- ___ f. Unusual Conditions Noted
- ___ g. Weather/Temperature/Lighting Recorded (first of several such)
 - ___ Outside
 - ___ Inside (if applicable)
- ___ h. Odors Present
- ___ i. Photographic/Video Documentation of Death Scene - Panoramas
(not detailed)

2. CARE OF INJURED

- ___ a. First Aid Rendered
- ___ b. Injured: Names/Circumstances Recorded
- ___ c. Emergency Equipment Called

3. DEATH SCENE PROTECTION/CONTROL

- ___ a. Witnesses/Suspects/Persons in Area Identified
- ___ b. Above Persons Segregated/Held for Questioning
- ___ c. Authorized Persons/Function in Area Notified, Recorded
- ___ d. Cordon: Death Scene Perimeter Accomplished
- ___ e. Death Scene Actions, Prior to Your Arrival, Recorded
- ___ f. Chain of Evidence Control Log Opened
- ___ g. Perpetrator Entry/Exit Path(s) Estimated
- ___ h. Entry/Exit, Walkway Control/Log Established
- ___ i. Death Description Made
- ___ j. Victim(s) Identification Recorded
- ___ k. Accurate Map Location of Death Scene Calculated

4. SUPPORT REQUIREMENTS

- ___ a. Law Enforcement (Security - Investigative)
- ___ b. Fire Department
- ___ c. Medical Examiner/Coroner Office
- ___ d. Other

5. DEATH SCENE SEARCH - DOCUMENTATION

Critical to any death investigation is the manner in which the investigation is documented. The conduct of a death scene search can NEVER be over documented.

Five means of documentation are recommended:

- Field Notes

- Photographs (Still Shots)
- Sketches
- Audio Tapes
- Video Tapes

Although specific documentation guidelines are included in subsequent sections, the following are considered basic to good record keeping.

a. FIELD NOTES

- All notes recorded chronologically.
- Cross reference notes to other means of documentation.
- Correct Field Notes prior to leaving death scene.

b. PHOTOGRAPHS

- For each photo record photographer's name, date and time of picture take, description of object photographed, film type and speed, and camera setting.
- Cross reference photographs with other means of documentation.

c. SKETCHES

- Rough sketch (not to scale) all areas to be included in sketch coverage (cross reference with item 1.i., above.)
- Designate North on each sketch and show reference points.
- All measurements must be made with tapes or other calibrated measuring devices.
- Have all measurements verified by a second person.
- Keep sketches uncluttered - use legends and margin notes.
- Make all sketch corrections at the Death Scene.
- Cross reference sketches with other documentation means.

d. TAPE RECORDERS

- Pre-label all tape cassettes with Tape 1, Side A & Side B, Tape 2, etc.
- Punch out the tab on the back of each tape cassette to prevent erasing of recorded information.
- If possible, use a tape carrier which frees the hands for other essential activity.
- For each recorded entry, turn on the mike (and leave it on) - note the date and time - give a key word or phrase to describe the information to follow - record the information - turn the mike off.

e. VIDEO TAPES

- Pre-label tape cassettes.
- Safeguard against erasure or tape-over.
- If the camera does not have a built-in microphone system - cross reference each camera shot with other documentation means.
- Use video camera initially for a complete overview of the death scene as defined by the established perimeter.
- Use video to record position and orientation of victim and objects in immediate vicinity.

6. DEATH SCENE SEARCH - INITIAL TASKS

- a. Search Pattern Organization Established
- b. Record Search Accomplished Prior to Your Involvement - By Whom.
- c. Reference points for all documentation means established.
- d. Objects missing or in disarray - foreign objects present listed.
- e. Victim/Suspect/Witness - Demographics - Photographs - Disposition Recorded.

7. FINGERPRINTS

DO NOT TOUCH OR MOVE any object before checking for latent prints or for visible impressions.

- a. Documentation (Who-What-When-Where Completed).
- b. Objects or Surfaces - Prints Lifted.
- c. Objects or Surfaces - Prints Photographed.
- d. Objects or Surfaces - Prints Cast.
- e. Visible Impressions - Preserved/Detached/Transported to Lab.
- f. Evidence Numbers Cross Referenced.

8. BIOLOGICAL FLUIDS

- a. Complete Documentation Made Before Moving/Removing Biological Fluid Evidence.
- b. Rapid Processing at Scene/Priority Transportation to Lab Accomplished.
- c. Shape, sizes and patterns of body fluid documented.
- d. Safeguards exercised against contamination of body fluid evidence.
- e. Clothing, bedding, etc. properly marked and oriented (right - left, head - foot, outer - inner).
- f. Trace evidence associated with the body fluid identified, documented, and safeguarded (hair, fiber, etc.).
- g. Laboratory contacted as to recovery procedure for body fluids other than blood, semen, urine.
- h. Times recorded as to body fluid discovery and dispatched to the laboratory.

9. FIBERS, HAIR, ROPE, STRING, THREAD

- a. Search for these items early in the investigation.
- b. Each finding separately packaged.

- c. Control samples collected

- d. Vacuuming accomplished last...separate filter and bag for each area (room) vacuumed.

10. ROCKS/SOIL/DUST/DEBRIS

- a. All imaginable surfaces checked (drive, sidewalk, floors, shoes, tires, fender wells, splashed areas).
- b. Disturbance patterns, checked for.
- c. Control samples collected and documented.

11. FIREARMS

- a. Weapon(s) location and orientation documented (notes, sketches, photographs).
- b. Weapon characteristics recorded.
- c. State of hammer and safety.
- d. Live rounds documented (in chamber, in box, loose, location).
- e. Spent cartridges documented (location, orientation).
- f. Spent bullets, bullet holes identified and documented.
- g. Firearms material safeguarded to protect and preserve other evidence (fingerprints, blood, tissue, trace elements and gunshot residue).
- h. Damaged weapons safeguarded and so labeled.
- i. Firearms evidence code marked.
- j. Live ammunition packaged and designated for control standard use.

12. TOOLS & TOOLMARKS

Do not attempt to fit a recovered tool with a discovered tool mark. That is a task for the laboratory to perform.

- a. As with firearms, document the location of all tools and toolmark impressions (notes, sketches, pictorially).
- b. Code mark all recovered tools.

- c. Tools and toolmark impressions packaged to preserve any trace evidence.

13. QUESTIONED DOCUMENTS

Prior to movement of any questioned document evidence, a qualified laboratory person should be called.

- a. Search for apparent suicide notes, document fragments, burned documents, writing identification completed.
- b. Laboratory contacted about any questioned documents found.

14. FATAL AUTOMOBILE ACCIDENT

- a. Fatal accident scene perimeter extending along route beyond estimated start of deceleration established.
- b. Pictorial panoramic coverage of the automobile death site completed.
- c. Measurements taken and verified.
- d. Sketches and photographs include skidmarks, debris, obstructions (barriers & view), liquid pools and trails, damage (exterior & interior) headlights, lenses.
- e. Calibration of measuring device recorded before and after use.
- f. All other forms of pertinent physical evidence processed.

15. FIRE & EXPLOSION

- a. Documentation complete (location of fire or explosion, possible places of origin, routes of movement, and materials used).
- b. Samples collected (accelerants, combustible materials, explosives).
- c. Devices packaged (initiators, timers, candles, primacord).
- d. All containers safeguarded for laboratory inspection.
- e. All fireplaces and appliances checked.
- f. Electrical system and appliances checked.
- g. All fuel systems checked (gas, oil, coal, wood, paper).

16. FINAL DEATH SCENE ACTIONS

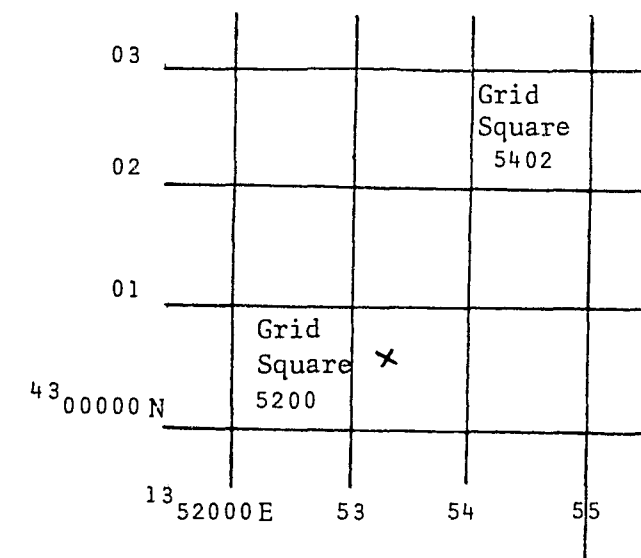
- a. Coordination complete with all officials/agencies on the scene (fire, ambulance, added law enforcement, medical examiner personnel, laboratory personnel)- names, titles & telephone numbers obtained.
- b. Death scene sketches corrected prior to leaving area.
- c. Provision made for witnesses, suspects, and others to be questioned/contacted/etc.
- d. Permission granted to shut down death scene, turn it over to someone or leave the scene.
- e. All evidence safeguarded/preserved/packaged and transported to the laboratory or turned over to qualified authorized persons. Double-check chain of custody log.
- f. All death scene investigation gear accounted for.

APPENDIX
II - B
UNIVERSAL TRANSVERSE MERCATOR
MAP LOCATION SYSTEM

UNIVERSAL TRANSVERSE MERCATOR

The Universal Transverse Mercator (UTM) map system is a worldwide military grid system which can be used to locate points in your city, county or state to within 10 meters (11 yards).

UTM grids consist of two sets of parallel lines, each set intersecting the other at right angles. Each grid square produced by these intersections is of the same size and shape as shown on Figure 1.



Colorado Springs, Colorado GRID

Fig. 1.

Under the UTM system all locations are read from LEFT to RIGHT AND then UP. Therefore, on Figure 1 the grid square in the lower left portion of the Colorado Springs map would be called Grid Square 52 (From Left to Right) 00 (Up) or 5200. The grid square in the upper right corner of Figure 1 would be referred to as 5402...54 (From Left to Right) and 02 (Up).

Assume that a death scene is located or a skeleton is found at the X mark on Figure 1. The exact coordinates for the location would be determined as follows.

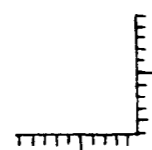
1. Identify the Grid Square in which the X is located:

- a. From Left to Right.....53
- b. UP.....00
- c. Grid Square.....5300

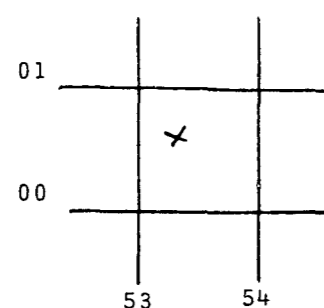
(On maps available to most cities and counties the above Grid identification would locate the death scene within a 1,000 meter square.)

2. Determine more precisely where in Grid Square 5300 the Death Scene is located.

- a. Make a coordinate scale that divides the grid square in tenths.



- b. Place the scale on the 5300 grid



- c. Read LEFT to RIGHT.....533

Read UP.....006

- d. The coordinates of the death scene are 533006.

(On maps available to most cities and counties the above coordinates would locate the death scene within 20 meters or 22 yards. By interpreting between the lines the location could be pinpointed to within 11 yards.)

Details concerning the UTM system can be obtained from the U.S. Army Map Service or from the National Oceanic and Atmospheric Administration, U.S. Geological Survey, or a National Cartographic Information Center.

CHAPTER THREE
BODY AT THE SCENE

CHAPTER THREE

BODY AT THE SCENE

KEYWORDS

Cause of Death...Coroner...Decomposition...Livor Mortis...Manner of Death...
Medical Examiner...Postmortem...Rigor Mortis...Temperature

I. RESPONSIBILITY AT THE DEATH SCENE

The Medical Examiner or Coroner normally has the legal authority to take charge of the body at a death scene and is responsible for determining the CAUSE and the MANNER of any death which is the result of violence, suspicious or unexplained circumstances or a death which is sudden, unexpected or unattended.

In many jurisdictions, the deceased's body is the responsibility of the Medical Examiner/Coroner and the death scene is the responsibility of the law enforcement agency. The law varies from state to state regarding these distinct powers. It is, therefore, imperative that the Medical Examiner/Coroner investigator be knowledgeable of the statutes in his jurisdiction. A common pitfall for the new investigator is to arrive at a death scene and be unsure as to what he legally can or cannot do regarding the body and the evidence relative to the death. This situation can be avoided if the investigator is familiar with the statutes and regulations governing his organization.

Cooperation between the Medical Examiner/Coroner representative and other members of the Death Investigation Team (such as members of the law enforcement agencies) is critical to the conduct of thorough, timely, competent, scientific death inquiries. (See Chapter II for coverage of the Physical Evidence at a Death Scene). In this regard, team cooperation is the only logical way in which to reduce duplicative investigation efforts by the individual team members (each representing a different authority, e.g., police and medical examiner).

II. INITIAL DEATH NOTIFICATION

The Medical Examiner/Coroner investigation normally will begin upon notification of a death from a member of a law enforcement agency. The date, time, and notifying person should be recorded. The investigator should attempt to determine what "type" of death inquiry he will be performing: for example-- gunshot wound death, hanging, drowning, motor vehicle fatality, etc. By obtaining this information immediately upon notification, the investigator can begin to plan his investigative workup prior to arrival at the death scene.

III. RESPONSE TO THE DEATH SCENE

Arrival at the scene should be accomplished as soon as possible without sacrificing the public's safety. Note the time of arrival and specify the names of investigators already at the scene. Determine if any emergency medical aid has been attempted by fire department, police or emergency medical personnel. If such aid was given, specify the procedures performed and any medications, oxygen or fluids that were given to the victim. Note the names and agencies involved with these resuscitative efforts.

IV. LOCATION WHERE BODY IS FOUND

Exact geographic location of the death scene is essential and should be documented -- as should the description of the exact location of the body.

Instructions for using the Universal Transverse Mercator (UTM) Grid are included in Chapter II, Appendix II-B. Measurements of the body in a sketch are most useful in most death scenes. Directional annotations as to the body locations, such as "head north, feet south" are also useful. See Chapter VII, PHYSICAL ANTHROPOLOGY, for information regarding burying human remains.

The scene environment affects the body's postmortem (after death) changes. It is important to document the TEMPERATURE, AMOUNT OF MOISTURE, AIR MOVEMENT and LIGHTING in the area where the body is found.

The type of surface upon which the victim is resting will affect the amount of body heat loss. Therefore, specify the surface type - frozen ground, concrete, wool carpet or stagnant warm water, for example.

In those investigations where the location and/or environment plays a major role in the death, such as lightning, cold (exposure), heat stroke, or a work-related death; make a very detailed report of the scene location. Example: If an elderly person is found dead in a snowbank, describe such items as the present environmental temperature, recent precipitation, depth of snow cover, lowest environmental temperature recorded in past 24 hours, and wind-chill factor.

V. DESCRIBE THE VICTIM

Eventually, the body should be fully described. Of the following, some items will not be ascertained at the death scene and are included on Demographic Reports filled out at the Medical Examiner/Coroner facilities.

- (a) sex
- (b) race, complexion
- (c) approximate age - date of birth, if known
- (d) height, note if estimate or measured
- (e) weight, note if estimate or weighed

- (f) hair color and length
- (g) eye color
- (h) clothing
- (i) tattoos/scars
- (j) jewelry and valuables
- (k) state of nutrition, dental care, cleanliness

A. Victim's Clothing:

Describe the color, fabric type and location of each piece of clothing the deceased is wearing. Be sure to specify if any piece of clothing is NOT in place. Example: The victim's blue short-sleeve cotton blouse was torn from the left lapel area downward to the front hem. The 5 buttons on the blouse were missing. She was not wearing a bra or underpants.

Note if the clothing is wet, moist or dry. Specify if there are any stains (blood, for example) found on any items of clothing. Describe any holes, cuts or tears in the clothing. Also note if there appear to be any discolorations (e.g. powder residue) about the clothing. Do not, repeat DO NOT remove, handle or attempt to cleanse or brush any of the victim's clothing. The clothing will be released to the crime laboratory personnel by the Medical Examiner/Coroner representative at the conclusion of the postmortem examination.

B. Victim's Jewelry & Valuables:

Describe all jewelry and valuables found on the body. Jewelry and valuables are helpful in identifying the victim and they are also important to the victim's family. The personal property should be kept with the body when it is sent to the morgue so that it can be available, if required, for identification purposes.

If any property is given to the family or taken from the body prior to

arrival in the morgue, note the time, date and articles removed and to whom they were given: to include complete information on and relationship of the recipient to the victim.

The agency's policy will dictate the procedures for handling this type of property.

C. Postmortem Changes:

After death, the body will begin to deteriorate due to the cessation of bodily functions. Postmortem changes vary depending upon many factors, such as temperature, humidity, and air movement over the body.

Postmortem body changes begin immediately after death, but often are not perceivable for several hours. The principle, observable postmortem body changes include body temperature, stiffness (rigor mortis), settling of the blood (livor mortis or lividity), and breaking down of the body's tissues (decomposition).

D. Body Temperature:

The rate of body cooling is influenced by such factors as the initial body temperature at the time of death, the environmental temperature, clothing, humidity, air movement, and premortem activity.

However, there is a general rule that can be used for estimating the time of death: the body temperature will remain constant for the first (1st) hour following death if there is no severe body/environmental temperature difference. After the first hour, the body will lose heat at a rate of approximately 1 to 1½ degrees F./hour until the body temperature reaches the environmental temperature. If the body has been in a cooler environment and then moved to a warmer one, this rate does not apply.

Body temperature can be determined by use of scientific equipment such as a thermometer or telethermometer. If no equipment is available by which to

determine the temperature of the body, a temperature estimate must still be made. This can be done by the investigator touching an uncovered part of the body and determining if the body is "HOT", "WARM", "COOL", or "COLD" to his touch. Specify the time and body location where this evaluation was made.

At least two body temperature determinations should be made. It is preferable to make them at least one hour apart, so that the rate of body cooling might be ascertained.

Indicate the body temperature in all death scene investigations, even if the death is witnessed. This will help verify statements of witnesses. Example: A mother states that she heard her newborn cry two hours ago and now finds the child dead in its crib. If the child is in a warm house and its body is very cool or cold to the touch, there is a discrepancy between the mother's recall and the physical body changes of the infant.

E. Rigor Mortis:

Rigor mortis is a postmortem change that causes the muscles of the body to stiffen. An enzyme is released into all muscle tissue at the time of death and this causes the muscle tissue to "congeal" or stiffen. Rigor mortis is visually apparent sooner in the small muscle masses (e.g. thigh, buttock). The process is detectable in 2-4 hours, fully developed in 12 hours, and disappears in 24-48 hours. This process can be influenced by the victim's nutritional state, muscular condition, pre-existing medical problems, activity prior to death and environmental conditions.

Assess the state of rigor mortis, and classify it as follows:

- (0) Not present
- (1+) Slight - just beginning in an extremity, slight resistance to movement
- (2+) Moderate - extremity moves with some difficulty

(3+) Severe - extremity is hard to move

(4+) Complete or Full - rigor is well established; extremity will
NOT move

Specify the site and time that the above assessment was made. It is preferable to determine the body temperature, and state of rigor mortis and livor mortis at the same time. In this way, all three variables are available to help determine the approximate time of death.

F. Livor Mortis:

Livor mortis (lividity) is a postmortem change that occurs when the blood settles in the capillaries, and a purplish discoloration appears on the dependent parts of the body. This change is perceptible in about 2 hours, well developed in 4 hours, and fixed after 8-12 hours.

Describe the color and location of the victim's lividity. To determine if the livor mortis is fixed, apply moderate finger pressure to the lividity. If the area whitens after the pressure is released, it is "blanching" and therefore not yet fixed. If after the pressure is released no color change is noted, the lividity is "unblanching": the livor is fixed.

Livor mortis is usually purple in color. If the lividity is cherry red in color this may indicate a carbon monoxide inhalation. If the color of the livor is pink, cold (hypothermia), or cyanide may have played a role in the death process.

If a purple lividity pattern is apparent, but not found in dependent body parts; this may suggest movement of body after death.

G. Decomposition:

Decomposition is the breaking down of body tissues after the cessation of body functions. External decomposition changes include putrefaction, mummification and adipocere.

Putrefaction is caused by bacterial activity digesting the body tissues, giving the tissues a fluid-like consistency and producing a foul smelling gas as a result of the digestion. Mummification is the process whereby the body shrivels and becomes parchment-like due to exposure to dry atmospheres. Adipocere is a wax-like, foul smelling substance that covers a body when it is exposed to water or a cool moist soil.

Decomposition is affected by the scene temperature, humidity, and time lapse between death and the body's discovery. A decomposed body may appear bloated or swollen, the skin may darken and the blood vessels may appear very prominently as "road maps" (marbling).

Insects may accumulate on the body, especially in the mouth, nose, ears, eyes, anus and vaginal area. The age of the insects (which can be determined by a forensic entomologist) can aid in the estimation of the time of death. If time of death is an important factor in the investigation, the investigator should collect a sample (30-50) of the largest and the smallest insects, and place them in a container filled with 70% isopropyl alcohol. The investigator should note the site from which the specimens were obtained, the date and time of collection, a description of the area where the body was found and the scene temperature. The assistance of forensic entomologist may be desired when the body is subjected to a detailed examination. One can usually be located at the Department of Biology at a state university.

H. Victim's Injuries:

Without removing or tampering with the clothing, note and record all injuries, unnatural appearing marks or impressions seen on the body. The

organization's Standard Operating Procedure (SOP) should be followed regarding the actualization (viewing) process and injury description. Special attention should be given to any evidence of defense wounds or trace evidence particles about the hands and forearms. Preserve all trace evidence by placing the area involved in a clean, paper container.

Heat, animals, insects and mechanical activity can produce marks on the body after death that may appear to be injuries related to the death, but are not. In watery death scenes, the victim can sustain postmortem injuries from marine life and boats, for instance. These marks are known as "post mortem artifacts."

Blood patterns found on or near the deceased should be photographed with a measuring device in each picture. The flow pattern should be consistent with positional gravity. If there is a discrepancy, this should be noted and investigated further.

The size of any pool of fluid (e.g. blood) near the body should be measured and its color and degree of wetness noted. For example - "A large pool of wet, bright red appearing substance, measuring 18" by 14" was seen under the victim's head."

Any objects or substances that may have caused or contributed to the victim's death should be noted and secured for laboratory analysis. These might include alcoholic beverage containers, medicine bottles or weapons. Any "messages" found at the death scene should also be preserved.

VI. ESTIMATION OF TIME OF DEATH

Often a family member or law enforcement official will request an approximate time of death. This is difficult to determine from just the physical changes in the body. However, the following information will assist in deter-

mining a closer approximation.

- (1) When was the individual last seen alive?
- (2) What was the individual wearing at that time? Is it the same clothing that the subject is wearing now?
- (3) Is the clothing consistent with the activity of individual?
Example: The person was found dead on the bank parking lot dressed in a red negligee.
- (4) When last seen, did the individual have any medical complaints?
- (5) Environment where subject is found:
 - (a) Indoors - Were lights/TV/radio on? Was the furnace/air conditioner operating? What was the date of the most recent newspaper found inside? If mail was found in the mailbox, what was the date of the last postmark? Was the dwelling secure? Were there any signs of forced entry?
 - (b) Outdoors - Determine the temperatures and precipitation (highs and lows) for the time period between the last time the subject was seen alive and the body's discovery. Contact local U.S. Weather Bureau for monthly weather summary reports. U.S. Coast Guard can give tide reports.

VII. TRANSPORTING THE VICTIM FROM THE DEATH SCENE TO THE MORGUE

Prior to movement of the victim to the morgue, it is essential to complete all scene photographs that include the body. This record will help eliminate the possibility of a morgue transportation-related injury being misconstrued as an injury that was present at the death scene.

Because trace evidence is often present on the victim's body, the victim's hands and feet should be placed in clean paper bags, secured with tape. This

will provide a safety check for any evidence that may have been on/in the hands/fingernails or feet but falls off during transport. Encasement of the body in a clean white sheet helps insure preservation of trace evidence. This is particularly useful in pedestrian and other violent deaths.

The subject should be taken to the morgue by a livery service whose personnel have been trained in such conveyance and are trustworthy. Explain to them any special handling instructions. Example: "Because of the fragile nature of the massive head wound, the head has been placed in a clean white pillow case to prevent any skull fragments from being lost in transit. Be very gentle with head when moving the body."

Also instruct the livery service personnel to notify you immediately if any problem develops in transit. Make special note if a postmortem injury might have occurred due to a mishap in the livery vehicle, for example: it was involved in a two vehicle collision enroute to the morgue.

VIII. PRONOUNCEMENT OF DEATH

The jurisdiction's statutes determine who can pronounce the victim dead. Follow your office's Standard Operating Procedure in this regard. State in your report who made the pronouncement, when and where it was made.

IX. ESTABLISHING VICTIM'S IDENTIFICATION

The victim's identification should be established by at least two different procedures. For example: the state driver's license found in the subject's pocket corresponded with the subject's physical features and, subsequently, the family identified the subject.

Identification can be established by comparison of dental and skeletal x-rays, fingerprints, visually, by scars and tattoos, by jewelry, valuables, personal papers, clothing and body uniqueness (spinal cord defect, surgical repair of organ).

A family should not be notified until the identification is firmly established. If there is any question regarding the victim's identification, the matter should be resolved before the notification. Never release information regarding the subject's identity to the news media until the identification has been established and the family notified.

Fully describe the identification process in your report. State how, when, and where the identification was established.

In some instances, it may be necessary to notify the news media that the body of an unknown person has been found dead. They may be able to assist in the identification process by informing the public that there is an unknown individual in the morgue. This should only be done when all other possible sources of identification have been exhausted.

After identification has been determined, a full description pedigree of the victim should be developed. This should include his sex, race, date of birth, residence, marital status, next of kin, employer and occupation.

X. NOTIFICATION OF NEXT OF KIN

The legal hierarchy of next-of-kin relationship is:

- (1) Spouse
- (2) Child of legal age
- (3) Parent
- (4) Brother or sister
- (5) Other relative
- (6) Friend

The highest applicable order in this hierarchy should be notified.

Notification of next-of-kin should be made as soon as possible after the identification has been firmly established by either the Medical Examiner/Coroner office, medical or law enforcement personnel.

The investigator should allow sufficient time for family members to be notified BEFORE releasing the victim's name to the news media.

The date, time of notification, and name and relationship of the next of kin should be indicated in your report.

In some situations, after the death investigation has been completed, the Medical Examiner/Coroner representative may decide that there is no evidence of foul play or injury. Following the jurisdiction's standard operating procedure, on occasion, the decedent may be released directly from the scene to the mortuary of the family's choice.

APPENDIX III - A

BASIC MEDICAL EXAMINER
DEATH SCENE INVESTIGATION

GUIDELINE CHECKLIST

Guideline Checklist

VICTIM NAME _____ CASE # _____
LOCATION (occurrence) _____ CASE # _____
EXAMINER _____ UTM COORDINATES _____ DATE/TIME (other agencies)
OF REPORT _____

BASIC MEDICAL EXAMINER DEATH SCENE INVESTIGATION GUIDELINE CHECKLIST

This guideline checklist covers only the basic, common responsibilities of the Medical Examiner/Coroner investigator at the death scene. It MUST be used with the appropriate checklist(s) for the specific type of death under investigation.

I. REFERRAL

- a. Date/Time
- b. Reporting Person/Agency
- c. Type Death
- d. Body Location
- e. Elapsed Time Between Notification of Death & this Report

2. ARRIVAL AT SCENE

- a. Date/Time
- b. Other Agencies Present/Names & I.D./Arrival Time
- c. Collaboration on Investigation
- d. Emergency Aid Given/By Whom/Procedure Used/Medication Given

3. DECEASED FOUND

- a. Date/Time
- b. By Whom/Agency or Relationship to Deceased

4. PRONOUNCED DEAD

- a. Date/Time/Where
- b. By Whom/Agency
- c. Authority

5. DEATH SCENE

- a. Location (UTM Coordinates)
- b. General Description
- c. Weather Conditions At & Since Time of Death
- d. Detailed Description of Site Where Body Found
- e. Scene Documentation/Notes/Sketches/Pictorial Coverage
- f. Surface on Which Body is Lying

6. DECEASED DESCRIPTION

- a. Basic Description
 - 1) Sex
 - 2) Age
 - 3) Race
- b. Ancestry
- c. Clothing/Condition/Placement/Defects
- d. Jewelry or Other Valuables on Body
- e. Estimation of Time of Death:
 - 1) Date/Time of Body Temperature at Scene (at least two readings, one hour apart)
 - 2) Rigor & Livor Mortis: Date/Time and Evaluation
 - 3) When Last Seen Alive
 - 4) Date/Time Evidence (Newspapers/Lights On/etc.)
- f. Decomposition State/Entomological Specimens Collected
- g. Injuries (especially defensive-type wounds on hands & arms)
- h. Last Seen Alive/Physical & Mental State/Clothing/Activity/Reported by Whom

7. PHYSICAL EVIDENCE PRESENT

- a. Chapter II Physical Evidence Guideline Checklist
- b. Coordinate with Laboratory and Law Enforcement Agency Death Scene Investigators

8. IDENTIFICATION

- a. Method of Identification
- b. By Whom
- c. When/Where
- d. Second or Back-Up Identification
 - 1) Method
 - 2) By Whom
 - 3) When/Where

9. TRANSPORT BODY TO MORGUE

- a. Protect & Preserve Trace Evidence on Body
- b. Assess Area Beneath Body
- c. Safeguard Against Further Trauma During Movement to Morgue

10. ACTION AT MEDICAL EXAMINER'S OFFICE/MORGUE

- a. Continue Identification/Conformation
- b. Notify Next of Kin (According to Procedure)
- c. Arrange Pathologist/Toxicologist Conference
- d. Arrange for Ancillary Tests/Sevrices/Analyses
- e. Consult with Counterparts on Death Investigation Team
- f. Prepare Necessary Reports

See following guidelines - checklist for representative types of death.

ADDED GUIDELINE CHECKLISTS* FOR REPRESENTATIVE DEATH CASES

(Not all conceivable types of deaths are covered in this appendix. Included are the more common types of deaths, especially those with unique characteristics. It is intended that portions of these checklists can be used in combination for the investigation of types of death not covered here.)

- Burns
- Carbon Monoxide
- Child Abuse/Neglect (Suspected)
- Drowning
- Drug Overdose
- Electrical
- Fall
- Gunshot
- Hanging
- Job Related
- Pedestrian
- Peri-operative & Therapeutic
- Poison
- SIDS
- Stabbing & Cutting
- Vehicular
- Apparent Natural Death
- Apparent Suicide
- Apparent Violent Death
- Alcohol Related
- Illicit Drug Related
- Sex Related

*To be used in conjunction with the "Basic Medical Examiner Death Scene Investigation Guidelines - Checklists."

Guideline Checklist

VICTIM NAME _____ CASE # _____
LOCATION (occurrence) _____ CASE # _____
EXAMINER _____ DATE/TIME (other agencies) _____

BURNS & FIRE

(For checklist items 1-10 see "Basic Medical Examiner Death Scene Investigation.")

11. STRUCTURE/OUT OF DOORS
 - a. Type (Use)
 - b. Construction/Composition
12. TYPE FIRE (Wood - Gas - Electrical - Grass)
13. CAUSE OF FIRE (Arson?)
14. FIRE LOCATION(S) Start/Extent
15. TIME FIRE STARTED
16. DEATH SCENE:
 - a. Exit(s) Available/Status
 - b. Proximity of Fire to Victim
 - c. Items found at Death Scene (Tabacco-Alcohol-Drugs, etc.)
 - d. Proximity of Items to Victim
 - e. Evidence of Fire used to cover another crime/suicide
17. VICTIM:
 - a. Apparent Physical Condition (Healthy/Disabled/Infirm)
 - b. Clothing Condition (Intact/Consumed, etc.)
 - c. Habits (Smoker/Drinker/Drugs or Narcotics/Amount)
 - d. Prescription Medications/For What/M.D. and Pharmacy
 - e. Status when Discovered (Alive/Dead/DOA/Died ___ hrs. later)
18. UNUSUAL CIRCUMSTANCES

Guideline Checklist

VICTIM NAME _____ CASE # _____
LOCATION (occurrence) _____ CASE # _____
EXAMINER _____ DATE/TIME (other agencies) _____

CARBON MONOXIDE

(For checklist items 1-10 see "Basic Medical Examiner Death Scene Investigation.")

11. GENERAL SCENE
 - a. Description (Garage, Residence, Factory, etc.)
 - b. Condition
12. SPECIFIC SCENE
 - a. Auto
 - Location
 - Ignition (on or off)
 - Gas Tank (how full)
 - Auto Battery (dead or operational)
 - Victim(s) location(s) in respect to auto
 - Other Victims (animals/birds/insects/etc.)
 - Auto Doors & Windows (locked/closed)
 - Hose or other Apparatus/Location/Description
 - Others Ill
 - b. Residence
 - Doors & Windows (locked/closed)
 - Heating/Cooling System (air circulating/water/other)
 - Garage (attached to residence/detached)
 - Other Possible CO sources

- Victim(s) Location(s)
- Other Victims (animals/birds/insects/etc.)
- Others Ill
- c. Factory
 - Doors & Windows (if appropriate)
 - Vat or Pit (description/condition)
 - Escape Devices (ladders, etc./location)
 - Possible CO Sources
 - Victim(s)' Location(s)
 - Other Victims (animal/etc.)
 - Others Ill
- d. Other Specific Sites
- 13. VICTIM(S)
 - a. Clothing (Type/Condition)
 - b. Trauma
- 14. SUICIDE NOTE

Guideline Checklist

VICTIM NAME _____ CASE # _____
 LOCATION (occurrence) _____ CASE # _____
 EXAMINER _____ DATE/TIME (other agencies) _____

CHILD ABUSE OR PHYSICAL NEGLECT (SUSPECTED)

(For checklist items 1-10 see "Basic Medical Examiner Death Scene Investigation.")

Much of the material to be developed when using this Checklist will be done so by extensive interviews and follow-on investigation.

- 11. DEATH REPORT
 - a. Date/Time/Reporting Means
 - b. Who Reported/Relationship to the Child
 - c. Time Delay between Death & Report
 - d. Reported Circumstances of Death
- 12. DEATH SCENE
 - a. Exact Site of Body vs Reported Site of Injury
 - b. Reported Offending Toys - Furniture - Object
 - Consistent with Reported Circumstances
 - Consistent with Injury
 - c. Grossly Visible Blood or Tissue on above
 - d. Comparison with Reported Circumstances of Death and any Conflicting Statements of Circumstances
- 13. VICTIM
 - a. Position of Body (back-stomach-side)
 - b. Livor Mortis (consistent with body positions)
 - c. Rectal Temperature
 - d. Secretions (where - what)
 - e. Attempts to Revive Child/How

- f. Victim's Clothing/What/Cleanliness/State of Repair
- g. Could Clothing have been Changed after Death
- h. When Victim Last Seen Alive/Physical & Mental state

14. FAMILY

- a. Other Children in Household/Ages & Sex/Degree of Parental Care
- b. Any Appear to be Abuse/Physically Neglected
- c. Clothing of Siblings & Parents Comparable to Victim's
- d. Children Appear Fearful of Parents
- e. Siblings' Reaction to the Death
- f. All Live-born Children Still Living
- g. Economic Level of Family/Receiving Assistance

15. PARENTS/GUARDIANS

- a. Guardians (mother/father/step/adopted/foster)
- b. Mother/Father/Paramour (full name/alias/maiden name/age/SSN)
- c. Natural Parent - If not Guardian (name/age/when separated)
- d. Family Structure (describe any change since acquiring child)
- e. Maturity of Guardians
- f. Parents/Guardians reactions to death
- g. Circumstances, if One Guardian Not Present at Death

16. RELATIONS/NEIGHBORS

- a. Names/Addresses/Relationship/Presence at Death
- b. Observations as to Care of Child
- c. Parent - Guardian Relationship with Child/with Other Children
- d. Sibling Relationship with each other
- e. Reaction to Child's Death

17. MEDICAL

- a. Doctors (family/obstetrician/pediatrician)
- b. Victim the Result of Planned Pregnancy
- c. Normal Prenatal Care
- d. Unusual Pregnancy/Birth
- e. Victims Growth & Development Normal

18. HOME

- a. Geographic Location
- b. Comparison with Neighborhood (state of repair/yard)
- c. Inside Condition (repair/sanitary facilities/furniture, etc.)
- d. Last Cleaned
- e. Foul Odors (sources)
- f. Rodent/Insect Infestation
- g. Safety Hazards
- h. Evidence of Drug or Heavy Drinking
- i. Food in House Appropriate for Children

19. FOLLOW UP INVESTIGATIONS

- a. Previous Child Abuse Reports (all agencies)
- b. Records of Child Trauma (hospitals, clinics, emergency rooms)
- c. Physician Records of Child Trauma
- d. Previous Family Disturbances (police, church, shelters, neighbors)
- e. Criminal Records (current & previous residences)
- f. Welfare Records on Disturbances

Guideline Checklist

VICTIM NAME _____ CASE # _____
LOCATION (occurrence) _____ CASE # _____
EXAMINER _____ DATE/TIME (other agencies) _____

DROWNING

(For checklist items 1-10 see "Basic Medical Examiner Death Scene Investigation.")

11. SCENE

- ___ a. Type of Water (lake, floodwater, swimming pool, tub, etc.)
- ___ b. Swiftess (MPH, riptide, etc.)
- ___ c. Entry Point Description/Location
- ___ d. Body Distance from Entry Point
- ___ e. Composition of Bottom/Stability/Obstructions
- ___ f. Water Depth
- ___ g. Water Used for Swimming
- ___ h. Swimming Pool
 - ___ - Ownership
 - ___ - Lifeguards/Hours
 - ___ - Other Swimmers Present
 - ___ - Fences
- ___ i. Boats Use the Body of Water
 - ___ - Types
 - ___ - Regulations
- ___ j. Drowning Incident Observed
- ___ k. Victim Trespassing/How Accomplished

12. VICTIM

- ___ a. Swimming Ability
- ___ b. Entry into Water
 - ___ - Voluntary (wade/swim/rescue attempt/snorkel & scuba/work)
 - ___ - Involuntary (fall/thrown/flash flood)
- ___ c. Water Activity
- ___ d. Clothing (swimsuit, naked, wet suit, non-swim attire)
- ___ e. Missing /Submerged length
- ___ f. Precipitating Disease
- ___ g. Alcoholic/Drug Intake

Guideline Checklist

VICTIM NAME _____ CASE # _____
LOCATION (occurrence) _____ CASE # _____
EXAMINER _____ DATE/TIME (other agencies) _____

DRUG OVERDOSE

(For checklist items 1-10 see "Basic Medical Examiner Death Scene Investigation.")

11. DEATH REPORT

- a. Date/Time/Reporting Means
- b. Who Reported/Relationship to Deceased
- c. Time Delay between Death & Report
- d. Reported Circumstances of Death

12. SCENE

- a. Description/Condition/Relationship to Deceased (home, etc.)
- b. Location of Medicine, Drugs, Alcohol & Containers
- c. Location of Paint, Glue, Solvents & Containers
- d. Location of Paraphernalia
- e. Location of Soot or Pill Residue/Blood Tinged Swabs or Tissue
- f. Suicide Note
- g. Evidence of Struggle/Illness, etc.

13. MEDICINE/DRUGS/ALCOHOL (product & container)

- a. Medicine Prescribed for Deceased
 - Type/Amount Prescribed/Amount on Hand
 - Location (table, floor, bathroom, etc.)
 - Deceased History of Normal Ingestion
 - Same Medication Prescribed by more than one M.D.

- "Stockpiling"

- Recent use indicators

- Evidence of Accidental Ingestion

b. Medication Prescribed to Another Person

- Type/To Whom Prescribed/Relationship to Deceased

- Location

- Amount Prescribed/Amount on Hand

- Some Medication Prescribed by More Than One M.D.

- "Stockpiling" Another Person's Medications

- Recent Use of Another Person's Medication

- Evidence of Accidental Ingestion

c. Illicit Drugs & Narcotics/Alcohol/Paint, Glue, Solvent

- Types/Quantities/Form (powder, pill, etc.)

- Evidence of Use or Accidental Ingestion

14. PARAPHERNALIA

a. Smoking

b. Drinking

c. Injecting

d. Ingesting

e. Inhaling

15. RESIDUE (soot, powder, etc.)

a. Types

b. Quantity

16. DECEASED

a. Clothing Condition/Appropriateness/Contents

b. Tattoos, Rings, Pins, etc. (suggesting drug cult)

Guideline Checklist

- ___ c. Needle Injection Sites (old and new)
- ___ d. Paraphernalia Still on/in Body
- ___ e. Pills & Capsules in Hands or Mouth/on Face
- ___ f. Soot or Pill/Capsule Residue on Body
- ___ g. Drug History
- ___ h. Rigor & Livor Mortis Consistent with Body Location & Position
- ___ i. Resuscitation Efforts (when/kine/by whom)
- ___ j. Hospital/Emergency Room/M.D. Administered Drugs
(when/type/quantity/means)

VICTIM NAME _____ CASE # _____
 LOCATION (occurrence) _____ CASE # _____
 EXAMINER _____ DATE/TIME (other agencies) _____

ELECTRICAL

(For checklist items 1-10 see "Basic Medical Examiner Death Scene Investigation.")

BE CAREFUL! THE FATAL ELECTRICAL HAZARD MAY STILL EXIST!

- 11. EQUIPMENT
 - ___ a. Electrical Apparatus (make/model/year)
 - ___ b. U.L. Approved
 - ___ c. Grounded (Three wire plug & socket/other)
 - ___ d. Power (Voltage/Current)
 - ___ e. Circuit Protection (fuse, breaker, interlock)
 - ___ f. Protection Devices (in use/bypassed)
 - ___ g. Apparatus Still Operable
 - ___ h. History on Apparatus (anyone killed or injured before)
- 12. SCENE
 - ___ a. Type Flooring/Platform (composition & condition)
 - ___ b. Other Grounding (pipe, wire, rod, etc.)
- 13. VICTIM
 - ___ a. Using Electrical Apparatus at Time of Accident
 - ___ b. Circumstances of Contact and Injury/Fatality
 - ___ c. Rescue Efforts (when/what/by whom)
 - ___ d. Witnesses Accounts

CONTINUED

1 OF 4

Guideline Checklist

VICTIM NAME _____ CASE # _____
LOCATION (occurrence) _____ CASE # _____
EXAMINER _____ DATE/TIME (other agencies) _____

FALLS

(For checklist items 1-10 see "Basic Medical Examiner Death Scene Investigation.")

11. DEATH REPORT
 - a. Date/Time/Reporting Means
 - b. Who Reported/Relationship to Deceased
 - c. Time Delay Between Death & Report
 - d. Reported Circumstances of Accident/Conflict in Statements by Others
12. SCENE
 - a. Description & Physical Condition of Fall Site
 - b. Person, Company or Agency Liable for Fall Site
 - c. Specific Defect in Surface or Apparatus
 - d. Safety Gear Regulations for Site/Complied with
13. VICTIM
 - a. Basis for Activity (primary job, extra job, service to others, hobby, etc.)
 - b. Deceased Trained in Activity Leading to His Fall
 - c. Unusual Activity Prior to Fall
 - d. If Fall from Height, Jumped or Pushed
 - e. Proper Clothing & Gear (especially shoes)

III-A-8

Guideline Checklist

VICTIM NAME _____ CASE # _____
LOCATION (occurrence) _____ CASE # _____
EXAMINER _____ DATE/TIME (other agencies) _____

GUNSHOT

(For checklist items 1-10 see "Basic Medical Examiner Death Scene Investigation.")

*PHYSICAL EVIDENCE INFORMATION AVAILABLE FROM PHYSICAL EVIDENCE DEATH SCENE INVESTIGATION TEAM MEMBER.

11. DEATH REPORT
 - a. Date/Time/Reporting Means
 - b. Who Reported/Relationship to Victim
 - c. Time Delay Between Death & Report
 - d. Reported Circumstances of Death/Conflict in Statements by Others
12. SCENE
 - a. Location/Description (Exact and Explicit)
 - b. Condition
13. WEAPON
 - a. Location Relative to Victim/Orientation
 - *b. Type/Make/Caliber, etc. *
 - c. Ownership of Gun/Registration
 - d. Normal Place Where Gun Kept
 - e. Disposition of Gun
14. DECEASED
 - a. Clothing/Condition
 - b. Visible Trauma
 - c. Blood Stains on Clothing/Exposed Portions of Body

III-A-9(1)

- d. Blood Stains Elsewhere
- e. Deceased Right or Left Handed
- f. Suicide Note

Guideline Checklist

VICTIM NAME _____ CASE # _____
 LOCATION (occurrence) _____ CASE # _____
 EXAMINER _____ DATE/TIME (other agencies) _____

HANGING

(For checklist items 1-10 see "Basic Medical Examiner Death Scene Investigation.")

11. DEATH SCENE

- a. Description/Condition
- b. Signs of Violence
- c. Presence of Alcohol, Drugs, Cutting Instruments, Firearms, etc.

12. LIGATURE

- a. General Description
- b. Description at Neck
- c. Description of Knot
- d. To What Was Ligature Anchored

13. AUTOEROTIC

- a. Towel or Soft Material between Ligature & Neck
- b. Signs of Masturbation
- c. Mirror in Use
- d. Nude or Stimulating Photographs
- e. Pornographic Literature
- f. Clothing of Opposite Sex in Use
- g. "Fail Safe" Mechanisms/Used/Operational

14. VICTIM

- a. Victims Clothing Description/Disarray
- b. Trauma Description/Location

15. SUICIDE INDICATORS

a. Note

b. Evidence of Use of Selected Items in II.c., above.

16. CRIME "COVER UP" INDICATORS

Guideline Checklist

VICTIM NAME _____ CASE # _____
LOCATION (occurrence) _____ CASE # _____
EXAMINER _____ DATE/TIME (other agencies) _____

JOB RELATED

(For checklist items 1-10 see "Basic Medical Examiner Death Scene Investigation.")

USE IN CONJUNCTION WITH SPECIFIC TYPE DEATH FORMS
(Electrical, Fall, Fire, Suffocation, etc.)

11. SCENE

- a. Employer/Address
- b. Product/Service
- c. Nature of Death (asphyxiation, crushing, electrical, fall, fire, etc.)
- d. Injury/Death Site Description & Condition
- e. Location & Condition of Apparatus/Combustibles/Electrical/Machinery/
Toxic Material that Played a Part in the Injury or Death
- f. Ventilation/Temperature/Lighting
- g. Safety Features/Conditions
- h. Life Saving Capability (first aid, equipment, training)
- i. Others Injured or Dead in this Accident/Circumstances
- j. Observers of Injury or Death
- k. Consistency in Reported Circumstances of Injury or Death

12. DECEASED JOB

- a. Job and Specific Tasks
- b. Injury or Death Related Task
- c. Others Who Perform Same Task

- d. Accident History of Task
- e. Established Operating Procedures & Safety Regulations
- f. Manner in Which Deceased Trained on above
- g. Normal Implementation of para. e., above
- h. Was Deceased Following Procedure & Regulations

13. DECEASED

- a. Sequence of Events from Task Performance to Injury to Death
- b. Clothing & Equipment Description/Condition
- c. Length of Service in Fatal Job
- d. Location & Orientation of Body in Relationship to Death Activity and Equipment or Substance
- e. Insurance/Workman's Compensation/Union

Guideline Checklist

VICTIM NAME _____ CASE # _____
 LOCATION (occurrence) _____ CASE # _____
 EXAMINER _____ DATE/TIME (other agencies) _____

PEDESTRIAN/AUTO

(For checklist items 1-10 see "Basic Medical Examiner Death Scene Investigation.")

11. SCENE

- a. Road
 - Surface Composition
 - Condition
 - Area (business, open, residential, school, etc.)
 - Traffic Lanes (description, number, etc.)
 - Posted Speed
- b. Road Side
 - Sidewalks/Shoulders/Bike Paths
 - Vehicle Parking (describe)
- c. Weather/Lighting/Precipitation/Visibility

12. AUTOMOBILE

- a. Type/Make/Year/Model/Color
- b. Skid Marks/Speed
- c. Direction of Travel/Lane
- d. Condition of Driver (well, ill, handicap, alcohol/drugs)
- e. Charges Against Driver (DUI, speeding, hit & run, etc.)

Guideline Checklist

13. VICTIM

- a. Activity When Hit (walked out between parked cars, jogging west with traffic on shoulder, etc.)
- b. Location of Impact/Body (measure distance)
- c. Alcohol/Drugs (type/quantity/location)

VICTIM NAME _____ CASE # _____
 LOCATION (occurrence) _____ CASE # _____
 EXAMINER _____ DATE/TIME (other agencies) _____

PERI-OPERATIVE & THERAPEUTIC

(Only selected material from the "Guidelines checklists: Basic Medical Examiner Death Scene Investigation" will be applicable to this type of death.)

11. GENERAL INFORMATION

- a. Operative or Therapeutic Procedure of Concern
 - Description
 - Level of Risk (normal)
 - Permission to use Procedure (date/time/by whom/relationship to deceased)
 - Procedure/Risk Explained (by whom)
 - Admission (scheduled or emergency)
- b. Disease or Injury
 - History of Disease or Injury (date & times)
 - Risk Associated with Delay in Corrective Procedure
 - History of Other Disease or Injury (dates 7 times/risk)
 - Understanding of Risks Related to All Problems
 - History of Treatment for all Diseases/Injuries

12. PROCEDURE

- a. Undiagnosed Additional Diseases or Injuries Found During Procedure
- b. Had 12.a., Been Known Preoperative Impact on Decision to use Originally Planned Procedure
- c. Given 12.a., was Procedure Negated or Changed

13. PRE-OPERATIVE TESTS

- a. All Routine Tests Accomplished
- b. Results Available/Reviewed by Surgical Team
- c. Test Results Normal
- d. Blood Typing & Cross Matching
- e. Amount of Blood Ordered/Normal
- f. Allergy History
- g. Allergy Impact on Scheduled Drugs/Any Drug Changes

14. PRE-ANESTHETIC AGENTS

- a. Agents Ordered/By Whom/When
- b. Agents Normal for Procedure
- c. Actual Administration
 - Types
 - Amounts
 - Methods
 - Data/Time/By Whom (experienced)
 - Reactions
- d. Anesthetic Agents Administered in 48 hours Prior to Procedure

15. ANESTHESIA

- a. Agents Used/Reasons/Exact Times Start-End/Exact Time Length
- b. Total Dose
 - Inhalation (duration, mix, inductive agents)
 - Spinal (diluent, injection site)
 - Parenteral (drip flow, diluent)
 - Muscle Relaxant (method, effect including respiratory)

- c. Reactions

- d. Time Period between Pre-Anesthesia Agents & Anesthesia/Reasons

16. OPERATIVE/THERAPEUTIC PROCEDURE

- a. Date/Time Commenced - Terminated
- b. All Persons in Operating Room/Duties
- c. Patient Stability at Commencement
- d. Patient Anesthetization Normal/Delays
- e. Normal Duration for Procedure/This Case/Reasons
- f. Fluid Infusions Operation History/Start - End Time
 - Type
 - Quantity
 - Rate of flow
- g. Additives to Infusion History
- h. Hemorrhaging History
- i. Unplanned Delays (during critical period of procedure)
- j. Any Other Unplanned Delays
- k. Unplanned Procedure Changes (critical portion of procedure)
 - l. Any Other Unplanned Changes
- m. Any Untoward or Unexpected Events During Procedure
 - Describe
 - Corrective/Additional Procedure
 - If Respiratory or Cardiac Arrest -- Duration/Heroic Action
- n. Patient Stability
 - Leaving Operating Room
 - Arrival at Recovery Room
- o. Additional Procedures in Recovery

Guideline Checklist

17. TERMINAL EVENTS

- a. Description/Dates & Times
- b. Resuscitative/Heroic Procedures

III-A-13(4)

VICTIM NAME _____
LOCATION (occurrence) _____
EXAMINER _____
CASE # _____
CASE # _____
DATE/TIME (other agencies) _____

POISON

(For checklist items 1-10 see "Basic Medical Examiner Death Scene Investigation.")

11. DEATH REPORT

- a. Date/Time/Reporting Method
- b. Who Reported/Relationship to Deceased
- c. Time Delay between Report & Emergency Treatment/Death
- d. Reported Circumstances of Death

12. SCENE

- a. Describe Condition/Relationship to Deceased (work place - home, etc.)
- b. Containers at Scene/Status (full, empty, closed-open, etc.)
- c. Location of Containers
- d. Drinking Containers Location/Description

13. SUSPECT MATERIAL

- a. Specific Poison Known/Suspected
- b. Possibility of Mixture of Container Contents
- c. Evidence of Recent Purchase of Material
- d. Suspected Material Usually On Hand

III-A-14

Guideline Checklist

VICTIM NAME _____ CASE # _____
LOCATION (occurrence) _____ CASE # _____
EXAMINER _____ DATE/TIME (other agencies) _____

SUDDEN INFANT DEATH SYNDROME (SIDS)

(For checklist items 1-10 see "Basic Medical Examiner Death Scene Investigation.")

11. VICTIM

- a. Last Seen Alive (date/time/by whom)
- b. Found Dead (date/time/by whom)
- c. Death Observed
- d. Rigor/Livor Mortis
- e. Rectal Temperature
- f. Object Caught or Swallowed (nose/mouth)
- g. Secretions (mouth/nose/etc.---mucus/food/foam/blood/etc.)
- h. Last Feeding (date/time/what food)
- i. Childbirth (difficulties)
- j. Birth Weight/Defects
- k. Breast Fed (when/how long)
- l. Cow's Milk Fed (when/how long)

12. SCENE

- a. Place of Death (own crib/parent's bed/etc.)
- b. Number in Bed at Time of Death
- c. Position of Body (on back/stomach/side)
- d. Bed Cloths & Covers (type/condition/position)

13. FAMILY

- a. Other Siblings (age/health history)
- b. Recent Illness (type/who/when)

14. MEDICAL RECORD

- a. Recent Illness (major/minor/cold/sniffles/etc.)
- b. Recent Medical Treatment
- c. Prior Illness
- d. Well-Baby Examinations (date/time/where)
- e. Routine Shots (shot record)
- f. Exposure to Contagious Disease (type)
- g. Falls or Accidents
- h. Attempts to Revive Victim (what & when)

Guideline Checklist

VICTIM NAME _____ CASE # _____
 LOCATION (occurrence) _____ CASE # _____
 EXAMINER _____ DATE/TIME (other agencies) _____

STABBING & CUTTING

(For checklist items 1-10 see "Basic Medical Examiner Death Scene Investigation.")

(If suspected of self-inflicted cutting, see "Suicide" Checklist)

11. SCENE

- a. Description/Condition
- b. Blood at Scene

12. WEAPONS

- a. Description/Condition
- b. Exact Location

13. VICTIM

- a. Clothing (Description/Condition/Disarrayment)
- b. Blood
- c. Deceased Right/Left Handed
- d. Self-Infliction
 - Hesitation Marks, Wrist/Throat
 - Scars/Marks on Wrists/Throat

Guideline Checklist

VICTIM NAME _____ CASE # _____
 LOCATION (occurrence) _____ CASE # _____
 EXAMINER _____ DATE/TIME (other agencies) _____

VEHICULAR ACCIDENT

(For checklist items 1-10 see "Basic Medical Examiner Death Scene Investigation.")

(Physical Evidence Information is available from Physical Evidence Death Scene Investigation Team Member)

11. SCENE

- a. Description/State of Repair of Road
- b. Road/Weather/Lighting/Visibility, etc.)
- c. Description of Collision (abutment, other car(s), etc.)

12. VEHICLES (DECEASED & OTHERS)

- *a. Make/Model, etc.*
- b. Speed (comparison with speed limit)
- c. Direction Traveling
- d. Safety Devices
 - Lap Belts
 - Shoulder Belts
 - Other Restraints
 - Locked Doors
 - Cushioned Dash
 - Pushout Windows
- e. Vehicle Defects
- f. Evidence of Alcohol/Drugs

Guideline Checklist

13. OTHER THAN VEHICULAR COLLISION (single vehicle, explosion, avalanche, etc.)

- a. Description of Events
- b. Evidence of Alcohol or Drugs

14. DECEASED

- a. Location at Moment of Accident
 - Driver/Passenger (seat location)
 - Body Location (post accident)
- b. Clothing (description/condition)
- c. Alcohol or Drugs Present (where, form)
- d. Consistency of Injuries w/Accident

15. OTHER

- a. Possibility of Homicide
- b. Possibility of Suicide

VICTIM NAME _____ CASE # _____
LOCATION (occurrence) _____ CASE # _____
EXAMINER _____ DATE/TIME (other agencies) _____

APPARENT NATURAL DEATH

(For checklist items 1-10 see "Basic Medical Examiner Death Scene Investigation.")

(This Checklist is designed for use with other checklists which deal with specific means of death.)

11. SCENE

- a. Unusual Conditions
- b. Normal Site for Deceased

12. DECEASED

- a. Clothing (condition & appropriateness)
- b. Medical History
- c. Last Seen Alive (date & time)
- d. Activity Immediately Preceding Death

13. PHYSICIAN

- a. Identification
- b. Role Vis-A-Vis Deceased
- c. Sign Death Certificate

Guideline Checklist

VICTIM NAME _____ CASE # _____
LOCATION (occurrence) _____ CASE # _____
EXAMINER _____ DATE/TIME (other agencies) _____

APPARENT SUICIDE

(For checklist items 1-10 see "Basic Medical Examiner Death Scene Investigation.")

(This Checklist is designed for use with other checklists which deal with specific means of death.)

11. BASIS FOR SUICIDE INVESTIGATION

- a. Evidence at Death Scene (note, drugs)
- b. Evidence at Home of Deceased/From Friends & Relatives/Observer
- c. Medical History (Physician, Hospital, Emergency Room, Clinic, Social Worker)
 - - Nervous Disorder (breakdown)
 - - Depression
 - - Medical - Surgical
- d. Medical Examination
 - - External/Autopsy
 - - Toxicology

12. DECEASED

- a. Nature of Deceased (happy, unhappy, etc.)
- b. Marital/Live-In Status (recent change, tumultuous)
- c. Court Litigation Pending
- d. Family/Loved One Problems
- e. Work Status
- f. Behavioral Changes

Guideline Checklist

VICTIM NAME _____ CASE # _____
LOCATION (occurrence) _____ CASE # _____
EXAMINER _____ DATE/TIME (other agencies) _____

APPARENT VIOLENT DEATH

(For checklist items 1-10 see "Basic Medical Examiner Death Scene Investigation.")

(This Checklist is designed for use with other checklists which deal with specific means of death.)

11. SCENE

- a. Visible Signs of Violence (overturned furniture, etc.)
- b. Medication/Drugs/Alcohol Present
- c. Signs of Overdose
- d. Weapon, Apparatus, Paraphernalia

12. DECEASED

- a. Medical History (complaints)
- b. Personal Life (problems)
- c. Clothing (condition & appropriateness)
- d. Visible Signs of Violence (trauma, defense, wounds)

Guideline Checklist

VICTIM NAME _____ CASE # _____
LOCATION (occurrence) _____ CASE # _____
EXAMINER _____ DATE/TIME (other agencies) _____

ALCOHOL RELATED DEATH

(For checklist items 1-10 see "Basic Medical Examiner Death Scene Investigation.")

(This Checklist is designed for use with other checklists which deal with specific means of death.)

- 11. SCENE
 - a. Description & Condition
 - b. Alcohol at Scene
 - Types and quantities
 - Empty Containers
 - c. Normal Site for Deceased
- 12. DECEASED
 - a. Alcoholism
 - Known Alcoholic (source/how long)
 - Treatment History
 - Alcohol Related Health Problem History
 - b. Last Seen Alive (date/time, by whom, relationship to deceased)
 - c. Clothing/Appropriateness

III-A-21

Guideline Checklist

VICTIM NAME _____ CASE # _____
LOCATION (occurrence) _____ CASE # _____
EXAMINER _____ DATE/TIME (other agencies) _____

ILLICIT DRUG RELATED

(For checklist items 1-10 see "Basic Medical Examiner Death Scene Investigation.")

(This Checklist is designed for use with other checklists which deal with specific means of death.)

- 11. SCENE
 - a. Location
 - b. Description & Condition
 - c. Appropriateness of Site for Deceased
 - d. Signs of Violence
 - e. Illicit Drugs
 - Types/Amounts (amphetamines, barbiturates, narcotics, stimulants, tranquilizers, etc.)
 - Location in Relationship to Deceased
 - f. Drug Paraphernalia/Location (especially if on body)
- 12. DECEASED
 - a. How Found/By Whom/Relationship to Deceased
 - b. Clothing/Condition/Appropriateness
 - c. Visible Wounds (location & description)/How Inflicted
 - d. Drug Use
 - Known User
 - Dealer
 - Prior Treatment

III-A-22(1)

- e. Route of Administration
 - Oral/Snorting/I.V./Skin Pop
 - Evidence of Prior Usage
 - Injection Sites (old & new)
- f. Injection Site Logical for Self Administration (left handed person-right arm)
- g. Artifactual Injection Sites by Rescue Personnel
- h. Evidence of Resuscitation Efforts by Unknown Persons

Guideline Checklist

VICTIM NAME _____ CASE # _____
 LOCATION (occurrence) _____ CASE # _____
 EXAMINER _____ DATE/TIME (other agencies) _____

SEX RELATED

(For checklist items 1-10 see "Basic Medical Examiner Death Scene Investigation.")

*USE IN CONJUNCTION WITH SPECIFIC TYPE DEATH FORMS
 (Electrical, Fall, Fire, Suffocation, etc.)*

11. SCENE

- a. Description/Condition
- b. Animals at Scene
- c. Drugs/Paraphernalia
- d. Alcohol
- e. Sexual Stimulants/What & Where
 - Paraphernalia (vibrator/photos/mirror, etc.)
 - Substance (lubricant/whipped cream/condiments)

12. VICTIM

- a. Clothing/Appropriate to Setting & Gender
- b. Clothing Disarray/Torn
- c. Gag/Ligature (what/where/how used)
- d. Genitals
 - Exposed
 - Injured
- e. Sexual Activity
 - Recent Activity
 - Masturbation

f. Injuries (what & where)

13. INFORMANTS

a. Knowledge of Victim Sexual Deviation

b. I.D. of Informants

CHAPTER FOUR

EXAMINATION OF THE BODY

CHAPTER FOUR

EXAMINATION OF THE BODY - THE AUTOPSY

KEY WORDS

Anatomy . . . Autopsy . . . Body Description . . . Body Fluid . . . Cause of
Death . . . Conclusion Reports . . . Coroner . . . Death Investigation . . .
Disease . . . Entomology . . . Epicrisis . . . Etiology . . . Enclusal
Concepts . . . Final Pathological Diagnosis (FPD) . . . Gross Autopsy . . .
Incisions . . . Inclusional Concepts . . . Injury . . . Medical Examiner . . .
Medio-legal Autopsy . . . Necropsy . . . Odontology . . . Organ Examination .
Pathogenesis . . . Physical Anthropology . . . Post-mortem Examination . . .
Provisional Pathological Diagnosis (PPD) . . . Toxicology.

PART ONE

EXTERNAL EXAMINATION

I. GENERAL

The subject of this chapter is the next logical step in the process of a death investigation. Chronologically, it follows the physical death scene investigation (Chapter II) and the examination of the body at the scene (Chapter III), two activities which may be accomplished simultaneously,

Whereas, in the two previous chapters members of the investigative team probably represented a law enforcement agency and the field investigation element of a medical examiner's/coroner's office, in this chapter different members of the medical examiner's/coroner's office will probably be involved, i.e., a pathologist and assistants.

That which is past is truly prologue in this phase of a medicolegal investigation of a death. The information collected and recorded in the two previous chapters is critical to the work discussed in this and subsequent chapters. The more complete the recording of the circumstances of death, the greater the extent and depth of the remaining steps in the investigation.

As a means by which to provide a common orientation for study of the guidelines provided in this chapter -- the autopsy -- the following is an illustrative case.

11. ILLUSTRATIVE CASE

A female white is received in the office of the Death Investigator at 0900 on July 1. The body is tagged on the toe with the name Mary Jane W_____ with an address of 1109 West Baynes Street. The body is clad only in a nightgown. The body temperature taken by use of a thermistor liver probe at the moment of arrival is 83° F. The body length is 5 feet 2 inches and the body weight is 110 pounds. The hair is rolled on plastic cylinders and there is no facial make-up. The finger nails contain red polish that has no chipping. Rigor mortis appears to be fully developed in all areas. The eyes are brown and the hair is blond. Livor mortis is on the back and is not fixed but is purple.

The police responded to the home at the above address pursuant to the call for the city ambulance service. Their report is as follows: Mrs. Jackie M_____ is a next door neighbor in the well-kept, middle-class neighborhood. She has gone to the back door at about 8:00 a.m. on this day to ask the deceased about the time of a theater engagement that was to be attended that evening by the two families. She got no answer to the door bell. She used the key, that she retained for her neighbor, to enter the kitchen. On looking through the house she found Mrs. W_____ on her back lying with her head pointed toward the East. The body was lying in the threshold of the master bathroom door that adjoined the master bedroom. The bedroom was east of the bathroom. Mrs. M_____ stated that the deceased was about 40-45 years of age and had visited with her the evening before, leaving to return home about 9:00 p.m. The M_____ (husband and wife) had invited Mrs. W_____ to dinner the night before because Mr. W_____ was out of town. Mrs. M_____ said that Mrs. W_____ was in good spirits and did not complain of any illness.

They had had about 2 drinks prior to dinner and had eaten steak, baked potato, lettuce salad, and rolls.

Mrs. M_____ said that she felt for a pulse at the wrist, and feeling none went to the telephone to call the emergency number. The EMT unit had arrived within 15 minutes and had removed and transported the body to the closest hospital emergency room (P_____ General). Dr. B_____ had seen and pronounced the person dead at 0840.

The senior EMT had said that he believed she was dead at the time they arrived and he attempted no efforts to resuscitate.

Mrs. M_____ had touched nothing after she had called the emergency number except the front door which she had unlocked and exited to await the arrival of the emergency unit.

The examination of the bedroom and bath revealed the double bed to be unmade. The bedroom lights were on but not the bathroom lights. There was a bottle of pills on the bedside table that contained 23 small white tablets and had the prescription number 213567 from P_____ Pharmacy, Telephone #777-9999. Otherwise the house was neat and clean.

Mr. W_____ had been notified and was returning later that day. He said that his wife had a heart condition and was being treated by Dr. Y_____ of 222 Whitman Blvd., Telephone #777-1111. She had had this heart condition for many years but was otherwise in good health. She was without any significant emotional problems and had been in good spirits when he had left on June 29 for a business trip. They were to go on vacation when he returned on July 3.

Dr. Y_____ was contacted and he recalled that he had treated Mrs. W_____ for about 1 year. There had been 1 hospitalization about 5 months ago for

congestive heart failure. This had been treated and responded well to the treatment. She was given 2 prescriptions. One was a diuretic to be taken once a day and one for digitoxin that was to be taken on alternate days. He stated that he believed the heart condition to be due to Rheumatic fever and she had aortic stenosis with a grade three murmur.

The examination of the body revealed a lower abdominal midline scar of 7 cm. in length. There were no contusions, abrasions, or lacerations present on the head, arms, chest, or trunk. There was a small amount of white foam present at the lips. The neck veins were prominent and the face was congested.

III. EXTERNAL EXAMINATION - TUTORIAL

A. RECORDS

1. General:

The ultimate purpose for a medicolegal investigation of death is to arrive as close as possible to a determination of:

- The complete circumstances surrounding a death.
- The true manner and direct cause of death.

It is seldom possible to totally replicate the scene and the circumstances surrounding the victim prior to an unobserved, violent or unexpected death. The same holds true at the moment of death... We live in a world of imperfect intelligence. For that reason it is critical to any medical examiner that all information uncovered during an investigation be recorded in such a manner that it is preserved in the most effective and efficient manner -- with emphasis on "effective".

The medical examiner requires all the information he can get pertaining to a death for two quite different phases of a medicolegal investigation of death: prior to and during the conduct of the external body examination and/or autopsy; and, later, during the preparation of the death certificate. The latter requirement is discussed in a subsequent chapter on the death certificates. Information requirements prior to initiating a body examination are covered here.

It is one thing to require a medical examiner to examine a body on which there are no pictorial, taped or written reports and a completely different situation when such documentation is readily

available. As an example, even the limited material available in the Illustrative Case (included at the beginning of the chapter) allows the medical examiner to tentatively exclude a large number of possible causes of death, e.g., explosion, automobile, aquatic, industrial, skiing, etc. However, without that basic information he cannot exclude anything and, accordingly, must perform an exhaustive, time wasting, diffuse, examination. In short, he requires, as preliminary information, all the recorded data discussed in Chapters II and III-- data developed during the investigation conducted at the death scene.

The examiner of the body, in turn, also has a mandate to make pictorial, audio, and written records of his examination -- whether it is an external examination or an autopsy. The medical examiner records, coupled with the death scene reports, provide necessary background for the toxicologist, specialists, such as an entomologist, odontologist, or physical anthropologist, and finally the person responsible for signing the death certificate.

B. TRAUMA CLASSIFICATIONS

1. General:

- a. Within each agency responsible for body examinations a lexicon of common words should be developed for use in all reports. The material in this section presents basic words for such a list.
- b. Each type of trauma produces an injury which, in turn, creates disease. Injury can be defined as a transfer of energy from an object to the body. Injuries which cause a break in the anatomical integrity of the body are referred to as wounds.

c. The causes of trauma include the following:

- 1) Mechanical - Includes cuts, gunshots, automobile accidents, falling objects and drowning.
- 2) Thermal (temperature) - Includes local and systemic effects of both heat and cold.
- 3) Electrical - Includes the effects on heart and brain as well as burns produced by an electrical current.
- 4) Radiation - Includes damage produced by the ultra-violet rays of the sun and the gamma radiation in an atomic explosion.
- 5) Chemical - Includes the whole field known as toxicology and consists of poisonings produced by overdosage as well as exaggerated responses to normal dosages.
- 6) Special - This is a "waste basket" category to include all types not covered above. It would include:
 - a) Atmospheric pressure
 - b) Sound

2. Wounds:

The most commonly observed result of mechanical trauma is a wound. Wounds are the result of a disruption of the normal anatomical integrity of tissues. Mechanical trauma produces a great variety of wounds in contrast to the wounds produced by thermal or chemical means. There are several physical factors which are significant in wound production.

- a. Factors - The factors relating to wound production by mechanical injuries may be summarized by the formula:

$$W = E \times \frac{1}{T} \times \frac{1}{A} \times K$$

W = Wound

E = Energy applied to anatomical part

T = Period of energy transfer

A = Area of application

K = Modifying factors

- 1) Energy - We are concerned with the energy which is imparted to the tissues and not the total energy available. The available energy is only important in so far as the greater the energy available, the greater the energy that CAN be imparted. If a high velocity bullet passes through a part and meets little resistance there will be a small wound for little energy has been given up. If the same bullet passes through bone then the expenditure of energy will be greater and the resultant wound will be great.
- 2) Period of Energy Transfer (time) - For any given force if the period of energy transfer is shortened the likelihood of producing a wound is increased. This concept is in part responsible for the miraculous event of a person falling from a great height and surviving, if he fell through three awnings on the way down, thus prolonging the period of energy transfer.
- 3) Area of Application - If the force applied is confined to a small area there is a greater likelihood of a wound being produced. A moving ice pick has less energy than a moving board, but a wound is easily produced by a force of an ice pick because the point is a very small presenting area.

4) Modifying Factors -

- a) Lever action. The effect of lever action is more often seen in skeletal wounds. The force applied may be magnified and transmitted to another part. For instance the force applied to the heels may produce a fracture to the base of the skull by transmission up the spinal column.
- b) Elasticity. The more elastic a tissue the more it can stretch and not tear.
- c) Plasticity. The more plastic a tissue the more it can bend and not break.
- d) Inertia. There are points in the body which are relatively fixed and immobile. At these points damage will occur for their inertia is greater. An example of this is the ligament of Treitz. This attachment of the small intestine makes this point especially vulnerable to blows to the abdomen.
- e) Hydrostatic Pressure. This physical rule is similar to lever action. If force is applied to a fluid filled abdomen the force created within the fluid may be transmitted to produce rupture at another point. The full stomach is more liable to rupture than the empty stomach.

3. TYPES OF TRAUMA:

- a. Contusion - If the force is transmitted through an organ and causes sufficient hydrostatic forces to occur within blood vessels that the vessels will rupture, a contusion (bruise) will

result. The contusion is an indication that trauma has occurred. If the bleeding occurs rapidly and in considerable volume it is known as a hematoma. The line separating a contusion from a hematoma is not very sharp and the terms are sometimes used interchangeably.

The hematoma becomes an excellent site for secondary infection to occur and in certain cases may resemble an abscess.

b. Laceration - If the force applied stretches the tissue greater than its elasticity then a tearing or laceration occurs. The laceration is often associated with dirt and other debris and therefore, must be carefully cleansed to remove this foreign material.

If the force is unidirectional then the laceration will be perpendicular to the vector of force producing the wound. If the force is multidirectional then the laceration will be stellate or star shaped. A multidirectional force typically occurs on the scalp when the force is applied at right angles drawn to a tangent on the scalp.

c. Fracture - If the force applied to a bone stretches the bone greater than its plasticity then the bone breaks (tears). A fracture is a laceration of a bone.

Because bones have multiple shapes, sizes, and functions there can be an almost infinite variety of fractures. Some require special forms of treatment. The detailed classification will be more important in orthopedics but for a medical examiner purposes there are three basic types.

- 1) Simple. This fracture is a single line tear (or break) across a bone.
 - 2) Compound. This fracture is associated with adjacent skin laceration. This is significant because of the potential of infection to the bone end which has produced the skin laceration.
 - 3) Complex. This includes all other types from spiral to oblique to comminuted.
- d. Incision - The incision is produced when force applied has a very small narrow area of application and cleanly separates the tissue (cut). The incision is frequently relatively clean. This is true because of the free bleeding with little tissue obstruction and because of the relative cleanliness of the wounding object.
- e. Abrasion - The scraping away of the surface of an organ to tissue by friction is an abrasion (scrape). The significance of the abrasion is usually that it provides an entry for micro-organism.
- f. Combination - In practice several types of wounds are often present in the same area. For instance, a laceration which has an abrasion at the edges, will often have an adjacent contusion. Another example is a stab or puncture. This is usually a combination incision and laceration. The significance of this wound is that it may produce hemorrhage or provide a foci of anerobic organismal grown (C. Tetanil).
- g. Gunshots - There are many types and varieties of gunshots. The rifled missiles have special energy characteristics. These are

combination wounds because they can include abrasion, laceration, and fracture.

- 1) Bullet Flight. The special energy characteristic of rifle and hand gun trauma deal with the additional energy produced by the spin. Often this spin is 3500 times per second and gives a tremendous wound producing capacity to a bullet. Whenever a bullet passes through tissue the energy imparted to the tissues produces a temporary cavity which is proportioned to the velocity and is from 2 to 20 times larger than the diameter of the bullet. This energy diffusion around the bullet may damage structures which are several inches removed from the path itself. Thus, a bullet may damage a nerve even though it does not strike the nerve. Bullets generally do not "tumble" except at the very end of their trajectory after striking a target. The "key hole" effect sometimes produced is produced by a feature known as yaw. Yaw is the rotation of the tail end or base of a bullet around the line of flight. The bullet thus has two types of rotation. One is the spin around its path and the other is the gyration that one extremity of a bullet makes occurring at angles to its path. The degree of this angle will range over 180° of the path so that the bullet may be traveling nose down relative to its path or nose up relative to its path when it strikes a target. If it is at the extreme of yaw in either direction it will strike "side on" and produce a "key hole" effect. The degree of yaw is a function of many things but generally

yaw will be greater at the beginning of its flight and toward the end of the flight.

- 2) Entry - Exit Wounds. The determination of entrance and exit wounds is important for both legal and medical reasons. It is therefore, significant to consider the features of each wound.
 - a) Entrance. The entrance wound produced by a bullet (assuming yaw is not extreme) is round or oval. The edges show an "abrasion collar". This abrasion is beveled much like a crater. The width of the abrasion collar is of some use in determining the direction the bullet had when it struck the body. As a general rule the wide part of the abrasion collar is the side the bullet struck first. The edges of the entrance wound have small crescent shaped lacerations on the edges much like a pin wheel. If the muzzle of the gun was within two feet of the target, powder may be present around the wound. This powder may be burning when it strikes and thus produce a small puncture burn or it may merely produce a small abrasion in the skin. These effects are known as "stippling". If the barrel is close enough the flame of the explosion may actually burn the skin. If the barrel is beyond the range of the powder the gunshot wound is known as a "distant" gunshot wound (usually greater than two feet). If powder is present around the

wound it is known as a "near" gunshot wound. If the barrel is in direct contact with the target then the powder, flame and gases will be discharged into the wound itself and the wound is known as a "contact" wound.

The "contact" wound produces special changes. The ordinary entrance (non-contact) wound is often smaller than the exit wound. In the "contact" wound, especially if it is a wound to the head, the "blast effect" of the gases will reflect off the skull and will split the edges of the skin around the gunshot wound. This will produce a large gaping wound which can resemble an exit wound.

- b) Exit. The exit wound in contrast is often an oval or "slit" which will have rather smooth edges with no abrasion around the edges. There will sometimes be strings of tissue protruding out of the wound. Obviously no powder will be present.

Once it can be determined which is exit wound and which is entrance wound it is possible to have some idea what structures are damaged. Bullets generally travel in straight lines from entrance to exit points.

There are striking exceptions to this rule. This is especially true in small caliber or low velocity wounds to the head. Because of the curve to the inner and outer table of the calvarium the bullet of low velocity may be deflected and travel adjacent to the inner table for several inches.

IV. AN EXTERNAL EXAMINATION ROUTINE

The examination routine described in the following pages is but one logical manner by which to perform a thorough external examination.

The routine described (especially the Guideline Checklist at Appendix IV-A) assumes that reports are available on the results of the physical death scene investigation and the on-site body examination. By so doing unnecessary duplications of tasks (and the waste of manpower) is avoided. Deliberate repetitions of previously accomplished tasks is to be expected because, in each case studied, one or more unusual aspects of a case warrant the verification of previously established facts, or are necessary to establish changes in scene, body and environmental condition.

A. SYSTEMATIC EXAMINATION

The examination of the skin must be systematic, a condition usually attained through inclusion in the agency protocol for external examinations.

It is not important where the skin/orifaces examination begins as long as the routine covers all of the body in a logical manner, i.e., right palm, sides of fingers, back of hand, wrist, elbow, shoulder, etc.

B. IDENTIFICATION

It is necessary to begin the task of identifying and verifying the identity of the body as early in the death investigation as possible. This process conceivably can begin at the time of notification of a death; "Mr. Jones just died -----." It definitely should be worked on by the Investigation Team at the scene. However, as illustrated in the case described in paragraph II, above, the law enforcement agency and the medical examiner's office may not be notified of the death until after the body is moved from the scene of the death to an emergency facility -- in which case, the

identification process may not have as yet been initiated. In any event, it is necessary to accomplish three identification tasks: establish an identity; confirm the identification; document the findings.

In the Illustrative Case it would appear that a close friend has identified the deceased. This is an "eyewitness" identification. The investigator must specifically ask if the deceased is positively identified and then must record the details as to the method used to make the identification, by whom, relationship to the deceased, when and where. In addition, a "back-up" identification must be made.

Identification can be accomplished via eye witnesses, documents on the body (drivers license, etc.), the results of an external body and dental examination in comparison with records and known conditions, photographic comparisons (retain the photos), fingerprints, etc.

Once an identification and confirmation have been made, the records should show what tag was placed on the body, where and when placed, and by whom. In this manner, a chain of identification can be established. Once positive and confirmed identification is made, the proper next of kin can be notified (if they are unaware of the death).

If required because of an inability to otherwise positively identify a body, x-rays may be required or an autopsy. It can be seen that these later techniques are progressively more expensive than, for example, a driver's license and an eye witness.

C. CLOTHING and VALUABLES

Assuming that a death scene investigation and a body examination at the scene were made and that complete reports were submitted to the pathologist at the time of delivery of the body to the medical examiner's facilities,

morgue, or funeral home, then the clothing examination referred to at this time will be an amplification of what has already been examined and described.

At the conclusion of this phase of an External Examination, a written inventory of all clothing, valuables and other items is prepared for the family of the deceased or for an agency assuming custody.

The major reason for the detailed examination of all clothing and items in possession is to obtain information that will aid in identifying the life style of the deceased, the events leading to death, and the actual cause of death. Every observation must be documented!

D. "DESCRIPTION" - DEFINED

1. Size: The best description includes a measurement in at least 2 dimensions. It may be measured in inches or centimeters. The measurement should be accomplished with a good ruler, if at all possible.
2. Shape: The shape of an object can be related to a geometric shape such as a circle, square or rectangle. It may also be related to a common object such as "bean-shaped". Whichever method is chosen may be supplemented by a drawing, photograph or both. The more unusual shapes should be described, sketched and photographed. If a photograph is taken, an object commonly recognized and of known size should be placed adjacent to the item photographed. A successful technique by which to document shape and location on a body is to make a tracing of the object in question on a transparent material laid over the object. Such an overlay should show body landmarks.
3. Color: This is a very difficult description to make--verbally. The variety of shades and hues of color are almost without limit. As such,

the color described can be quite different from the color perceived by the report reader. If color is considered a very important observation then a good photograph must be taken. Faithful color reproduction in a photograph requires color balanced light, proper film and attention to detail.

4. Precise Anatomical Location: There are certain anatomical "landmarks" that are fixed. These are to be used as reference points for measurements just as a land surveyor uses fixed geographic landmarks. Some of the more commonly used body landmarks are the heels for measuring distances in the "head to toe" direction: the anterior, superior iliac spine, the midline of the sternum (breast bone); the umbilicus (belly button); and, the nipple of the breast of a male. There are many other anatomical landmarks that can be used. When using these landmarks it is necessary to have a "head to toe" landmark as one reference and a "side to side" landmark for the other reference. This is analogous to locating a point on a map by giving longitude and latitude. Measure to a particular scar, wound or other blemish from an anatomical landmark to the edge of the skin blemish or to the center of the skin blemish if it is symmetrical.
5. Consistency to Touch: This is the least needed parameter in describing skin areas. It is more important for skin masses than skin wounds. The more common skin masses would be lipomas (fatty tumors) or nevi (moles). These are normally soft. Skin masses that are hard are usually scars.

E. SKIN SURFACE EXAMINATION

1. General Characteristics:

Included in this phase of the examination are such obvious items as: weight, height, color of hair and eyes, etc. Perhaps not so obvious are judgement matters concerning muscle development, nutritional state, the presence of edema, rigor and livor mortis, etc. Of even less obvious a nature is the need to examine for make up, nail polish, etc. The breasts and genitalia should always be examined. All of the above items aid in the positive identification of the deceased and often prove to be useful in clarifying points related to the manner and cause of death.

2. Skin Characteristics:

Again, identification is aided through the diligent examination for scars, tattoos, permanent skin marks, malformed or missing body parts. Detailed records on mechanical, electrical, chemical health aids (from prostheses to pacemakers) also prove invaluable for purposes of identification and also for recreating the circumstances surrounding the death.

On the other hand, needlemarks, open wounds, abrasions -- although helpful in identification -- serve a greater purpose in arriving at the cause of death. For the same reason genitalia should also be examined.

3. Orifices Characteristics:

Included in this type examination because of its usefulness to identification and the study of the death, is a detailed examination of all body orifices and any discharge therefrom. Included would be, at least, a preliminary examination of the oral cavity -- to include the airway.

The circumstances of the case will dictate the thoroughness of this phase of the examination.

F. SPECIAL EXAMINATION

The external examination of the body may include any of a large number of special procedures that can be accomplished without elaborate equipment. These special procedures will not fully substitute for a complete and thorough autopsy, but there are many cases in which a scene investigation, an external examination and selected special procedures will provide ample evidence by which to establish an identification and to reconstruct the circumstances of death and perhaps the time of death.

It is an excellent rule to constantly consult with the testing laboratory concerning their procedures, specimen requirements, and equipment (containers, preservatives, etc.) preferences. Toxicological matters are discussed in a subsequent chapter of this book.

1. Body Fluids:

- a. Blood Collection - Blood may be required for a factual determination of the presence of such things as drugs, alcohol and carbon monoxide, and has an historic use in identification. Care must be taken to get as high a percent whole blood as possible. Because post-mortem blood is often mixed or contaminated with other body fluids or gastric contents, it may be necessary to centrifuge the blood specimen to ensure that what has been collected contains 30%-40% red blood cells.

The percutaneous blood collection method is often successful in collecting a post-mortem specimen: using a syringe with a 3 inch long, 15 gauge, stylet, needle, the needle is inserted into the

second left intercostal space and angled 45° to the right side and 45° toward the foot. This should place the needle in the right ventricle of the heart. Once in place, the vacuum should be released and the blood collected should be placed in a container prescribed by the toxicology laboratory.

- b. Urine Collection - It is often helpful to collect other body fluids to guard against erroneous conclusions based on possible flawed blood. Urine is one such fluid. Again, a syringe and needle -- as described for blood -- is inserted just above the symphysis of the pelvis. The needle is angled 45° toward the foot. By maintaining some suction as the needle is inserted, a good size specimen may be collected. It is a sound practice to collect all the urine possible.
- c. Vitreous Humor - The eyes contain a thick, usually clear fluid that is enclosed between the lens and retina -- usually 2 to 3 cc's per eye. This fluid is useful for many toxicological procedures, to include alcohol determination and time of death. A 19 gauge needle is inserted into the corner of the eye at the outer junction of the lids.
- d. Spinal Fluid - This source is often used to detect bleeding within the skull. However, the finding of blood must be interpreted with caution because blood may be present only because of the tapping process itself. A 15 gauge needle is inserted into the spinal column just inferior to the back of the skull.
- e. Thoracentesis or Paracentesis - Confirmation of the presence of

of massive bleeding into the chest or abdominal cavity can be obtained by inserting the stylet needle into dependent portions.

f. Joint Fluid - Joint fluid is often helpful in alcohol analysis.

Several cc's may be obtained by inserting a needle into the joint space of the knee.

2. X-ray:

X-rays can be used in the identification process (prothesis, sinuses) as well as in the detection of bullets, fractures, pneumothorax, etc.

3. Dental Examination:

A detailed examination of the oral cavity is a well established identification technique. As such, it is dependent on comparison with previous records. Discussion on odontological procedures is contained in a subsequent chapter of this manual.

G. THE NEXT PHASE . . . AUTOPSY?

The external examination may be the first phase of an autopsy or it may be the full extent of the examination to be conducted by the medical examiner.

If the external examination is phase one of an autopsy, the next step in the death investigation is the autopsy. If the external examination is not to be followed by an autopsy, the next phase may be the activities of the toxicologist or specialists -- followed by the preparation of the death certificate. All of these matters are addressed in subsequent chapters.

H. GUIDELINE CHECKLISTS

Following the discussion of the autopsy are appended a series of Guideline Checklists covering the autopsy -- to include the External Examination.

PART TWO

THE AUTOPSY

I. GENERAL

Just as the external examination of the body is measurably more specific when supported by complete reports of the investigation carried on at the death scene, so also are the same reports extremely relevant to the conduct of the autopsy.

II. AUTOPSY HISTORY

The autopsy, sometimes called necropsy or post-mortem examination is the scientific and systematic examination of a body after death. The purpose of any autopsy is to develop an inventory of abnormalities (diseases) present and to synthesize these diseases into a logical sequence of events that began with an illness and terminated in death. The autopsy is not merely the physical removal of organs and their dissection. The autopsy includes this removal plus all the additional toxicological tests and studies and is the conclusion that occurs following this process.

The history of the autopsy is closely tied with the rebirth of learning that occurred in Europe following the period known as the "dark ages."

During this time scientists began to question the then prevalent theory that illness was due to an imbalance of "humors" within the body. It had been believed there were various fluids within the body which were "in balance" during health. When disease appeared it was because these fluids or "humors" were out of balance. It was further believed that various techniques were useful in correcting this imbalance. This concept led to the therapeutic techniques

of "blood-letting" or the use of strong cathartic drugs. In the former instance these humors were in the blood and by controlled bleeding a physician could remove some of the humors that were elevated and bring the body back "into balance."

The theory of purging with cathartics was founded on a similar concept, which held that since the process of defecation was removing waste products from the body, by acceleration of this process balance could be restored.

With the reawakening of the concept of inquiry, the condition we know as disease had features that were observable in the vital, or internal organs. In order to develop this theory it was first necessary to learn what represents normal. Those who studied normal structure were known as anatomists, and the scientific field of anatomy developed.

Since abnormalities were often too subtle to see with the naked eye or with a microscope, it was necessary to examine abnormal function. Again it was necessary to know the normal prior to understanding the abnormal. This study of normal function became known as the field of physiology and those who studied it as physiologists.

As a result of these new fields of scientific inquiry, a group of scientists evolved who concentrated their fields of study in the area of abnormal structure and function. This field became known as pathology and those who studied it were known as pathologists. The principal tool of the pathologist was the autopsy.

The concept of death investigation as a part of the legal process is at least as old as the ancient Egyptian civilization where the physician rendered opinions to the government regarding causes of death.

The coroner system in medieval England evolved into an inquiry about the

cause of death even though it was originally for the purpose of establishing whether the dead body was Norman or Saxon.

It was not until the 19th Century that the autopsy became an integral and commonly used process as a part of official death investigation.

The original purpose of the autopsy was to contribute -- as one autopsy of many -- to the general knowledge. Thus, a group or series of autopsies were necessary to confirm or modify a particular hypothesis.

The medico-legal autopsy is a more directed, more specific examination. One critical process that will aid the medical examiner to accomplish a highly directed autopsy is the availability of all the reports generated during the preceding steps in a properly executed medico-legal investigation of death. Comprehensive investigation reports will aid an autopsy surgeon to move from a time consuming, diffuse autopsy to one in which specific things are being investigated. As an example, it greatly simplified the investigation of a particular death to know that the deceased had a serious heart problem for which prescription medicine was taken.

III. AUTOPSY PHASES

There are three generally recognized phases to an autopsy:

- Gross Autopsy
- Laboratory Analyses
- Conclusions

A. GROSS AUTOPSY

A gross autopsy is usually considered to include the external body examination which was discussed in Part ONE of this chapter plus that portion of the internal examination which concludes with the removal of needed specimens from vital organs, other tissue, and fluids. Usually,

the Provisional Pathological Diagnosis (PPD) is a product of this first phase of the autopsy.

The gross autopsy can be completed in a matter of hours. There usually is a sense of urgency to complete the gross autopsy: the desire of relatives to conduct the burial service. However, the next phase can take days, weeks and, in especially complex cases, months.

B. LABORATORY ANALYSES

The second phase of an autopsy includes the microscopic examination of tissue and the myriad toxicological tests (which are covered in greater detail in a subsequent chapter). This phase is a far more time consuming operation than is the first phase -- for two reasons: 1) the caseload of the laboratories involved may preclude immediate reaction, and 2) a case may require time consuming testing methodologies.

It should be noted that the need for all previous reports on the case is as critical during this phase of an autopsy as in any previous phase. As an example, in the illustrative case in Part One of this Chapter, the knowledge that Mrs. W _____ was taking prescription drugs for congestive heart failure would be extremely important information to the toxicology laboratory.

C. CONCLUSIONS

This last phase of a medico-legal autopsy begins when the last report is received from the offices conducting the laboratory analyses and concludes with the issuance of reports on the cause and manner of death.

The products of this phase can be two documents: the Final Pathological Diagnosis (FPD) and the Pathogenesis.

The FPD gives the cause and manner of death and, if used, the

Pathogenesis (or "Epicrisis" or "Medico-legal Opinion") is a narrative explanation for the cause of death -- beginning with the onset of the problem that finally caused death.

IV. THE MEDICO-LEGAL AUTOPSY

A. EXTERNAL EXAMINATION

Part One of this chapter covers this aspect of a total autopsy.

B. INTERNAL EXAMINATION

1. Incisions:

Regardless of the precise technique employed in making incisions, the purpose is still the same: to make incisions in such a way that, at the funeral service, they will not be visible.

As a general rule three basic incisions are made:

- Chest
- Abdomen
- Scalp

The chest and abdominal incisions are usually hidden by clothes and, if properly accomplished, the scalp incision is hidden by hair or the pillow that mounds up around the back of the head while the body is in repose in a casket.

2. Organ Examination:

From this point forward each pathologist has his or her logical procedure concerning the sequence for organ examination. In practice, each case may dictate a different sequence. Therefore, the examination sequence presented below is only one of many variations on the theme.

- a. Cardiovascular System - Many disease processes that affect the

heart and blood vessels are lethal and thus this system can be examined and inventoried first.

The purpose of this examination is to study all the anatomical areas of this system and to describe and document those diseases present. This includes the heart, aorta, and major branches.

It may also include major veins such as the pulmonary vein.

Following this examination, the pathologist may select specimens that are later to be subjected to tissue processing by a histology or other laboratory. The specifications for each specimen are usually dictated by the laboratory. The laboratory microscopic or chemical examination will depend, in part, upon the data discovered by the scene and body investigation process.

b. Respiratory System - Again, because many diseases that affect this system are a cause of death, this examination is also very important. A thorough examination includes the mouth, larynx (or voice box), trachea and lungs. As is true in most bodily systems, weight and measures may be important as a part of the detailed examination process. The experienced pathologist may estimate the weight of certain organs to be low, normal, or high and thus not record a precise weight for all organs. Following the gross examination of the organs, specimens may be taken for further study.

c. Central Nervous System - This system is also commonly involved in death-causing diseases. It is probably the most complex of the bodies' systems. As a result of this complexity, the pathologist may choose to have specially-trained pathologists

(neuropathologists) assist in the examination.

Often, several days of special preparatory work must be accomplished on the system before a thorough examination can be made. However, if toxicological analysis is to be performed, the necessary specimens must be taken before any special preparation is initiated.

Following the gross examination of the central nervous system (which may include the spinal cord as well as the brain) microscopic slides may be prepared.

d. Other Systems - The rest of the body systems are now examined in a similar manner. This involved the isolation of the individual organs of each system and a detailed examination of each organ. Special dissection technique, special preparation, or special handling may be required.

It must be remembered that the body functions as a whole and that each of the systems that make up the body are mutually dependent on each other. Therefore, the classification of the autopsy by systems is artificial: it is done for convenience of discussion and presentation. A pathologist may choose not to report by systems or may, for sound reasons, classify one organ into a different system than has been portrayed here.

C. SPECIAL PROCEDURES

Following are examples of situations requiring special procedures or experiences:

1. Mass Disasters -- Fragmented Remains:

Aircraft and train accidents, bombings, etc. produce special problems

because of the co-mingling of body parts. Before attempting to reassemble bodies, expert help should be sought -- such as Federal Aviation Administration or Airline endorsed professionals, in the case of an aircraft accident.

Meticulous record keeping and an identification system (tagging and flagging) must be initiated before any body part is moved. Failure to take this initial action will change a difficult task into an impossible one.

2. Skeletal Remains:

A subsequent chapter on anthropology deals at length with the proper handling of skeletal remains. Nevertheless, the pathologist remains as the focal point in controlling the manner in which skeletal remains are handled. Unless someone in the coroner or medical examiners office is especially trained in forensic anthropology, it is strongly advised that a nearby forensic anthropologist be utilized in an on-call capacity.

Because the physical scene containing human bones may be as revealing as the bones, the expert should direct the recovery of the remains and their subsequent transfer to the examiners facilities. The goal is to recover the entire skeleton and to know where each part was located -- in context with the site and evidence associated with each attached and detached bone.

As a general rule, the physical anthropologist can determine age, height, race, and handedness. Often the cause of death must be determined by the circumstances and exclusionary process.

Once the bones are assembled and tentative conclusions reached as to

sex, height, etc., it is advisable to conduct a search of missing person files for any reasonably similar skeletal structures and circumstances of disappearance. A matching of data can then be accomplished. Dental records, x-rays, prosthesis history, facial reconstruction and media coverage are aids to be used during the identification process. On occasion, fingerprints can be recovered but it must be remembered that the national fingerprint system requires a full set of good prints for successful entry into that system.

3. Burned Remains:

Identification must be the first consideration. The use of X-ray becomes most valuable here...by comparing X-ray images of the deceased with prior X-rays of the person tentatively identified or by comparing the dental findings with previous records.

If it can be established with certainty that only two persons were present and these techniques can positively identify one, then the other can be identified by the exclusionary process. The records should clearly reflect that this was the procedure used.

The autopsy technique becomes modified only to the extent that the body surface has been so altered that it is of little value. However, the charred surface of a burned body does not reflect the state of the internal organs. Because the human body is largely water, the surface may be badly charred while the internal organs are totally preserved.

The purpose of this autopsy, in addition to standard conclusions, are for the discovery of "soot" within the airway of the respiratory system and the collection of blood or muscle for a carbon monoxide

determination. The presence of soot deep in the lung and/or the elevation of the blood carbon monoxide can usually be used as proof that the person was alive prior to the fire. The corollary to this is not necessarily true, however.

4. Disinterred Remains: The fact that a body has been buried following embalming does not preclude the completion of an autopsy that has significant interpretive value. Many autopsies have been performed on Egyptian mummies (buried for over 3,000 years). The disinterred autopsy does require that the pathologist have some experience in interpreting the artifacts produced by embalming or body decay. Other than that, the procedures and techniques are exactly the same as previously discussed.
5. Decomposed Remains: This is a very unpleasant task, but if the autopsy is performed by standard procedures -- with attention to detail and with a thorough investigation -- it can reveal valuable information. The findings obtained from the skin are probably the most diminished. An entomologist's services can be quite valuable, in some of these type cases, especially as it pertains to the time of death. The various stages of insect life present on the body are time oriented.

D. DECISION MAKING

The autopsy, per se, -- as with all earlier investigations -- is but a means to an end: the decision as to the cause and manner of death. Subsequent chapters will cover the use of reports in the decision process -- leading to the accomplishment and filing of an official death report.

V. ADMINISTRATIVE MATTERS

A. ATTENDANCE AT THE AUTOPSY

Commonly, texts on medico-legal autopsy, state that other members of the death investigation team must be present during the first phase of the autopsy. It is quite true that there must be close cooperation between the other members and the pathologist. It is also quite true that those members can contribute information during the first phase of the autopsy, but it is an overstatement to require that they be present during the first phase of the autopsy.

Most autopsy suites are not of sufficient size to accommodate more than the number of persons that are required to actually perform the autopsy.

Thorough investigation reports that are concisely and clearly written are far more preferably than the physical presence of a law enforcement officer and far less costly. Telephone communications will adequately serve the need of the pathologist when further information is required.

B. FACILITY, EQUIPMENT, AND INSTRUMENTS

Minimum requirements include:

- Adequate lighting
- Adequate ventilation
- Ample water taps
- Disposal facilities (crematory)
- Specimen storage facilities
- Table
- Scales
- Gas source (natural & bottled)

Page IV-35
needs this inserted
cut & paste

VII. MANAGEMENT OF EVIDENCE

Legal
precedence for the management of evidence (its retention & preservation and the rights of all parties) is covered in Chapter Nine, "Evidence Management."

VII. GUIDELINE CHECKLISTS

cut & paste
current VI here

- X-ray/fluoroscope
- Evidence bags and specimen containers
- Photographic equipment
- Instruments & Supplies
 - * Knives
 - * Scissors
 - * Clamps
 - * Syringes & needles
 - * Bone saw
 - * Formalin
 - * Disinfectant
- Other
 - * String
 - * Labels
 - * Report Forms

VI. GUIDELINE CHECKLISTS

At Appendix IV-A are a series of Guideline Checklists covering the common yet different death cases encountered in the autopsy phase of a death investigation.

No protocols or detailed morgue procedures are included. The literature is replete with suggested procedures by which to conduct autopsies on specific types of cases and, as stated earlier in this chapter, competent pathologists have their own routines by which to conduct external and internal examinations.

Following is a list of Guideline Checklists which are appended:

- Guideline Checklist #IV-A1 Basic External Examination
- IV-A2 Basic Internal Examination

- Guideline Checklist #IV-B1 Alcohol - Drug Overdoes - Medication -
Poison Related Death
- IV-B2 Burned - Charred - Skeletal Remains
 - IV-B3 Child Abuse/Neglect
 - IV-B4 Decomposed Remains
 - IV-B5 Drowning
 - IV-B6 Falls
 - IV-B7 Gunshot Deaths
 - IV-B8 Lightning - Electrocution
 - IV-B9 Perioperative - Peritherapeutic
 - IV-B10 Sex Related Death *The joys of copulation
 - IV-B11 Vehicular Fatality

APPENDIX IV - A1

GUIDELINE CHECKLIST

MEDICAL EXAMINER
BASIC EXTERNAL EXAMINATION

Guideline Checklist

VICTIM NAME _____
LOCATION (occurrence) _____
EXAMINER _____

AUTOPSY # _____
CASE # _____
CASE # _____
DATE/TIME (other agencies) _____

BASIC EXTERNAL EXAMINATION

This guideline checklist covers only the external examination of the body after removal from the death scene and prior to an autopsy (if one is indicated). Data recorded during the Death Scene Investigation (see Chapters II/III) are not repeated here on the assumption that those reports will be available at the time of the External Body Examination.

Adequate DOCUMENTATION of the data collected during the examination is of critical importance to assure that the information will be of the utmost utility in further investigations and/or interpretation and admissible as evidence. Documentation may take many forms including: recording examination observations on tape (audio or video), reports, certificates, inventory forms and receipts, checklists, specimen collection forms and receipts, photographs, x-rays, dental records, medical records, etc.

1. DOCUMENTATION

a. On Hand

- * Scene Investigation & Other Reports
- * Forms -- Report/Anatomical Sketches/etc.

b. Available

- * Pictorial Equipment
- * X-ray Equipment

2. CLAD BODY EXAMINATION (AS RECEIVED)

a. "Cause/Manner of Death" Evidence

b. Photography

c. Clothing Inspection

d. Trace Evidence/Residue Collection

IV-A1(1)

3. CLOTHING & VALUABLES

a. Inventory

b. Undress Procedure (over plastic bag, etc.)

c. Air Dry Clothing

d. Preserve Droppings/Findings

e. Document Clothing/Valuables/Characteristics (color, patterns, labels, dryclean marks, wear/tear/repair, etc.)

f. Package & Label (each item in separate paper bag).

4. UNCLAD (UNWASHED) -- PRELIMINARY DOCUMENTATION

a. Photograph -- Face/All Unusual Conditions & Features

b. Description of Photographed Features

c. Evidence of Violence

5. UNCLAD TRACE EVIDENCE/RESIDUE INITIAL COLLECTION

a. Dust/Dirt/Debris/Fiber/Hair, etc.

b. Body Discharge (blood/fluids)

c. Hair Combing/Smears (bite marks/sex crimes)

d. Gunshot Residue (hands, body, wound area)

e. Vehicular Paint/Glass

6. BODY WASH

a. Wash Down Procedure (do not scrub)

b. Preserve Selected Washed Down Material/Evidence

c. Time Delayed Lividity

7. GENERAL CHARACTERISTICS

a. Weight/Lb. or Kgm./Method

b. Length/In. or Cm./Method

c. Hair Color -- Head/Face/Body/Pubic

IV-A1(2)

- d. Eyes -- Color/Pupils - Condition
- e. Hygiene
- f. Nutritional State
- g. Preservation (decomposition)
- h. Rigor Mortis
- i. Skin Color (not race)
- j. Race

8. SPECIFIC CHARACTERISTICS

Describe, photograph with identifying number any unusual features, note body landmarks.

- a. Oral Cavity
- b. Teeth
- c. Malformations
- d. Missing Body Parts
- e. Livor Mortis
- f. Lividity (discoloration)
- g. Cyanosis (bluing)/Clubbing
- h. Sclerae
- i. Breasts/Genitalia
- j. Scars
- k. Incisions
- l. Wounds
- m. Abrasions
- n. Needlemarks/Narcolism Scars
- o. Tattoos
- p. Fractures

IV-A1(3)

- q. Nevi (growths)
- r. Stretch Marks
- s. Orifices/Airway
- t. Nose/Passage
- u. Prostheses (interior & exterior)/X-rays
- v. Pacemaker/Cardiac Stimulator Marks/Thoracotomy
- w. Tracheostomy, etc.

9. SPECIMEN COLLECTION

- a. Blood
- b. Urine
- c. Vitreous

10. DOCUMENTATION

- a. Examination Report
- b. Body Evidence Receipt
- c. Body Delivery Receipt
- d. Toxicology Request Form

IV-A1(4)

- o) Uterus
- p) Cervix
- q) Ovaries
- r) Fallopian tubes
- s) Vagina
- 5) Weights & Measures
 - a) Organs weighed
 - b) Organs measured

3. DOCUMENTATION

a. Diagrams

- 1) Female/Male Body - frontal & dorsal views
- 2) Female/Male Body and Skeleton
- 3) Female - lateral view
- 4) Muscles
- 5) Hands
- 6) Head
- 7) Skull
- 8) Vertebral Column
- 9) Rib cage
- 10) Thorax & Heart

b. Photographs

- c) Vena Cava
- d) Other Major Branches
- e) Veins
- 2) Respiratory System
 - a) Mouth
 - b) Larynx
 - c) Trachea
 - d) Lungs
- 3) Central Nervous System
 - a) Neuropathologist required?
 - b) Brain
 - c) Spinal Cord
- 4) Other Systems
 - a) Stomach
 - b) Contents collected
 - c) Small Intestine
 - d) Large Intestine
 - e) Spleen
 - f) Liver
 - g) Adrenals
 - h) Kidneys
 - i) Pancreas
 - j) Bladder
 - k) Prostate
 - l) Pelvis
 - m) Penis
 - n) Testes

Guideline Checklist

BODY EXAMINATION -- AUTOPSY

VICTIM NAME _____ AUTOPSY # _____
LOCATION (occurrence) _____ CASE # _____
EXAMINER _____ EST. DATE/TIME (other agencies)
OF DEATH _____
ASSISTANTS _____ DATE/TIME/START/
COMPLETE _____/_____

BASIC INTERNAL EXAMINATION

This guideline checklist covers only the autopsy examination after the external examination. Data recorded during the Death Scene Investigation (Chapter III) and the Body Examination -- External (Chapter IV) are not repeated here on the assumption that those reports will be available at the time of the Autopsy.

Adequate documentation of the data collected during the autopsy is of critical importance to assure it will be of the utmost utility in further investigation and/or interpretation and as admissible evidence. Documentation takes many forms, including: recording examination observations on tape (audio and/or video), reports, inventory forms and receipts, specimen collection forms and receipts, checklists, photographs, x-rays, dental and medical records, etc.

- 1. INCISIONS
 - a. Chest
 - b. Scalp
 - c. Abdomen
 - d. Other
- 2. EXAMINATION
 - a. Description of Internal Evidence
 - b. Photographs
 - c. Specimens collected and Tagged
 - d. Organ Examination
 - 1) Cardiovascular System
 - a) Heart
 - b) Aorta

IV-A2(1)

APPENDIX IV - A2

GUIDELINE CHECKLIST

MEDICAL EXAMINER
BASIC INTERNAL EXAMINATION

APPENDIX IV - B

ADDED
GUIDELINE CHECKLISTS

Guideline Checklist

VICTIM NAME _____ CASE # _____
LOCATION (occurrence) _____ CASE # _____
EXAMINER _____ DATE/TIME (other agencies) _____

ALCOHOL -- MEDICATION -- POISON -- DRUG OVERDOSE RELATED DEATH

This added Guideline Checklist material must be used in conjunction with the two BASIC Medical Examiner Guideline checklists at Appendix IV-A.

- 1. DOCUMENTATION: INJECTION SITES
 - a. Old
 - b. New
 - c. Include Ruler, Identification Number, Body Landmarks in Photos
- 2. TOXICOLOGY SAMPLES
 - a. Blood
 - b. Bile
 - c. Urine
 - d. Vitreous
 - e. Liver
 - f. Kidney
 - g. Brain
 - h. Stomach Contents
 - i. Muscle
 - j. Injection Sites

Guideline Checklist

VICTIM NAME _____ CASE # _____
LOCATION (occurrence) _____ CASE # _____
EXAMINER _____ DATE/TIME (other agencies) _____

BURNED -- CHARRED -- SKELETAL REMAINS

This added Guideline Checklist material must be used in conjunction with the two BASIC Medical Examiner Guideline checklists at Appendix IV-A.

1. CONSULTATIONS

- a. Forensic Odontologist
- b. Forensic Physical Anthropologist
- c. Entomologist

2. X-RAY

- a. Characteristic Bone Structure
- b. Bone Injury

3. FINGERPRINTS

- a. Attached Hand Prints (if possible)
- b. Remove Hands for Laboratory Fingerprinting (if a., above, is not possible.)

Guideline Checklist

VICTIM NAME _____ CASE # _____
LOCATION (occurrence) _____ CASE # _____
EXAMINER _____ DATE/TIME (other agencies) _____

CHILD ABUSE -- NEGLECT

This added Guideline Checklist material must be used in conjunction with the two BASIC Medical Examiner Guideline checklists at Appendix IV-A.

1. NATURAL FEATURES

2. UNNATURAL FEATURES (Previous Abuse/Neglect)

3. INJURIES

- a. Description/Location
- b. Photography
- c. Tracing of Injuries on Transparent Material
- d. Pattern (Fall vs. drop -- bump vs. beating, etc.)

4. BITE MARK (Consult with Odontologist)

5. BODY CAVITIES (If case appears sex related)

a. Swab Oral Cavity

- 1) Two or more glass plate smears
- 2) Fix with spray
- 3) Package/Bottle - Seal - Label

b. Rectal Swab

- 1) Same as "a" above
- 2) Collect liquid and blood air dried samples

c. Vaginal Swab

- * Same as "b" above

Guideline Checklist

VICTIM NAME _____

LOCATION (occurrence) _____

EXAMINER _____

CASE # _____

CASE # _____

DATE/TIME (other agencies) _____

6. CONTROL SAMPLE COLLECTION

a. Hair

1) Head

2) Axilla

3) Pubis

b. Nail

1) Clippings

2) Foreign Substance under Nails

7. S.I.D.S. CONSIDERED

8. DOCUMENTATION

a. Whole Body X-ray

b. Whole Body Photography

DECOMPOSED REMAINS

This added Guideline Checklist material must be used in conjunction with the two BASIC Medical Examiner Guideline checklists at Appendix IV-A.

1. CONSULTATIONS

a. Forensic Odontologist

b. Forensic Physical Anthropologist

c. Entomologist/Botanist

2. INSECT & FLORA/FAUNA EXAMINATION

a. Collect Specimens/Preserve

b. Instructions to Entomologist and Botanist (of postmortem interval information is vital).

3. OTHER EVIDENCE COLLECTION (especially that which falls from decomposed body.)

4. COLLECT SKELETAL MUSCLES/PRESERVE

Guideline Checklist

VICTIM NAME _____
LOCATION (occurrence) _____
EXAMINER _____

CASE # _____
CASE # _____
DATE/TIME (other agencies) _____

DROWNING

This added Guideline Checklist material must be used in conjunction with the two BASIC Medical Examiner Guideline checklists at Appendix IV-A.

1. PULMONARY EXAMINATION

- a. Congestion
- b. Edema
- c. "Froth-Cone"
 - 1) Nose/Mouth
 - 2) Airways
- d. Aeroembolism

2. TOXICOLOGICAL EXAMINATION

- a. Drugs
- b. Alcohol

3. DECOMPOSITION

- a. Adipocere Present
- b. Wrinkling of Hands/Feet

4. FINGERPRINTS

5. INJURIES

- a. Abrasions
 - 1) Face
 - 2) Chest
 - 3) Extremities
- b. Lacerations (propellers/Fish)
 - 1) Trace Patterns
 - 2) Photograph

Guideline Checklist

VICTIM NAME _____
LOCATION (occurrence) _____
EXAMINER _____

CASE # _____
CASE # _____
DATE/TIME (other agencies) _____

FALLS

This added Guideline Checklist material must be used in conjunction with the two BASIC Medical Examiner Guideline checklists at Appendix IV-A.

1. BLEEDING

- a. Ears
- b. Nose
- c. Mouth

2. HEAD INJURY

- a. "Brim of the Hat" Level Injury
- b. Orbital Roof Fracture
- c. "Pathologic" Fracture
- d. Base of Skull Ring Fracture

3. OTHER INJURIES

- a. Tibias (driven through soles of feet)
- b. Heart Severed from Vessels/Displaced
- c. Compression Fractures of Vertebrae

Guideline Checklist

VICTIM NAME _____ CASE # _____
LOCATION (occurrence) _____ CASE # _____
EXAMINER _____ DATE/TIME (other agencies) _____

GUNSHOT DEATHS

This added Guideline Checklist material must be used in conjunction with the two BASIC Medical Examiner Guideline checklists at Appendix IV-A.

1. HAND RESIDUE COLLECTION

- ___ a. Paper Bags in Place on Hands
- ___ b. Collect Gunshot Residue from Hands
- ___ c. Package and Label
- ___ d. Note Any Tiny Spots of Blood

2. CLOTHING

- ___ a. Describe Clothing
- ___ b. Note Defects Due to Violence
 - ___ - type
 - ___ - location
 - ___ - size

3. PHOTOGRAPHS

- ___ a. Body, as Received
- ___ b. Face with Case ID Number
- ___ c. Unusual External Features

4. CONTROL SAMPLES

- ___ a. Head Hair
- ___ b. Axilla Hair
- ___ c. Pubic Hair
- ___ d. Nail Clippings, right hand

IV-B7(1)

- ___ e. Nail Clippings, left hand
- ___ f. Blood, for Serology

5. WOUND EXAMINATION

DO NOT USE METAL FORCEPS OR PROBE NEAR BULLET!

a. Describe unnatural external features - gunshot injuries

- ___ - Size
- ___ - Shape
- ___ - Edges
- ___ - Color
- ___ - Rim
- ___ - Location (by body landmark and above heel and buttocks)
- ___ - Diameter of wound(s)
- ___ - Residues
- ___ - Abrasions, etc.

b. Photograph closeup of entrance and exit wounds, including residues, with landmark and ruler.

c. X-ray body in region of wound to locate bullet, fragments.

d. Excise wound or portion for chemical, microscopic or other exams.

e. Collect powder scrapings.

f. Conduct dissection noting internal evidence of injury or therapy.

g. Photograph internal injury or therapy.

h. Photograph from sagittal and coronal locations, body with probes in place to indicate trajectory.

i. Describe internal natural findings.

6. SPECIMEN COLLECTION/RETENTION

- ___ a. Collect representative sections of unusual pathologic findings.

IV-B7(2)

Guideline Checklist

VICTIM NAME _____ CASE # _____
LOCATION (occurrence) _____ CASE # _____
EXAMINER _____ DATE/TIME (other agencies) _____

LIGHTNING -- ELECTROCUTION

This added Guideline Checklist material must be used in conjunction with the two BASIC Medical Examiner Guideline checklists at Appendix IV-A.

- 1. CLOTHING & EFFECTS
 - a. Degree of Wetness
 - b. Singeing/Holes (Including Shoe Soles)
 - c. Metallic Objects/Injury Beneath
- 2. SKIN SURFACE
 - a. Burn Mark
 - b. Fern-Like Pattern of Skin Discoloration (Shoulders/Flanks)
 - c. Hair - Singed/Scorched (Head/Face/Body/Pubic)
 - d. Dampness
- 3. INTERNAL EXAMINATION
 - a. Heart Examination
 - b. Rupture of Typanic Membrane
 - c. Paralysis of Vital Organs

- b. Retain appropriate gross organs, as necessary, for subsequent illustration or evidence.
- c. Photograph significant findings on dried clothing with case ID number and ruler.
- d. Package significant clothing portions individually, seal & label
- e. Tag all clothing.
- f. Fingerprint body.

Guideline Checklist

VICTIM NAME _____ CASE # _____
LOCATION (occurrence) _____ CASE # _____
EXAMINER _____ DATE/TIME (other agencies) _____

PERIOPERATIVE OR PERITHERAPEUTIC

This added Guideline Checklist material must be used in conjunction with the two BASIC Medical Examiner Guideline checklists at Appendix IV-A.

1. DRESSING

Loosen Dressing - Document Blood, Exudate, Drainage

2. WOUND/INJURY/INCISION

a. Describe Each Surgical/Therapeutic Wound.

1) Location

2) Length

3) Closure

4) Drains

5) Dressings

6) Therapeutic Paraphernalia/Insertions

b. Detach Paraphernalia (Leave Insertions)

3. COLLECT TOXICOLOGY/SEROLOGY SAMPLES

a. Blood/Urine/Vitreous

b. Organs (Gross and Sections)

c. Weigh Organs

Guideline Checklist

VICTIM NAME _____ CASE # _____
LOCATION (occurrence) _____ CASE # _____
EXAMINER _____ DATE/TIME (other agencies) _____

SEX RELATED DEATH

This added Guideline Checklist material must be used in conjunction with the two BASIC Medical Examiner Guideline checklists at Appendix IV-A.

1. CLOTHING

a. Ultraviolet Light Survey of Exterior of Clothing & Effects.

b. Ultraviolet Light Survey of Interior of Clothing & Effects.

2. UNCLE BODY

a. Ultraviolet Light Survey for Seminal & Narcotic Stains.

b. Swab Injury Areas.

c. Swab Nipples.

d. Collect Miscellaneous Evidence from Body Surface (Including Auto-Erotica).

e. Document All Marks/Injuries/Unnatural Features

3. TRACE EVIDENCE

a. Hair

1) Head

2) Axilla

3) Pubis

b. Nail Clippings/Scrapings (Especially Broken Nails)

3. PUBIC HAIR

a. Comb for Foreign Material

b. Inspect for Insects

c. Swab General Pelvic Area

- 4. BITE MARK EVIDENCE
 - a. Consult with Forensic Odontologist
 - b. Swab & Make Casts
- 5. ANAL EXAMINATION
 - a. Document Dilation/Patulousness/Tear or Abrasion
 - b. Aspirate if Sodomy Indicated
- 6. BODY CAVITIES
 - a. Swab Oral Cavity
 - b. Swab Rectal Cavity
 - c. Vagina
 - 1) Swab
 - 2) Aspirate Vaginal Contents
 - d. Collect & Air Dry Samples of Liquid & Blood (each cavity)
- 7. COLLECT OTHER SAMPLES (as required)
- 8. SEXUAL ASSULT EVIDENCE KIT
 - (Replenish as needed)

Guideline Checklist

VICTIM NAME _____ CASE # _____
 LOCATION (occurrence) _____ CASE # _____
 EXAMINER _____ DATE/TIME (other agencies) _____

VEHICULAR FATALITY

This added Guideline Checklist material must be used in conjunction with the two BASIC Medical Examiner Guideline checklists at Appendix IV-A.

- 1. SPECIAL PHYSICAL EVIDENCE
 - a. Paint Chips
 - b. Glass
 - c. Chrome
 - d. Rubber
 - e. Grease/Oil
- 2. SPECIAL DOCUMENTATION
 - a. Tire Marks on Clothing/Body
 - b. Other Impressions/Patterns
 - c. Related Injury
- 3. CONTROL SAMPLES
 - a. Hair
 - 1) Head
 - 2) Axilla
 - 3) Pubis
 - b. Nails
 - 1) Clippings
 - 2) Scrapings
- 4. DESCRIBE & DOCUMENT INJURIES
 - a. Size, Shape, Color, Location

- b. Group Similar or Contiguous Injuries.
- c. Trace Pattern Injuries on Flexible, Transparent, Durable Material.

CHAPTER FIVE

TOXICOLOGY

CHAPTER FIVE

TOXICOLOGY

KEY WORDS

Forensic Toxicology . . . Detection . . . Isolation . . .
Identification . . . Quantitation.

I. INTRODUCTION

As currently understood, toxicology is the science of poisons and poisoning in its broadest sense. Hence, forensic toxicology is toxicology applied to legal problems and issues, including official death investigations; or, according to the definition used by the American Board of Forensic Toxicology, it is "the study and practice of the application of toxicology to the purposes of the law." Forensic toxicology is conveniently divided into the factual aspects broadly involving analyses and measurements of chemical substances in biological and nonbiological specimens, and the opinion aspects involving the evaluation and interpretation of the experimental findings, although there is obvious overlap.

II. TOXICOLOGY IN DEATH INVESTIGATIONS

Most often in official death investigation, toxicological examinations consist of the search for, detection, isolation, identification, and quantitation of chemical entities in the body of the deceased. Thus, the examinations may involve search for specified suspected toxic substances such as ethyl alcohol and documentation of the absence, or presence and concentration of the designated analyte(s) of interest in the biological specimens submitted; or the examinations may involve search for toxic substances of a given analytical or

or pharmacological classification or category. A comprehensive analytical screening of autopsy specimen materials, without knowledge of whether a particular toxic agent was involved in the death, and intended to confirm or eliminate the presence of a broad spectrum of toxic agents, is often called a "general unknown analysis." Such screening can produce two results:

- 1) Toxic agent(s) are identified
(to be followed by specific quantitative analyses for these substances in the same or other biological specimens); or
- 2) No toxic agents, for which analyses were conducted, are found
(generally interpreted to mean that detectible quantities or concentrations of those toxic agents were not present).

In practice, forensic toxicology, as carried out in coroner or medical examiner systems, usually also encompasses chemical examinations of biological specimens for other than "toxic" substances. Typical examples of the latter are so-called post mortem chemistry analyses to determine the concentration and relative distribution of normal body constituents in post mortem specimens as indicators of the time interval between death and autopsy or of suspected metabolic disease, search for and quantitation of therapeutic drugs supposedly used by the deceased, and the identification and state of digestion of gastrointestinal contents as an element in identification or time of death decisions. Modern forensic analytical toxicology practice no longer employs bioassays or comparably biological testing to detect or estimate the concentration of poisons. Instead, it relies generally upon physical, chemical, biochemical, and immunochemical techniques in either classical "wet chemical" or instrumental mode and carried out as individual "manual" or as mechanized "automated" methods. Because of the technical complexities of modern toxicological analyses

and the importance of the decisions which may be based upon their results, the system of procedural controls and safeguards encompassed under the term "quality assurance"¹ is an indispensable element of forensic toxicology practice. The integrity, identity, noncontamination, and other quality elements of the specimens are an important part of the overall quality assurance complex; but those aspects of these related to specimen selection and collection are usually beyond the control of the analyst, whose responsibility focuses primarily on safeguarding the accuracy, reliability, and validity of the analytical results and preserving the specimens once they reach the laboratory.

An excellent and current overview of forensic toxicology can be obtained from a recent introductory text on the subject.²

Interpretation of Toxicological Analysis Results:

The data most often generated through toxicological analyses are factual information reflecting detection, identification, and quantitation of chemical entities - usually toxic agents - in biological specimens. Equally or more commonly, and often equally important, is the demonstration of the absence of suspected toxic agents in the analyzed specimens. The principal task of the toxicology laboratory in the medical examiner/coroner setting is to furnish factual information concerning the involvement, or lack of involvement, of chemical entities in the death (including the issues of cause, manner, mode, and circumstances of the death) and in the immediate antemortem period. Alcohol - or drug-related deaths are much more frequent than those caused by such agents,

¹S.L. Inhorn, ed., Quality Assurance Practices for Health Laboratories, (Washington: American Public Health Association, 1978).

²R.H. Cravey and R.C. Baselt, eds., Introduction to Forensic Toxicology, (Davis, California: Biomedical Publications, 1981).

i.e., recognized fatal poisonings, which are relatively rare events. Consequently, such issues as the effects, if any, of drugs on mental state or physical capabilities of the decedent at the time of death, and the role of drugs or other chemical agents as contributory or precipitating factors in the cause of death require consideration much more frequently. Toxicological examinations, therefore, are an important part of the death investigation. This role of forensic toxicology is, however, masked from the view of most people because the results of toxicological analyses and any interpretations thereof are normally provided to the investigating medical examiner/coroner or forensic pathologist, rather than to the public, and are often incorporated into the opinions or conclusions of these officials. That common practice reflects the usual operational partnership or close collaboration of the medical examiner/coroner, pathologist, and toxicologist. Assessing the significance of toxicological findings involves at least three elements: 1) Establishment of the validity and reliability of the toxicological examinations or analyses performed; 2) awareness of the analytical and pharmacological characteristics of the toxicological analysis methods used; and 3) interpretation of the significance of the various negative and positive findings and results.

The first element is the responsibility of the toxicologist, who must obtain and provide appropriate proof of the adequacy of the methods employed and their ability, in that toxicologist's hands and laboratory, to yield correct results, i.e., the laboratory's analytical proficiency. The analyst and the toxicology laboratory director must also vigorously safeguard and document the identity and integrity of all specimens after receipt in the laboratory by, for example, preventing changes in composition and avoiding contamination and mix-up of specimens. Also involved are such fundamentals of quality assurance

CONTINUED

2 OF 4

as experimentally verifying results and confirming findings which are preliminary, presumptive, or questionable. Ideally, the latter task is accomplished by repeated analyses on specimens with positive findings and other appropriate specimens by independent, alternative analytical methods. Such an approach will make "false-positive" results extremely rare.

The second element is a shared responsibility of the toxicologist and the person(s) who will determine the cause and circumstances of death. Both parties must be aware of and familiar with the analytical characteristics of the particular methods actually employed in examination of the specimens concerned, in such respects as: 1) What substances are encompassed or searched for in the analysis scheme and actually detectible under the conditions employed, e.g., in the kind and quantity of sample available for analysis; 2) sensitivity of or detection limits for the various analytes searched for; 3) specificity or freedom from positive or negative interference; 4) identity of analytes found as to original form taken into the body or reflective, in whole or in part, of subsequent biotransformation or metabolism in the body during life; 5) qualitative or quantitative alteration of chemical agents through neoformation, disappearance, or chemical change in the specimen after removal from the body.

The third element also involves shared responsibility and collaboration, but is largely the province of the person(s) who will determine the cause and circumstances of death, normally a medical examiner or pathologist. While knowledge and consideration of several of the enumerated factors under the second element, above, are important in interpreting the significance of negative and positive toxicological analysis results, other primarily medical factors also must be taken into account. The latter include compatibility of the chemical and post mortem anatomical findings; estimates of the time intervals

between coma, death, and specimen preservation or collection; the state of decomposition of the body at time of autopsy; presence or absence of lesions characteristic of the toxic agents found; medical treatment and drug therapy during the agonal state or recently before death; and exact knowledge concerning how and from what site(s) of the body the specimens were collected. Pathological findings of particular pertinence to interpretation of toxicological analysis results typically include the nature, extent, and probably duration of acute and chronic disease of the liver, kidney and other organs. The contributions of a qualified toxicologist to this element of assessment of the significance of chemical findings includes communicating the pertinent factors under element two; and providing information on signs and symptoms of poisonings by given toxic agents; mechanism of action and on metabolism and pharmacokinetics (uptake, distribution, elimination) of various drugs and toxic substances; current licit and illicit drugs prevalent in the community; nature and effects of drug interactions; and data from the accumulated experience of other toxicology laboratories concerning the therapeutic, toxic, and lethal concentrations of various drugs and toxic agents recorded in the Registry of Human Toxicology³ and elsewhere.

Five questions commonly sought to be answered through toxicological examinations in connection with official death investigations are:

- 1) What do the chemical analysis findings indicate about, or contribute to the determination of, the cause of death and the manner and

³Toxicology Section, American Academy of Forensic Sciences, Registry of Human Toxicology - Data on Fatal Cases Reported for 1980, (Colorado Springs: American Academy of Forensic Sciences, 1981). (Annual compilations issued 1959-1981.)

circumstances of the death?

- 2) What do the chemical analysis findings indicate about the physical and mental status and capabilities of the decedent at and recently prior to the time of death?
- 3) Can specific drugs, poisons, toxic agents, or other chemical substances be ruled out as present in the decedent at the time of death and hence eliminated from consideration?
- 4) What is the nature and identity of suspected poisons, medications, apparent illicit drugs of abuse, or other substances found at the death scene or on the body of the decedent?
- 5) Was acute alcoholic intoxication, or intoxication by other specific drugs or toxic substances, an element in the death?

From the foregoing considerations, it is evident that the evaluation and interpretation of post mortem toxicological findings is a very complex and demanding task subject to many theoretical and practical constraints, limitations, and exceptions to the usual rules.

The effect of given concentrations of various drugs and toxic agents on the decedent during life is nearly always unknown. Hence, recourse is usually had to comparison of the particular toxicological findings with the collated statistical experience for comparable population groups, say adult males, in respect to documented therapeutic effectiveness, or toxicity, or documented fatal effects of various concentrations of the agents involved in the tissues or body fluids. However, numbers and chemical agent identity alone, regardless of how validly established, do not necessarily tell the whole story. Distribution of the toxic agents in various body tissues and fluids, reflected in the respective concentrations of the agent and of its intermediate and ultimate

biotransformation products, can indicate the dose and probable time interval between intake or exposure and death. Tolerance and habituation to a given drug or chemical can drastically alter the expectable effects of a drug concentration of that agent in the decedent, in comparison with populations lacking such accommodation. Cross-tolerance may predispose an individual to greater tolerance, and hence diminished effects, of other drugs in the same pharmacological category. Other drug interactions lead to additive or offsetting effects of the respective agents. Exaggerated drug effects can be the result of individual hypersensitivity, or hyperactivity to that agent. Unexpectedly drastic or atypical effects of toxic agent exposure, as either extreme sensitivity to low doses or insensitivity to high doses, can occur because of idiosyncrasy, i.e., a genetically determined abnormal reactivity to a chemical agent.

Extreme caution is, therefore, necessary in making - or accepting - categorical statements about the significance of toxicological laboratory findings, especially isolated results, and in accepting a face value compilations and tabulations of drug and toxic agent concentrations versus their anticipated effects. These limitations and the consequent overlap between concentrations and effects are particularly well illustrated by the situation for ethyl alcohol, the most commonly encountered and most important toxic substance in human toxicology. Table V-1, Stages of Acute Alcoholic Influence/Intoxication, correlated blood-alcohol concentrations with nominal stages of alcoholic influence and with commonly-encountered clinical signs and symptoms of ethyl alcohol effect. The deliberate overlap in concentrations versus effects tabulation reflects the wide biological variability in human consumption tolerance and constitutional tolerance to ethyl alcohol, but does not suffice to exclude rare or atypical combinations of blood-alcohol concentration and effects. Accordingly, these data

should be considered only as an initial guide to interpretation of blood-alcohol concentration, subject to modification in a given individual case according to its facts, factors and peculiarities.

The Practice of Forensic Toxicology

The toxicologists' functions and responsibilities include:

- Direction and supervision of the toxicologist's laboratory and its work and personnel.
- Selection and validation of the methods employed.
- Institution and maintenance of the requisite physical security arrangements and scientific quality assurance and control measures.
- Preparation and maintenance of necessary files, records, and reports.
- Consultations with law enforcement and medicolegal investigators and officials.
- Provision of testimony on the nature and results of toxicological examinations and the toxicological significance of the findings.

For historical and other reasons, forensic toxicologists have not been educated and trained according to universal academic and experience standards, as is true in medicine or law. (For chronological history of forensic toxicology see Appendix V-B.) After several decades of progress in the development of academic curricula and postgraduate practical training programs, the profession adopted minimum standards for the education, experience, and competence to be expected of persons entering the field, and for the establishment of continued qualification of active practitioners, through the establishment of the American Board of Forensic Toxicology, Inc. (ABFT) in 1975 under the sponsorship of the American Academy of Forensic Sciences, the Society of Forensic

Toxicologists and the California Association of Toxicologists⁴. Additional membership societies in the field of toxicology have since joined in sponsoring ABFT. The objective of the Board is to establish, enhance, and revise as necessary, standards of qualification for those who practice forensic toxicology, and to certify as qualified specialists those voluntary applicants who comply with the requirements of the Board. Certification by ABFT is based upon the candidate's personal and professional record of education and training, experience, and achievement, as well as the results of a final written examination. Periodic requalification of diplomates is subject to comparable formal requirements. Persons holding a currently valid Certificate of Qualification in Forensic Toxicology issued by the American Board of Forensic Toxicology are entitled to use the designation "Diplomate of the American Board of Forensic Toxicology" and the initials "DABFT" wherever professionally appropriate. Certification programs in general toxicology or its nonforensic specialities are operated by other certifying bodies, including the American Board of Clinical Chemistry which instituted its certification in Toxicological Chemistry in 1962.

Because of the need for continuing education and other professional contacts, qualified forensic toxicologists will generally also hold membership in cognizant national societies, such as the American Academy of Forensic Sciences (Toxicology Section), Society of Forensic Toxicologists, or Canadian Society of Forensic Science. Most also belong to one or more regional toxicology societies, such as the California Association of Toxicologists or Southwestern Association

⁴R.H. Cravey, "The American Board of Forensic Toxicology," J. Analyt. Toxicol. 2 (1978): 163-164.

of Toxicologists; and to The International Association of Forensic Toxicologists (TIAFT).

Forensic Toxicology is practiced on a full-time basis in a relatively small number of laboratories, usually associated with a statewide or local medical examiner or coroner system or one of a few federal agencies. Because of the limited number of qualified forensic toxicologists and forensic toxicology technicians, and the high costs of establishing and operating a full-service forensic toxicology laboratory, not all medicolegal death investigation offices will have a forensic toxicology laboratory.

They must thus necessarily refer biological specimens and requests for their toxicological examination to "outside" laboratories. It deserves reemphasis that forensic toxicology is a highly specialized and continually evolving endeavor and has unique requirements for facilities and professional skills of a high order. Many broad-spectrum forensic science laboratories at local, regional, or state levels will, therefore, not have the requisite personnel or facilities to undertake, competently, toxicological analyses and examinations on tissue, body fluids, and other biological specimens derived from dead human bodies in varying states of decomposition; and laboratories so situated should not be expected or prevailed upon to perform these services.

The same limitations and precautions apply with equal, or perhaps greater force to clinical laboratories, whether independent or hospital-based; pathology laboratories; and other consulting laboratories. Such establishments rarely, if ever, operate under forensic science constraints and employ routines for specimen retention, record keeping, result verification, etc. which are wholly inappropriate to and inadequate for the forensic situation with its specialized chain-of-custody needs and its expectable legal challenges. Further, they do

not, of course, possess staff familiar with and unthreatened by the unique forensic documentation practices and the ultimate provision of testimony. They are only a handful of independent laboratories throughout the United States adequately situated to perform forensic toxicological analyses with validity and reasonable promptness on a routine bases.

In the circumstances, three practical alternatives are available for outside referral of specimens for toxicological analysis; listed in the order recommended:

- 1) By prearrangement, send such specimens and requests to a high volume forensic toxicology laboratory in a nearby jurisdiction, which possesses the requisite expertise, has the ability to absorb the additional workload, and is willing to perform such services on a case-by-case fee-for-service basis.
- 2) Request assistance from a state-level, regional, or local general forensic service laboratory - if the selected establishment possesses the requisite capabilities and expertise in forensic toxicology, particularly with respect to personnel.
- 3) Refer the work to one of the small number of reputable, high volume independent laboratories possessing the requisite capabilities and expertise in forensic toxicology; after making careful inquiries concerning the availability of qualified toxicologists, at that time, to carry out the work involved. Consultation with a qualified forensic toxicologist to assist in locating and assessing the qualifications and capability of the candidate independent laboratory is highly recommended, before the need arises.

In reaching a decision concerning the suitability of an "outside" laboratory

for referral of forensic toxicology work, specify inquiry should be made whether the laboratory currently participates in recognized external performance evaluation or "proficiency testing" program(s) in toxicology*, and which, and concerning the laboratory's performance in such PT surveys as documented by recent proficiency test reports which each participating laboratory receives.

Information Exchange: Requesting and Reporting of Toxicological Examination/Analysis Results:

The sole objective of the submission of post mortem specimens and other pertinent materials, e.g., suspected poisons and medications found at a death scene, to a toxicology laboratory for examination and analysis is to obtain, in timely fashion, valid, reliable, and pertinent information bearing on the death investigation. To facilitate that process, there obviously needs to be an exchange of information between the parties most directly involved - normally the specimen collector also functioning as submitter and subsequent recipient of reports, and the receiving toxicology laboratory which is normally also the reporting entity. That exchanged information, if it is to serve its purpose, must be correct, complete, timely, pertinent, traceable to its source, understandable by the receiving party, and - not least - legible if in written form. This section is intended to summarize briefly the nature of the information which should be provided by and to an official utilizing forensic toxicology services in a death investigation, to complement details appearing elsewhere in this document.

*Appropriate proficiency testing programs include the "Drug Monitoring Survey" and the "Toxicology: Drugs of Abuse Proficiency Testing" programs of the Centers for Disease Control, Public Health Service, U.S. Department of Health and Human Services; and the "Advanced Toxicology Survey" of the College of American Pathologists. Several states and the federal government also operate proficiency testing programs limited to forensic alcohol analysis.

Minimal and Optimal Information Exchange:

The least a requestor can communicate to a toxicology laboratory and the least the laboratory can report back are, respectively, the nature of the submitted specimen(s) and the examinations desired thereon; and the results of the analyses. Such cryptic communications are wholly inadequate and inappropriate to any death investigation which requires toxicological services; but they are, unfortunately, not uncommon. Both submitter and laboratory can also overwhelm each other with massive transmittals of irrelevant details which will obscure and bury any useful data, perhaps irretrievably.

What is needed is the optimal information from and to each party:

- A. From the submitter to the laboratory - enough information to indicate the nature and identity, in all requisite particulars, of what is being submitted for examination; what information is sought from the laboratory; sufficient case and other data to allow subsequent tracing; name and other particulars of the contact person who can clarify matters concerning the specimen(s), if necessary; all relevant dates and times; and sufficient pertinent information about the case to focus and expedite the laboratory's work and to eliminate or minimize false clues and wasted effort.*
- B. From the laboratory to the submitter - enough information to indicate what specimen(s) were examined; what examinations or analyses were performed with the pertinent features of each (method identity and reference to literature, analytes encompassed and detection limits or sensitivity for any analyte which was not detected in the instant case); the

*A prime example of inappropriate omission is withholding the information that the body was embalmed prior to collection of the specimen.

findings and results in adequate detail, with full quantitative unit expressions where pertinent; sufficient case and other data (analysts, etc.) to allow subsequent tracing; name and other particulars of the contact person who can clarify matters concerning the examinations undertaken and the findings, if necessary; and all relevant dates and times.

Optional, but useful communications to the laboratory include any suspected drug, poisons, or toxic materials, preservatives added to specimens; pertinent medical history, death scene, and autopsy findings; details of emergency medical or hospital treatments shortly before death, especially in regard to drugs thus administered; the putative or apparent cause of death, if known; and instruction for retention or disposal of the specimens after completion of the analyses.

Optional and useful information from the laboratory to the submitter of the specimens, or the person who is to receive the laboratory reports if different include an estimate of the probable length of time before a report of findings will be issued; details of any unrequested but pertinent incidental findings such as presence of formaldehyde as evidence of embalming, or degree of decomposition of the specimen; record of reserved and retained specimen materials and discard dates, if established.

Specimen Selection and Collection:

Poisons that enter the body have many different chemical forms, enter by many different portals, and are distributed unevenly among the body tissues and fluids. It is thus difficult to list those body items that should be collected in a death suspected of being caused by a poison. The following listing and discussion is not meant to be comprehensive but illustrative of the more common materials that can be collected.

- A. Blood Because the blood circulation is the usual distribution system of the body, poisons and toxic agents will be found in a blood sample. Some poisons, although distributed by the blood, will not remain in this tissue and thus very low concentrations will be found when the blood is analyzed or the agent may not be detectable in blood. The determination of ethyl alcohol and other volatile substances can easily be made by using a blood specimen. Strychnine, however, as an example may be present in very low concentrations in the blood and still be a cause of death.
- B. Urine Most foreign substances will be eliminated from the body in the urine. Consequently, the urine is an excellent specimen material for toxicological analysis. Because of the high water/low protein content of urine, it is a material that can be readily analyzed by most laboratories. There are two major disadvantages to urine as a specimen:
- 1) It is often not found in a dead body. The bladder may be emptied during the dying process.
 - 2) The concentration of substances in the urine is frequently not a reflection of the amount in the body. This means that the substance is not present in the target organs where the action of the poison is most life threatening. The urine alcohol concentration may be very high but the blood or brain alcohol concentrations may be very low. Since the brain is the principal target organ for the acute effects of alcohol (blood and brain concentrations are equally significant), the urine concentration will not reflect the proper brain concentration. This lack of correlation makes a urine alcohol

determination an unacceptable substitute for a blood alcohol determination; alcohol presence in the urine can at most document the fact that alcohol was taken into the body recently.

C. Gastric Contents Many poisons enter the body by being swallowed. If the death rapidly follows this oral ingestion, the stomach (gastric) contents is an excellent material to save for subsequent submission to a toxicology laboratory. The poison is usually present in higher concentration and in more nearly the original form ingested than other specimen materials.

D. Other Fluids There are many liquids within the body. These are usually easy to obtain and are easy to store, ship, and simpler to analyze than most tissues. Each may be of special pertinence depending upon the poison being searched for by the laboratory. Some of these liquids are:

- 1) Vitreous fluid from the eye
- 2) Bile
- 3) Small intestinal contents
- 4) Major joint fluid (knee)

E. Body Organs Many poisons are concentrated in internal body organs and different poisons and toxic agents exert their principal effect on different target organs. Therefore, adequate portions of these organs need to be saved if an unknown poison is suspected. Some of the organs most commonly saved include:

- 1) Liver
- 2) Kidney
- 3) Spleen
- 4) Brain

The general key that will determine which solid organs to save will be which poison is suspected. In this regard a knowledge of poisons suspected will make an intelligent specimen collection process easier. Consultation with an experienced forensic toxicologist before selecting and collecting the specimens is advisable.

F. Special There are a wide variety of special circumstances that require special procedures or unusual specimens. Some examples are:

- 1) Air from the trachea If the death is suspected to have resulted from a toxic gas, then it may be useful to collect air from the lungs. These specimens may be collected by means of vacuum containers that will draw the air into a sealed container for subsequent submission to the laboratory, or with special gas syringes.
- 2) Bone, hair, and nails Some substances concentrate in these organs, e.g., heavy metal poisons. Under certain circumstances these specimen materials need to be saved, in adequate quantity. Generally the presence of a poison, such as arsenic, in these specimens cannot be interpreted adequately unless the concentrations are also known in other organs. The substances that concentrate in these organs are usually not indicative of the body effect by these poisons, but may be very useful in indicating the probably interval between exposure and death.

Quantities of Specimens:

It is difficult to generalize about the amount of specimen material to save for submission to a laboratory, except to state that one cannot submit too much.

The following are some general rules that should be helpful in determining how much to collect and submit:

A. What does the laboratory need in order properly to process the request made upon it?

Because laboratories vary in their resources, the best way to answer this question is to discuss it with the laboratory before the question arises. Laboratory A may be able to provide an analysis using 1 ml. of a body fluid and Laboratory B may require 10 ml.

B. How much can be collected?

Using the liver as an example organ, an adult liver may weigh 3000 grams, while an infant liver may weigh only 300 grams. A laboratory may require a minimum of 500 grams for a set of analyses; thus there needs to be a discussion of optional choices with the laboratory prior to autopsy and before making a request for analysis.

C. What analyses are being requested?

If a specific, single analysis is requested, then the quantity of specimen needed is usually easy to specify. If the request for analysis is vague such as "Look for poisons", then the quantity of specimens (even the variety of specimens) becomes very difficult to predict. This type of request should never be made of a laboratory without prior consultation with the laboratory.

D. What role is the poison suspected of contributing to the death?

If the poison is suspected of being the cause of death, then more extensive analysis may be required in the laboratory. This extensive testing will require a greater quantity and variety of specimen than would usually be required to exclude a specified poison. A laboratory

may perform screening tests and several confirmatory tests. Each procedure will require additional specimen quantities.

Specimen Handling:

The handling of the specimens by the submitter is supremely important, since improper handling may prevent proper interpretation of the results or, indeed, impede or even vitiate or invalidate an analysis. The laboratory should always be consulted in advance regarding proper collection, preservation, and chain of custody of all specimens. Because procedures vary from laboratory to laboratory, the requirements for each may vary.

A. Collection The collection of a specimen must avoid contamination.

Contamination may occur because of an admixture of fluids (the mixing of a small amount of gastric contents with a blood specimen may invalidate the interpretation of the laboratory result). Contamination may occur because of residue in the specimen container. If a glass jar has been sterilized with a mercury solution, then a mercury analysis will be useless. Contamination may occur because substances are leached from the wall of the container during storage. Lead in glass may contaminate urine that is collected in glass containers that are not properly prepared. There are many potential sources for contamination, and the collector must be prepared to prevent this from happening.

B. Preservation The decomposition of biologic specimens is not preventable indefinitely. The purpose of preservation is to protect the biologic specimen for the time frame that is expected to lapse between collection and final analysis. The collector is responsible for preservation between collection and arrival in the laboratory. This can

usually be accomplished by three methods:

- 1) Rapid Delivery As a general rule the instant delivery of the specimens to the laboratory is the best method of preventing specimen change or decomposition.
- 2) Chemical Chemicals may be added to a biological specimen for short-term preservation. The chemical preservative must not dilute the specimen (through use of liquids) and must not be a substance that is suspected of being present in the instant case. Dried sodium fluoride in a blood collection tube for alcohol analysis is an example of an acceptable chemical preservative.

The use of formalin is to be avoided!

- 3) Cold The use of refrigeration and freezing are time honored methods of specimen preservation. If the collector does not know the proper method for preservation, then refrigeration of the specimen is the best choice until the laboratory can be consulted. Specimens should not be repeatedly frozen and thawed.

C. Chain of Custody Whenever a specimen leaves the possession of the collector, the potential for catastrophe is present. The collector must assist in establishing and maintaining the identity and integrity of the specimen and must insure prompt physical delivery to the laboratory. Personal delivery of the specimen by the collector to the laboratory is obviously the usual method that provides the greatest control of these two items. There are many ways of obtaining the same control. However, physical and personal delivery of specimens

without receipts and documentation of transfers will not necessarily maintain chain-of-custody. The following are two examples that have been found useful:

- 1) Single specimen mailing Blood is probably the most common specimen submitted, and analysis for ethyl alcohol is the most common request. It is also very common to deliver this specimen using the U.S. Postal Service. In this instance, the mailing container must be sturdy (heavy cardboard is very useful). There must be a shock-absorbing packing. The mailing label should be a "wrap around" to allow the receiver in the laboratory to testify that the box was fully sealed upon receipt. The box contents should include 3 additional items.
 - a) Specimen Container A glass or plastic test tube with a screw top and unused liner works very well. The tube should contain dried sodium fluoride as a chemical preservative, at a final concentration of at least 1% w/v (=10mg/ml).
 - b) Request Form This may either be a request only or a request/report form. The request form contains the various informational items such as identity of the subject; case number; geographic area of submission; identity of material submitted; when, where, and by whom collected; test(s) requested; identity of the submittor; person(s) to whom report is to be rendered; and signature of submittor.
 - c) Adhesive Number Labels These labels are to be affixed

to the specimen tube and to the request form. This allows proof that the request form and the specimen container represent the same subject.

This example provides total control of the chain of custody from submitter to laboratory.

- 2) Multiple Specimen Mailing Often there will be a variety of materials collected. This will be common when an autopsy has been performed. The example which follows is merely one method of assuring that chain-of-custody has been accomplished. There are other advantages of this system that can be used in a self-contained environment, but would require modification for an "outside" laboratory system.

The items that are present in this example are:

- a) A multipart request form (3 parts). This is N.C.R. (no carbon required) paper. The upper part of the first page is for the basic identification that gives accession number; geographic region; name of subject; list of specimens; date, time, and signature of collector; analyses requested; name and address of police officer (if involved); and signature of person responsible for investigation or submission.

The second page of the 3 part form has an inventory list on the lower half that is identical to the third page. The first and second page are delivered with the specimen to the laboratory.

The third page is retained by the submitter. These two

pages tell the laboratory what is requested. When all tests are completed, the report and the second page are returned to the submitter. The latter can review the results; and if no additional tests are required the submitter will recombine the second and third pages, and indicate approval to discard any remaining specimens with the affixing of a date and signature. The second sheet is now returned to the laboratory, with the third sheet being retained by the submitter.

- b) The second item is a multipart number label. The various stickers are placed on each container submitted, each page of the request form, and on the investigation form itself. Those stickers that are not used are sent to the laboratory with the request form.

This system allows identity control between the request sheet and the specimen containers. It also allows the investigator's files to be complete at all stages. It finally assists the laboratory to manage the specimen inventory by providing timely discard authorization. For "outside" laboratories, adequate clinical details and information concerning the autopsy findings should be provided to the laboratory so the laboratory can be of consultative help to the submitter and logically plan its work.

Embalming Embalming of a body, whether by arterial or cavity injection, irreversibly alters the chemical composition of the tissues and structures and affects all remaining body components in various ways. Arterial embalming also

results, of course, in removal of blood from the circulation. Embalming is, therefore, a profound hindrance to toxicological analysis and will completely destroy the usefulness of a search for any components of the embalming fluid used, e.g., methyl alcohol. Formaldehyde, which is a principal component of embalming fluids, reacts with and changes chemical entities within the body inclusive of many toxic agents, if present. Embalming thus greatly complicates toxicological analyses; but it does not make it impossible to carry out, successfully, any toxicological analysis, as is sometimes alleged. Some analyses remain relatively unaffected; others are affected to varying and usually unpredictable extents. Hence, the general rule should be to produce adequate quantities and kinds of biological specimens for all anticipated toxicological analyses before any embalming of the body. When the rule is inapplicable, as in exhumations or other instances of inquiry initiated subsequent to embalming, the recommended practice is to consult with a qualified toxicologist to discuss the relevant factors prior to the decision on examinations to be performed and prior to the selection and collection of specimens from embalmed bodies. Obviously, when specimens are collected from an embalmed body, the toxicology laboratory should be informed of that fact.

At Appendix V-A1 and A2 are Guideline checklists relating to materials, information, and actions by the agency submitting requests to toxicology/microbiology/and other analytical laboratories.

In the guideline checklists, reference is made to the inclusion of death scene and body examination reports with the specimens to be analyzed. In fact, the toxicology/microbiology/other laboratories will have established procedures and forms which may summarize these relatively voluminous backup/historical reports. Such possibilities point up the requirement for constant, close coordi-

dination with the analytical laboratories. Laboratories are constantly improving testing methodologies -- which, in turn, reflect on specimen and case information requirements.

results, of course, in removal of blood from the circulation. Embalming is, therefore, a profound hindrance to toxicological analysis and will completely destroy the usefulness of a search for any components of the embalming fluid used, e.g., methyl alcohol. Formaldehyde, which is a principal component of embalming fluids, reacts with and changes chemical entities within the body inclusive of many toxic agents, if present. Embalming thus greatly complicates toxicological analyses; but it does not make it impossible to carry out, successfully, any toxicological analysis, as is sometimes alleged. Some analyses remain relatively unaffected; others are affected to varying and usually unpredictable extents. Hence, the general rule should be to produce adequate quantities and kinds of biological specimens for all anticipated toxicological analyses before any embalming of the body. When the rule is inapplicable, as in exhumations or other instances of inquiry initiated subsequent to embalming, the recommended practice is to consult with a qualified toxicologist to discuss the relevant factors prior to the decision on examinations to be performed and prior to the selection and collection of specimens from embalmed bodies. Obviously, when specimens are collected from an embalmed body, the toxicology laboratory should be informed of that fact.

At Appendix V-A1 and A2 are Guideline checklists relating to materials, information, and actions by the agency submitting requests to toxicology/microbiology/and other analytical laboratories.

In the guideline checklists, reference is made to the inclusion of death scene and body examination reports with the specimens to be analyzed. In fact, the toxicology/microbiology/other laboratories will have established procedures and forms which may summarize these relatively voluminous backup/historical reports. Such possibilities point up the requirement for constant, close coordi-

dination with the analytical laboratories. Laboratories are constantly improving testing methodologies -- which, in turn, reflect on specimen and case information requirements.

APPENDIX V-A-1

GUIDELINE CHECKLIST

TOXICOLOGY
SPECIMEN SUBMISSION
(TO THE LABORATORY)

Guideline Checklist

DECEDENT _____ CASE # _____
LOCATION (occurrence) _____ CASE # _____
SUBMITTING AGENCY: _____ DATE/TIME (other agencies) _____
PERSON TO CONTACT _____ PHONE: _____

TOXICOLOGY SPECIMEN SUBMISSION (TO LABORATORY)

- 1. CONSULTATION WITH TOXICOLOGY LABORATORY
 - a. Case Description
 - b. Test Selection
 - c. Specimen Selection
 - d. Specimen Quantity
 - e. Delivery Details
 - f. Estimated Report Date
- 2. CASE HISTORY TO LABORATORY (As Required)
 - a. Death Scene/Ancillary Investigation Reports
 - 1) Scene Details
 - 2) Body Details
 - 3) Last Meal Details
 - b. Medical/Medication History
 - c. Emergency/Hospital Treatment/Drug Administration
 - d. Body Examination Reports
 - 1) External Examination Only Report
 - 2) Internal Examination Report

3) Embalming Details

4) Apparent Cause/Manner of Death

3. SPECIMEN SUBMISSION

a. See para. 1, above

b. Identification/Description

1) Bile

2) Blood

3) Bone

4) Brain

5) Drug Material

6) Gastric Content

7) Hair

8) Kidney

9) Liver

10) Major Joint Fluid

11) Nails (clippings/scrapings)

a) Fingers

b) Toes

12) Plant Material

13) Small Intestinal Content

14) Spleen

15) Tissue

16) Trachea Air

17) Urine

18) Other

c. Collection Process Details

1) Technique/Location

2) Collection Date/Time

3) Preservatives Added

4) Storage

d. Specimen Retention/Disposition Instructions

4. SUSPECTED DRUGS/POISON/TOXIC MATERIAL

5. ANALYSES REQUESTED

6. CHAIN OF CUSTODY DOCUMENTATION

a. Log (Possession)

b. Specimen/Forms/Documentation Control Identification (Tagging)

7. SUPPLY REPLENISHMENT

a. Chain of Custody Forms/Labels/Tags

b. Dressing (Specimen) Jars

c. Evidence Sealing Material

d. Forms (Submission/Request/Administration)

e. Nail Kit

f. Packaging Material

g. Paper Bindles

h. Preservatives (Sodium Fluoride)

i. Test Tubes (Glass/Plastic)

APPENDIX A-2

GUIDELINE CHECKLIST

TOXICOLOGY

Guideline Checklist

DECEDENT _____

CASE # _____

LOCATION (occurrence) _____

CASE # _____

REQUESTOR: _____

DATE/TIME (other agencies) _____

EXAMINER: _____

PHONE: _____

TOXICOLOGY

1. CASE DESCRIPTION

- a. Requestor Case Number
- b. Decedent
- c. Examination Request
- d. Specimens Submitted

2. EXAMINATIONS/ANALYSES

- a. Methods
 - 1) Title
 - 2) Description
 - 3) Literature References
- b. Detection/Sensitivity Limitations
- c. Problems Encountered

3. FINDINGS & RESULTS

- a. Listing (Per Request)
- b. Quantitative Unit Expressions
- c. Unrequested Findings

4. ANALYTIC DETAILS

5. SPECIMEN DISPOSITION

- a. Reserved/Retained Specimens
- b. Discard Schedule

APPENDIX B

HISTORICAL ASPECTS
OF
FORENSIC TOXICOLOGY

HISTORICAL ASPECTS OF FORENSIC TOXICOLOGY

Highlights

- 1814 Mathieu Joseph Donaventure Orfila (1787-1853) published a test TRAITÉ DES POISONS in Paris, considered to mark the beginning of "modern" forensic toxicology.
- 1836 First practical method of arsenic detection described by James M. Marsh (1789-1846), subsequently improved by Hugo Reinsch.
- 1851 Method of extracting organic poisons from tissue introduced by Jean Servais Stas; modified by F.J. Otto in 1856 to become the "Stas-Otto" method.
- 1874 Professor John J. Reese of the University of Pennsylvania Medical School published A MANUAL OF TOXICOLOGY.
- 1880 Professor Rudolph A. Witthaus, Cornell University Medical School, practiced forensic toxicology in New York City and with T.C. Becker, in 1894, published the leading text MEDICAL JURISPRUDENCE, FORENSIC MEDICINE AND TOXICOLOGY.
- 1889 Qualitative tests for carbon monoxide in blood developed by F. Hoppe-Seyler.
- 1903 F. Peterson, W.S. Haines, and R.W. Webster edited the text LEGAL MEDICINE AND TOXICOLOGY.
- 1905 W. Autenrieth developed a systematic method for extraction of nonvolatile organic poisons from tissues, and published the leading text DIE AUFFINDUNG DER GIFTE UND STARK WIRKENDEN ARZNEISTOFFE ZUM GEBRAUCH IN CHEMISCHEN LABORATORIEN.
- 1915 E.M.P. Widmark described correlation of alcohol intake with concentration in blood and urine.
- 1918 Professor Alexander O. Gettler of New York University (1883-1968) established the toxicology laboratories of the Office of the Chief Medical Examiner, City of New York. During 1930-50, he formalized academic toxicology education in the U.S. at New York University.
- 1921 "Drowning test" (differential chloride determination in heart chamber blood) developed by A.O. Gettler.

- 1922 Professor Rolla N. Harger began practice of forensic toxicology at Indiana University School of Medicine in Indianapolis. He demonstrated, in 1931, the first practical breath-alcohol analysis device (the Drunkometer) and co-founded, in 1936, the National Safety Council's Committee on Alcohol & Drugs.
- 1940s Professors F.L. Kozelka (University of Wisconsin), W.D. McNally and W.J.R. Camp (University of Illinois), and Dr. C.W. Nuehlberger (Cook County Coroner's Office, Chicago) practiced forensic toxicology in the Midwest and developed many advances in analytical and interpretive toxicology.
- 1948 Leo R. Goldbaum described a widely-used ultraviolet spectrophotometric analysis method for barbiturates in biological specimens, an early prototype of many instrumental analysis methods in toxicology.
- 1950 Organizational meeting of American Academy of Forensic Sciences and of its Toxicology Section was held in Chicago.
- 1958 Registry of Human Toxicology was established by the Toxicology Section, American Academy of Forensic Sciences.
- 1963 The international Association of Forensic Toxicologists (TIAFT) was founded in London.
- 1963 Certification in Toxicological Chemistry was initiated by American Board of Clinical Chemistry.
- 1974 Society of Forensic Toxicologists (SOFT) was organized.
- 1975 American Board of Forensic Toxicology was established, with Professor Kurt M. Dubowski of the University of Oklahoma as its first President.
- 1977 Journal of Analytical Toxicology was established.

APPENDIX C

STAGES OF ACUTE ALOHOLIC

INFLUENCE/INTOXICATION

STAGES OF ACUTE ALCOHOLIC INFLUENCE/INTOXICATION

BLOOD-ALCOHOL CONCENTRATION, %w/v	STAGE OF ALCOHOL INFLUENCE	CLINICAL SIGNS/SYMPTOMS
0.01-0.05	Sobriety	No apparent influence Behavior nearly normal by ordinary observation Slight changes detectable by special tests
0.03-0.12	Euphoria	Mild euphoria, sociability, talkativeness Increased self-confidence; decreased inhibitions Diminution of attention, judgment, and control Loss of efficiency in finer performance tests
0.09-0.25	Excitement	Emotional instability; decreased inhibitions Loss of critical judgment Impairment of memory and comprehension Decreased sensory response; increased reaction time Some muscular incoordination
0.18-0.30	Confusion	Disorientation, mental confusion; dizziness Exaggerated emotional states (fear, anger, grief, etc.) Disturbance of sensation (diplopia, etc.) and of perception of color, form, motion, dimensions Decreased pain sense Impaired balance; muscular incoordination; staggering gait, slurred speech
0.27-0.40	Stupor	Apathy; general inertia, approaching paralysis Markedly decreased response to stimuli Marked muscular incoordination; inability to stand or walk Vomiting; incontinence of urine and feces Impaired consciousness; sleep or stupor
0.35-0.50	Coma	Complete unconsciousness; coma; anesthesia Depressed or abolished reflexes Subnormal temperature Incontinence of urine and feces Embarrassment of circulation and respiration Possible death
0.45+	Death	Death from respiratory paralysis

KURT M. DUBOWSKI, Ph.D., DABFT
 University of Oklahoma
 College of Medicine
 Oklahoma City, Oklahoma
 Member, Committee on Alcohol and Drugs,
 National Safety Council

DENTAL EVIDENCE

KEY WORDS

Antemortem Dental Records . . . Bitemarks . . . Documentation . . .
Identification . . . Odontologist . . . Postmortem Dental Records . . .
Trauma.

I. INTRODUCTION

The examination and evaluation of dental evidence can be of assistance in the medico-legal investigation of death. The skills of the forensic odontologist are most frequently called upon to assist in three major areas:

- Identification
- Analysis of Dental Trauma
- Analysis of Bitemarks

Most often, the evidence which the odontologist examines and evaluates has been collected or photographed by someone else -- the initial policeman on the scene, the scene investigator, the detective, the medical examiner, etc. As with all other forms of evidence, it is of the utmost importance that all procedures and guidelines concerning the collection, handling, tagging, photographing and maintenance of evidence are followed. Bitemark

evidence is very fragile, so it is mandatory to document the evidence as soon as possible.

Once the body is removed from the death scene to the morgue, if dental evidence is involved, the pathologist should consult with the odontologist to determine:

- What evidence exists/is sought?
- What autopsy procedures are required?
- What analyses will be performed?
- What ancillary information is required?

It is very important to work out the decision-making process in advance -- or important evidence may be damaged or destroyed. For example, in the case of unknown, decomposed remains if the pathologist excises the jaw for dental examination before the anthropologist has examined the skull, the anthropological work-up will be severely impeded.

II. IDENTIFICATION

Dental evidence has been in use in the U.S. since the founding of the country. The first recorded case of a dental identification was made by Paul Revere during the Revolutionary War. Revere, who dabbled in dentistry, identified a body in an unmarked grave as that of General Joseph Warren who was killed during the Battle of Bunker Hill. The identification was based on the dental prosthesis (a bridge of silver and ivory) which he had made for the General two years earlier.

As early as 66 A.D. a tooth was used to confirm the identity of a severed head. Nero's mistress demanded that the head of his wife be presented to her on a silver platter to prove her dead. A discolored anterior tooth was used to confirm the identification.

Dental evidence was first admitted in American courts during the Webster Parkman murder trial in 1849 in Massachusetts. In that case, Dr. Webster was convicted of murdering Dr. Parkman by stabbing, dismembering and partially burning him. Parkman's dentist identified fragments of porcelain denture found in Webster's laboratory furnace as belonging to Parkman.

Identification is the most common use made of dentistry in the medico-legal investigation of death. Dental evidence is used in the identification of burned, fragmented, mutilated, decayed or otherwise unidentifiable human remains. The teeth are the most durable of the tissues of the body and dental restorations such as metal crowns, porcelain jackets, inlays or prosthetic appliances resist heat in the range of 2000°F. Hence, dental evidence can be of critical importance in airplane crashes, explosions, fires and mass disasters. Indeed, it may be the only solid evidence in some cases.

Dental identification is established by comparison of some type of dental evidence from the unknown person or remains with similar dental evidence obtained from a known record of the person in question. The combinations of teeth missing or present, surfaces filled or unfilled, filling materials, prosthetic appliances, anomalies and the like are almost limitless. Antemortem records of these conditions may be found in written dental records, x-rays, study casts, models, impressions and certain photographs.

Data Collection/Recording

Guidelines for the collection of dental evidence at the scene are well documented in Chapter II - Death Scene Investigation, Chapter III - Body at the Scene and Chapter VII- Anthropology.

The following procedures involve the tasks and analyses to be performed by the odontologist after the evidence is made available to him.

Care must be taken to accurately record the condition of the teeth after death. The following techniques may all be used to compile postmortem records:

- Charting of Teeth
- X-rays of Dentition
- Models of Teeth

The postmortem records of the unknown are then compared with antemortem records of a known person. The antemortem records may consist of any or all of the following:

Written Dental Records

- cavities
- existing fillings
- present and missing teeth
- treatment
- anomalies and/or unusual conditions
- prosthetic appliances, tooth shades (laboratory prescription)
- schematic drawings
- insurance payment records (machine print-outs)

X-Ray Films

- teeth and jaws (panoramic)
- segment teeth and roots, jaw (periapical)
- segment crowns both jaws (lateral jaw)
- one side teeth and jaws (lateral jaw)
- teeth and jaws both sides (lateral skull)
- anterior teeth (anterior-posterior skull)

Dental Models

- study casts
- prosthetic models
- dies (models of individual teeth)

Prosthetic Appliances

- full dentures
- fixed partial dentures (bridges)
- removable partial dentures
- crown and jackets (caps)

Photographs

Comparison of Antemortem and Postmortem Findings

The examiner must carefully evaluate the validity, accuracy and completeness of the known, antemortem records. Most often, the postmortem records will be more accurate and complete than the antemortem records which may include more financial data than complete dental information. A single x-ray film, for example, may contain more information than written records. However, all antemortem records available should be utilized.

The most valid type of dental record to use for identification purposes is one in which all the unique and individual characteristics to be used in the comparison are graphically displayed. A check should be made to determine if this record has been tampered with or altered.

X-ray films represent the best record for identification purposes. In fact, the greatest technological innovation in the field of dental identification is the availability and use of dental x-rays for comparisons and identifications. A single dental x-ray film will contain considerable amounts of objective information.

Dental models are also an excellent source for comparisons. In both x-ray films and dental models, numerous morphological characteristics delineating dental treatment and restorations are present. (Orthodontists' files are an excellent repository of photographs, x-rays and models.)

It is critically important in all cases where dental evidence and records are to be used for identification purposes, that the validity of the "known" evidence is ascertained.

Once all records of antemortem and postmortem records have been evaluated, the odontologist may make the following determinations regarding identity:

- positive identification - data confirms
- probable identification
- excluded - data indicates antemortem and postmortem records are not of one individual.

In addition to confirming or excluding an identification, the odontologist can assist in determination of the age of the deceased by studying:

- tooth eruption
- odontogenesis
- attrition (teeth lost)
- degenerative processes

Race determinations may also be made. Specific dental characteristics peculiar to a certain race may be detected.

III. DENTAL TRAUMA

Odontological examination of injuries to hard and soft structures may assist in determining causation. Although not frequently called upon to perform such work the odontologist should have the following information: hospital records, dental treatment records and photographs. Hospital and dental records

will often include narrative descriptions of injuries and treatment rendered, x-ray films, professional opinions of injury age and statements to doctors or other personnel (by the patient or others) which allege the manner in which the injury was caused.

IV. BITEMARKS

During the past decade increasing attention and recognition has been given to the "marks" made by the dentition of one individual on the skin of another. These bitemarks can be of considerable value in including or excluding individuals as the suspect or perpetrator in cases involving sexual abuse, child abuse and homicide.

Collection of Evidence

Because of the nature of the injury patterns caused by biting, it is important that suspected bite marks are:

1. recognized
2. preserved
3. documented
4. analyzed

Awareness of the types of cases where bite mark evidence is most frequently encountered will assist the law enforcement officer, investigator, emergency medical personnel, coroner and/or pathologist in recognizing bite mark injuries. Knowledge of common location of bite marks in various types of cases is also important. (See Table VI-1).

At the scene, if bite mark injuries are suspected the following procedures should be followed:

1. photograph the injury
2. perform saliva washings for serological analysis (See Chapter II)

TABLE VI-1

COMMON LOCATIONS OF BITEMARK INJURIES

<u>Type of Case</u>	<u>Locations of Bitemarks</u>
Heterosexual Assault - Female Victim	Breast, Thigh, Anterior Shoulder, Pubic Area, Neck, Arm, Buttocks
Heterosexual Assault - Male Victim	Abdomen, Chest, Arm
Homosexual Assault -	Upper Back, Armpit, Posterior Shoulder, Penis, Scrotum, Breast, Arm
Child Abuse	Cheek, in particular. Almost any place else.
Nonsexual Assault	Arms, Legs, Thorax, Chest

If bite mark evidence is not recognized at the scene the following procedures should be performed in the morgue:

1. photograph the injury
2. perform saliva washings
3. collect tissue specimens for microscopic study
4. if appropriate, take impressions

The pathologist may resect the entire bite mark area or take small samples for microscopic analysis. He may determine grossly and microscopically whether the bite mark is a healed, healing, or new injury in relation to the time frame of the crime. Good color photographs may be used by the pathologist, forensic odontologist, or other competent expert to render opinions relative to the age of the injury.

Care must be taken in photographing bite marks. Photographs should be shot from directly above the injury and from several angles emphasizing the outline and pattern of the mark. Both black and white and color fine grain film should be used. If only one film is used, color is mandatory. All photographs should be prepared on a 1 : 1 basis, that is life size.

The photographs should show the bite mark in relation to adjacent anatomic landmarks, close-ups of the entire bite mark, and close-ups of each individual arch pattern. Oblique lighting using a single floodlight or flash is helpful in bringing out the texture and surface indentation of the mark.

In all cases, photographs should be taken with and without a millimeter ruler present to demonstrate that the ruler has not obscured any evidence.

Microscopic analysis of tissues sections will assist in determining whether the wound is new, healing or healed and/or whether it was inflicted antemortem, perimortem or postmortem.

Examination of the suspected "biter" will require appropriate legal authority. The odontologist may seek to obtain:

- dental casts of suspect's dentition
- wax bites
- photographs (intra and extra oral)
- interocclusal bite registration
- oral examination
- x-rays

Evidence collected during the examination is interpreted by the forensic odontologist and a comparison made with the bite mark pattern in the tissue which now usually exists as a photograph. The basic question the forensic odontologist is trying to answer is, "Are the teeth of the person in question the common origin of the bite mark in the tissue and the comparison materials?"

Bitemark Analysis

The odontologist may employ several analytical methods to compare the bite-mark injury evidence with data on the suspect's dentition. The methods may include: acetate tracings; radiographic overlays; measurements of tooth size, arch width, and biting radius; image enhancement; xerography; and computer analysis.

In the analysis of bite mark evidence the questions, observations, and opinions might follow this sequence:

1. Is the injury a bite mark?

Factors: Ovoid or elliptical pattern

Full or partial shape

Includes "suck mark"

Linear interrupted abrasion pattern
(consistent with tooth sizes)

Arch size consistent with dentition
(or portion of dentition)

2. Is the bite mark human or animal origin?

Factors: Arch form

"Suck mark" present/absent

Canine perforations deep/superficial

Tissue tearing and laceration/superficial abrasion pattern

Arch size consistent with human/animal dentition

Individual tooth pattern consistent with human/animal
dentition

3. Has the bite mark been made by adult or child?

Factors: Arch size

Individual tooth size

4. Which is upper arch/lower arch?

Factors: Arch size

Class incisor tooth size

5. Which teeth are represented?

Factors: Class characteristics of types of teeth

6. Is individualization possible with reasonable dental certainty?

Factors: Unique and individual characteristics

7. Can this bite mark be placed in the time frame of the crime?

8. Is the bite mark consistent with the type of death, e.g., sexual
assault, homicide, child abuse?

Basic forensic odontology conclusions include:

1. With reasonable dental certainty the bite mark in the tissue and the
exemplar have been left by the same teeth. (A high degree of proba-
bility that the two bite marks have a common origin)

2. The bite mark in the tissue and the exemplar are consistent. (The
bite marks could have a common origin. A meaningful conclusion be-
cause a single discrepancy will exclude a suspect.)
3. The bite mark in the tissue and the exemplar are not consistent.
(Exclusion)

It should be noted that a positive identification is theoretically possible.

V. CONCLUSIONS

Through careful recognition, collection, preservation and documentation
and analysis, dental remains, dental trauma and bitemark injuries can be of
great assistance in determining identity of the unknown, causation of injury
and inclusion or exclusion of suspects.

Guideline Checklist

VICTIM NAME _____ CASE # _____
LOCATION (occurrence) _____ CASE # _____
EXAMINER _____ DATE/TIME (other agencies) _____

APPENDIX VI-A

BASIC ANTEMORTEM DENTAL RECORDS

BASIC ANTEMORTEM DENTAL RECORDS

(In addition to all Death Scene, Demographic and other Auxiliary Investigation Documentation made on this case, the following antemortem records should be sought - given possible deceased identifications.)

1. WRITTEN/CHARTED/SCHEMATIC
 - a. Cavities
 - b. Existing Fillings
 - c. Present and Missing Teeth
 - d. Treatment History
 - e. Anomalies/Unusual Conditions
 - f. Prosthetic Appliances
 - g. Tooth Shades

2. X-RAY FILM
 - a. Teeth/Jaws (Panoramic)
 - b. Segment Teeth/Roots/Jaws (Periapical)
 - c. Segment Crowns (Lateral Jaw)
 - d. One Side Teeth/Jaws (Lateral Jaw)
 - e. Both Sides Teeth/Jaws (Lateral Jaw)
 - f. Anterior Teeth (Anterior - Posterior Skull)

3. DENTAL MODELS

- a. Study Casts
- b. Prosthetic Models
- c. Dies (Individual Teeth Models)

4. PROSTHETIC APPLIANCES

- a. Full Denture
- b. Fixed Partial Denture (Bridge)
- c. Removable Partial Denture
- d. Crown/Jackets (Caps)

5. PHOTOGRAPHS

6. MISCELLANEOUS DOCUMENTATION

- a. Schematic Drawings
- b. Insurance Claim/Payment Records
- c. General Medical History Records
- d. Missing Person Repositories/Data Bases
- e. Hospital/Clinic Dental Treatment Records

7. ANTEMORTEM DOCUMENTATION VALIDATED

APPENDIX VI-B

DENTAL IDENTIFICATION

Guideline Checklist

VICTIM NAME _____ CASE # _____
LOCATION (occurrence) _____ CASE # _____
EXAMINER _____ DATE/TIME (other agencies) _____

DENTAL IDENTIFICATION

(For Checklist Items #1 - 7, see "Basic Antemortem Records")

- 8. DENTAL PRE-EXAMINATION CONSULTATION
 - ___ a. Pathology
 - ___ b. Toxicology
 - ___ c. Physical Anthropology
 - ___ d. Criminalistics Laboratory
 - ___ e. Death Scene Investigation

- 9. DENTAL PRE-EXAMINATION DECISION-MAKING
 - ___ a. Body Examination Protocol Established
 - ___ b. Dental Examination Protocol Established
 - ___ c. Toxicology Requirements Established
 - ___ d. Ancillary Requirements Requested

- ___ 10. POST-MORTEM DOCUMENTATION/FINDINGS AVAILABLE/STUDIED

- ___ 11. POST-MORTEM EXAMINATION CONDUCTED

- ___ 12. POST-MORTEM EXAMINATION DOCUMENTATION
 - ___ a. Written Reports
 - ___ b. Charting
 - ___ c. X-Rays
 - ___ d. Models
 - ___ e. Photographs

- ___ 13. DENTAL EXAMINATION ANALYSIS (POST MORTEM vs ANTEMORTEM)
 - ___ a. Unique/Individual Characteristics Comparison
 - ___ b. Comparison of all Documentation

- ___ 14. DENTAL DETERMINATIONS
 - ___ a. Identification
 - ___ b. Age
 - ___ c. Race
 - ___ d. Other

- ___ 15. DOCUMENTATION/CHAIN OF CUSTODY ACCOMPLISHED

APPENDIX VI-C

BITEMARKS

Guideline Checklist

VICTIM NAME _____ CASE # _____
LOCATION (occurrence) _____ CASE # _____
EXAMINER _____ DATE/TIME (other agencies) _____

BITEMARKS

(For Checklist Items #1 - 7, see "Basic Antemortem Records")

- ___ 8. SUSPECTED BITEMARK INJURIES LOCATED
- ___ 9. CONSULTATION
 - ___ a. Pathologist (Protocol Established)
 - ___ b. Toxicologist (analyses Established)
- ___ 10. EVIDENCE COLLECTION
 - ___ a. Saliva Washings
 - ___ b. Tissue Specimens
- ___ 11. DOCUMENTATION
 - a. Photography
 - ___ 1) Shots (Overhead/Angle)
 - ___ 2) Film (Color and Black & White - Fine Grain)
 - ___ 3) Lighting (Single Floodlight or Flash/Oblique)
 - ___ 4) Composition (Large Area - Anatomic Landmarks/Closeup - entire bite mark & individual arch patterns)
 - ___ 5) Comparison (with millimeter ruler/without ruler)
 - b. Impressions, if appropriate
 - c. Written/Taped Records
- ___ 12. SUSPECTED "BITER" EXEMPLARS
 - ___ a. Legal Authority Granted

b. Examination Conducted

- 1) Dental Cost
- 2) Wax Bite
- 3) Photographs (Intra & Extra Oral)
- 4) Interocclusal Bite Registration
- 5) Oral Examination
- 6) X-Rays

13. ANALYSIS

a. Methods

- 1) Acetate Tracings -
- 2) Radiographis Overlays
- 3) Tooth Size Measurements
- 4) Arch Width
- 5) Bite Radius
- 6) Image Enhancement
- 7) Xerography
- 8) Computer Analysis

b. Bite Mark ?

c. Human or Animal Bite Mark ?

d. Human Adult or child Biter ?

e. Upper & Lower Arch Identification ?

f. Teeth Identification ?

g. Induvidualization Possible ?

h. Bite Mark Age Determination ?

i. Bite Mark Consistent w/Cause & Manner of Death ?

14. CONCLUSIONS DOCUMENTED

CHAPTER SEVEN

PHYSICAL EVIDENCE - ANTHROPOLOGY

CHAPTER SEVEN

PHYSICAL EVIDENCE - ANTHROPOLOGY

KEY WORDS

Burials...Forensic Archaeology...Forensic Anthropologist...
Scene Investigation...Skeletal.

I. INTRODUCTION

The human skeleton consists of 206 bones. The smallest are the tiny bones of the middle ear which can be contained in an English pea with room to spare. The largest is the femur, or thighbone, which may be nearly a couple of feet long in a very tall man. As we usually see them - wired together and dangling quietly in the corner of a biology laboratory or doctor's office - they appear as inert and uncommunicative as stone. Yet, properly studied, each bone can tell a tale about the life and death of the individual whose flesh once clothed it. For bone, in the living human, is as dynamically alive as the pulsating cells of the blood and brain. From the time the first spicules of bone are laid down in the developing fetus until the last death rattle of the brittle-boned centenarian, bones respond with exquisite sensitivity to the stress of living. Details of their shape reflect our familial and racial heritage; poor diet may alter them; diseases and injuries may scar them. Even the habitual

patterns of muscle use peculiar to certain sports or occupations may be reflected in their shape. Finally, if our death is unpeaceful and we die at the hand of a murderer, the agent of the act-bullet, knife or cudgel -- may leave a mark as damning as the testimony of a witness.

Unlike our fleshy tissues which will wither and waste within a season of our death, our bones and teeth may survive for millenia. As long as they persist, the records of our lives that they embody will also be preserved. The toil-bowed bones of the poorest pauper may tell his story long after the marble epitaphs of chiefs and kings have crumbled to dust.

The scientists who specialize in reading these brief, bony biographies are physical anthropologists. Traditionally, they have devoted their efforts largely to the study of the bones and teeth bequeathed us by our fossil and prehistoric forebearers. Most of the skeletons they study are unearthed by their colleagues, the archaeologists who, through the excavation and analysis of prehistoric man's structures, tools, weapons, pottery and other items of material culture, attempt to reconstruct the pattern of life of our remote ancestors. Working together, the archaeologist and physical anthropologist often succeed in developing a picture of prehistoric life that, in many ways, is more complete and informative than the written histories of day-to-day living in more recent societies.

Not all the skeletons that come to light are exposed by the spades of archaeologists. Each year in the United States several thousand are found under circumstances that bring them to the attention of law enforcement officers. Many are discovered in bucolic rural settings by hunters, Boy Scouts, bird-watchers, strolling lovers and other citizens who frequent woodsy places on more or less innocent errands. They can occur almost anywhere, however, and

even in our larger cities, dozens are found annually in parks, alleys, vacant lots and abandoned buildings. Others are washed ashore along lake or ocean beaches or dredged from rivers. Some are found buried more or less deeply by highway or building construction crews, farmers plowing their fields or home gardeners puttering around in their backyards.

This skeletal harvest represents a motley congregation of the dead. Some will prove to be the remains of ancient Indians disturbed from their dusty graves by a Ditch Witch laying a sewer line for a new shopping center. Others, not quite so old, may be pioneers laid away in long forgotten church or family burial grounds. Also among them will be the hunters and hikers who disappeared months or years ago and the aged winos and bag-ladies who froze to death under bridges and in vacant buildings last winter. From along the highways come the bones of the teen-age runaways who hitched one ride too many. Pastures and roadside ditches yield the skeletal victims of criminal wars: snitches, pushers, pimps, petty-dealers, double-dealers and other assorted punks whose transgressions have earned them the terminal trademark of their kind: the close-range, small-caliber entrance wound just behind the ear. Not all are nonentities: surely somewhere among them lies the long-missing candy heiress Mrs. Helen Brach, Jimmy Hoffa and Judge Crater. Perhaps somewhere out there in the deep forests of Oregon, even the bones of the legendary D.B. Cooper lie mouldering among the entangled shrouds of his tattered parachute. Saddest of all are the small skeletons: all of the children who never came home from school one day.

II. FORENSIC ANTHROPOLOGISTS

Toward the end of the last century, police - especially in Europe - began to turn to physical anthropologists in cases involving skeletal remains. It

stood to reason that the skills and knowledge that could be used to reconstruct the lives of individuals who lived thousands of years ago could also be productively applied to the study of skeletons of more recent victims. In this country, these initial contacts between police and anthropologists were begun in the late 1890's when Chicago authorities consulted Dr. George Dorsey, an anthropologist at the Field Museum in the famous Luetgert case. Luetgert, a wealthy Chicago sausage manufacturer, was accused of the murder of his wife, Louisa. The evidence indicated that Luetgert, who had tired of the ailing Louisa, wished to be rid of her so that he would be free to marry a wealthy widow with whom he had been carrying on a rather torrid affair. For several months, he had unsuccessfully attempted to induce Louisa to divorce him by a campaign of verbal and physical abuse. Louisa remained steadfast however. Unable to dissolve his marriage, Luetgert decided to dissolve his spouse. One evening in May of 1897, he lured Louisa to his sausage factory, murdered her there, and spent the rest of the night rendering her body in a solution of caustic potash which he had prepared in a vat ordinarily used in processing his tasty wares. In the subsequent investigation of Louisa's mysterious disappearance, police found a few fragments of bone in the foul-smelling sludge at the bottom of the vat. They were taken to Dr. Dorsey who identified them as those of a human female. On the basis of this and other evidence, Luetgert was eventually convicted.

Today there are approximately 25 physical anthropologists in the United States who have fully qualified themselves as Forensic Anthropologists by meeting the professional standards of education, training and experience established by the American Board of Forensic Anthropology. Most of the AFBA Diplomates hold full-time teaching or research appointments in university

anthropology departments or museums. Most are available to serve as consultants to Medical Examiners, Coroners or law enforcement agencies in cases involving the recovery and identification of human skeletal remains. A roster of these specialists is available from the Forensic Sciences Foundation.

III. SCENE INVESTIGATION

In cases involving skeletonized remains, the strategy fundamental to any skilled death scene investigation - the discovery and recovery of all significant evidence - still applies. Experience has shown, however, that investigative tactics must be modified to fit the special circumstances of such cases. Forensic anthropologists have found that some of the methods and techniques used by their archaeologist colleagues in the excavation and recovery of prehistoric skeletons can be profitably applied to the investigation of more recent deaths. Increasingly, the term forensic archaeology is being used to describe this approach.

A. Types of Scenes:

While human skeletal remains can turn up in an endless variety of unexpected locations, the majority fit within the following classifications:

Outdoors

- a) Surface finds
- b) Burials

Indoors

- a) Structure intact
- b) Structure damaged or destroyed by fire, explosion or other agents.

The method of recovery of skeletonized remains varies with the type of scene. The methods employed in indoor scenes differ little from those used in routine death investigations of recently dead bodies and will not be considered here.

B. Surface Finds:

These comprise the vast majority of skeletal finds seen by the forensic anthropologist. In homicide cases the victim has either been killed at the site or, as is more commonly the case, the body has been transported there after death. Not all such scenes are homicides: suicides frequently seek isolated outdoor sites and accidental or natural deaths may also occur in such surroundings.

Whatever the cause and manner of death, the body will undergo a series of well-defined decompositional changes whose rates vary greatly with climate, season, microenvironment and the prevalence and types of animal scavengers. During the early stages of decomposition, it remains relatively intact, and scene investigation techniques differ little from those of the ordinary homicide. After a certain period, however, soft tissues are lost through bacterial lysis and scavenger activity and the skeleton becomes disarticulated or separated.

Following disarticulation, the bones generally become scattered. Usually they are dispersed by dogs, coyotes, skunks, feral cats or other small carnivores. Occasionally, mechanical agents such as flooding during heavy rains can also contribute to their dispersal. Eventually, they may be distributed over an area which, depending largely upon local terrain factors, may range from a few square yards to several acres. During this time they are exposed to sunlight, frost, soil acidity, plant root enzymes and other environmental agents that can damage and, sometimes, completely destroy them.

Usually such surface finds are made by citizens who notify law enforcement officers of their discovery. Often they will have picked up a number of the bones to examine them before they become fully convinced that they

are human. Not infrequently, they may remove some bones - particularly the skull - and carry it into the local police headquarters or sheriff's office as proof of their find. In such cases, it is important for the discoverer to return to the scene with the investigating officers to demonstrate any alterations of the site that they may have made before reporting their find.

As in any case, the first priority is to secure the scene. Usually the find will be found no more than a few hundred yards from a well-traveled road. Initially, no vehicles should be allowed to leave this road and approach the scene. After an initial "walk-through" of the site by one or two investigators some idea of the size of the area that the bones are dispersed over can be gained and the boundaries of the scene established with rope or tape. During this initial examination, any bones or other evidence discovered should be left in place, although their locations may be marked so that they can be easily relocated during the more systematic scene search that will follow. The small wire flags used to mark the location of underground utility lines are handy for this purpose. The location of the scene should be recorded utilizing the Universal Transverse Mercator system described in Chapter II, Appendix B.

Under no circumstances should the search be conducted at night. The effective recognition and recovery of small bones and teeth, which often resemble pebbles or clods of earth, is dependent on sharp eyesight and natural light. For similar reasons, searches should not be carried out in inclement weather. If the soil is muddy from recent rains, it is well worthwhile to wait a day or two to begin the search. At night and during bad weather, an officer should be posted at the scene to guard it from intruders.

In the course of the subsequent search, one should keep in mind that the

objectives of the investigation are:

1. To recover and properly preserve all material evidence (bones, teeth, clothing, personal effects, weapons, bullets, etc.) associated with the find.
2. To document accurately (by maps and photographs) the spatial distribution of the recovered items of evidence.
3. To determine the original location of the body and, if possible, its orientation and position.
4. To estimate time of death by correlation of the skeletal evidence of postmortem change with local ecological factors influencing the rates of decomposition and skeletonization.

There is no single ideal search pattern for such cases. Depending upon the size of the area over which the bones appear to be dispersed, the nature of the terrain, the density of the vegetative cover and the manpower available, the investigator in charge must make a tactical decision in selecting a grid, strip, linear sweep, or circular sweep search. The main point to remember is that, whatever pattern is selected, it should be performed in a thorough and systematic manner.

Before beginning the search, the area should be accurately mapped. If the investigative team does not have officers trained in basic mapping techniques or the necessary equipment available, call on your local county or city surveyor. In most sites, a good surveyor equipped with a plane table can, with one chainman, adequately map several acres within an hour or two.

When the search begins, one person should be delegated to register the location of any bone, tooth or other item of evidence found by the search team. When they make a find, the search team members should halt in place

until the officer in charge of the find registration can collect, bag and tag the item and register the site on his map. The searchers should also put down a wooden stake or other marker at each site where a major bone or several small bones are found.

If the agency does not have a forensic anthropology consultant who can travel to the scene and direct the recovery effort, the problem of recognizing human bone and distinguishing it from non-human skeletal remains is bound to arise. Almost any large outdoor site will include some animal skeletal remains, ranging from those of small rodents to horses and cows. Determining whether these are human or animal - especially when the bones have become fragmented through trauma, post-mortem mutilation or animal scavengers, can at times be difficult. A good rule to follow is to treat any item that faintly resembles a bone or tooth as human until it can be examined by an expert. Such questionable items should be bagged and tagged and their locations registered just as if they were definitely human.

It is also useful to have a copy of any one of the elementary anatomical atlases or textbooks that treat the human skeleton in some detail. Such basic texts are usually available at college bookstores or may be borrowed from your local high school or civic library.

After the search area has been swept once, the investigators should take a break and study the results. With the aid of a checklist and diagrams of the bones of the human skeleton, it is possible at this time to develop some ideas that will help guide the subsequent search efforts. For example, if one of the two bones of the left forearm (radius and ulna) has been found, it is very probable that its missing companion will not be too far away. Similarly, bones of the hands and feet tend to be clustered together.

Usually some teeth are missing from the jaws but are very apt to be found near the location of the cranium and mandible.

Also, at this time, it is usually possible to pinpoint the original body location from the spatial distribution of the recovered bones. When animal scavengers attack a decomposing body, they tend to carry away the meatier portions such as the arms and legs. Because it is easily detachable, the less meaty skull may also be carried or tugged some distance from the body. While they may chew and gnaw the bones of the torso such as the ribs, vertebrae and pelvic bones, the ligaments binding these together are especially strong and difficult to detach until nearly all the flesh has rotted from the bone. By the time these bones have become disarticulated and transportable, they are not very attractive to scavengers who thus tend to ignore them. Therefore, in most instances, the original location of the body can be inferred from a clustering of the ribs, vertebrae and pelvic bones. Despite some minor scattering, these bones tend to maintain some semblance of their original anatomical order which will indicate the directional orientation of the body at the time it was deposited at the site.

The original body location is extremely important since many small but vital items of evidence are apt to be concentrated in its immediate area. For example, any teeth not found with or near the skull, may have dropped out before the head was detached by animals and will thus be found near the original body site. Also, the tiny hyoid bone, which is frequently fractured in manual strangulation, may be there. Finally, many non-skeletal items of evidence such as bullets, weapons, jewelry, buckles, etc. may be recovered from this area. Therefore, a more intensive search of this area is warranted once it is identified.

A grid system is the most effective means of searching the immediate body location area. A square, 10 x 10 unit grid pattern with yard, meter or 2-foot units is usually sufficient to cover the site. The main concentration of bones should be in the approximate center of the gridded area. The grid should be laid out with stout wooden stakes and heavy surveyors cord. A numerical or an alphanumeric designation each grid square should be devised and the pattern laid out on graph paper.

Starting at one corner, each grid is searched individually. First it should be covered by a metal detector. Next the investigator should systematically remove the plant growing in the area. The soil adherent to plants should be loosened and sifted through a $\frac{1}{4}$ inch shaker screen. Once the soil surface is exposed, it should be carefully examined for any items on the surface. A whisk broom and small flat triangular trowel is useful at this stage. If the soil is loose or vegetation particularly heavy, small items may have worked their way an inch or so under the surface. For this reason, after the surface has been examined, the top 2-3 inches of soil should be removed with a flat-bladed shovel and screened. Each shovelful of earth removed should be completely screened before adding the next. Each item of bone or other evidence recovered should be assigned a number and placed in a suitably-sized paper bag marked with the item-number and the grid-square in which it was found. Photographs of each find should be made while still in its original location.

C. Burials:

Compared to surface finds, burials are relatively rare. There are two reasons for this: first, not many murderers bury their victims and, secondly, the graves of many victims who are buried are never found. However,

when a grave comes to light it can, if properly studied, provide a bonanza of scientific evidence for the scene investigator. Unlike murderers who, thoughtless of the needs and concerns of the forensic scientist, carelessly dump their victims in a roadside ditch or pasture, heedless of the fact that weather and scavengers will scatter or destroy the evidence, those who are considerate enough to inter the body provide us with a neatly packaged time-capsule. In the first place, burial generally slows decomposition so that soft tissue evidence is preserved longer. Although the body is eventually reduced to a skeleton, all the bones are in the grave and one does not have to scour the countryside for a fugitive femur or missing molar. Likewise, physical evidence such as clothing, bullets, shot, weapons, etc. will remain in the grave with little disturbance of their original position. The grave will also contain good evidence of the time of death. From a study of the type of soil, experts may gain some idea of the rate it retarded decomposition. Plant materials when properly analyzed may also help bracket the time of death. In certain cases, the imprints of the tools used to dig the grave may be preserved. If the digger has stepped into the grave a foot or shoe-print impression may be exposed with delicate excavation techniques.

D. Locating Burials:

Sometimes burials are accidentally exposed by farming, construction work or other human activities. In other cases, animal scavengers, attracted by the scent of a decomposing body may partially disinter and scatter the remains which then are discovered by humans. Depending upon the degree of disturbance and dispersal, the scene investigation must include a surface search along the lines described above, followed by an excavation of the grave.

Often, investigators are led to the scene by informants or the perpetrator

himself. In such instances, the grave will be found undisturbed. Unfortunately, informants may have only a second -- or third-hand knowledge of the burial location and cannot lead the investigators to the exact spot. Since such graves are often dug hastily, at night, in unfamiliar surroundings, even the perpetrator may have difficulty in relocating the grave. As a result, the investigators may be faced with the task of finding the grave site in an area ranging in size from a few hundred square yards to several acres.

In locating a burial of this sort, the first and most obvious step is to make a systematic walk-through of the area, noting any signs of soil disturbance, earth depression or vegetational changes that appear to be suspicious. Such spots should be marked for more intensive study.

Once the suspect sites are identified, the area immediately around them should be secured. Generally, this need be no larger than a 20 x 20 foot square. Before beginning an excavation, one should determine whether or not the site is the actual grave. There are several means of doing this. First, sink a small "control hole" in a spot a few feet from the suspected grave. This can be done with an ordinary post-hole digger. As each "bite" of soil is taken out, lay it in a small pile on a long clean, flat surface such as a board or piece of cardboard. The successive bites should be laid out in a row so that by the time you get down to about four feet you will have a good idea of the normal "profile" of undisturbed soil. This will be manifest by changes in soil color, consistency or compactness as you proceed from the surface to the bottom of the hole. Typically, for example, you may find a foot or so of dark topsoil overlying a deeper strata of clay. If you wish to be really scientific, you should dig a second hole at an equal distance on the other side of the grave and lay it out parallel to the row

from the first. Once this is done, sink a "test hole" in the exact center of the suspected grave. As each bite of 2-3 inches is removed, it should be laid out in a row parallel but separate from that from the control holes. As each test bite is removed, it should be minutely examined for any evidence of bone or artifacts associated with the burial. Proceed slowly, processing each small bite completely before digging the next.

If the site you have tested is indeed the grave, you will probably begin to observe some difference between contents of the test and control holes immediately. First the more recently disturbed soil over the burial is apt to be noticeably looser and easier to dig, to get the feel for this difference in consistency all of the digging should be done by the same person. Secondly, you will find that the color and composition of the earth removed from the test hole differs strongly from the controls. This is because the normal stratification of the soil was destroyed when the grave was dug and the dirt used to refill represented a mixture of the once distinct strata. As you proceed deeper, you may also begin to notice a more or less strong odor of decomposition than can linger in the soil for years after a body is buried. After each bite is removed, examine the sides and bottom of the hole for any signs of bone, clothing, artifacts, etc. with a strong flashlight. At the first sign of bone or artifact, stop digging immediately. Mark the exact location and size of the test hole on the grid map and note its depth. If the suspicious item has been brought up in a test bite, bag it with a note of the depth at which it was found.

In using this method, some slight damage to the skeleton may result; usually however, if the work was done carefully, this will be minimal and repairable if the damage is properly documented. Commonly, for example,

the first bony items noted will be some fragmented ribs or vertebrae.

If the test hole is sunk to a distance of 4 feet without noting any of the above signs, you may exclude the site as being a grave and go on to another.

Other, more sophisticated methods of locating and confirming burials are available in some jurisdictions. These include methane gas detectors, infra-red scanning or photography, isomagnetic surveying, and ultrasound probes. Sensitive metal detectors can be helpful provided some metallic objects are in the grave, which is not always the case. Dogs trained to detect the odor of butyric acid (a breakdown product of body decomposition) have also been used with success in finding graves up to four or five years old. Most of these methods require well-trained operators to be effective and should not be used by amateurs with borrowed equipment.

IV. ANALYSIS AND INTERPRETATION

Experience has shown that it is virtually impossible to recover each and every one of the approximately 200 bones and 32 teeth of the adult skeleton. For this reason, some practical limits must be placed on the time and manpower devoted to such a search. While each bone or tooth can embody information useful in the determination or identification and cause of death, some are generally more informative than others. Some idea of the relative importance of the various skeletal elements is given below:

1. Skull (cranium and mandible)

- a. Race can be determined more reliably from the skull than any other bone.
- b. Sex can be determined from the skull although not with the same high degree of confidence as from an examination of the pelvic bones. (See below)

- c. Age can be estimated within rather broad limits from the skull.
- d. Cause of death: Because the head is a frequent target of violence, the skull will often display fractures, gunshot wounds or other forms of trauma.
- e. Positive Identification: The head is one of the most frequently x-rayed parts of the body. If skull x-rays can be found in the medical records of a possible decedent, positive identification (or exclusion) can be made by comparing them with corresponding films taken on the unknown skull.
- f. Photographic Superimposition: When good photographs of a possible decedent are available, they may be compared with photographs of the skull taken in a corresponding pose. A good match of the superimposed photographs cannot be used as evidence of positive identification but can be used for exclusion.
- g. Facial Reconstruction: Once all locally-known missing persons have been excluded, a reconstruction of the facial features from the skull should be attempted. This technique has become more widely used in the United States in the last decade and presently there are several scientists and artists in this country who have mastered it. It should not be undertaken by amateurs since the results are apt to be extremely misleading. Good facial reconstructions, widely circulated in the media, have provided leads resulting in the eventual positive identification of missing persons in a gratifying number of otherwise stubborn cases.

2. Teeth

The recovery of as many teeth as possible should be a high priority

goal of any search since, in about 80% of cases, positive identification of the victim is made through comparing them with antemortem dental records.

Teeth - especially the front ones - tend to fall out during skeletonization. These loose teeth will most likely be found in the area immediately around the skull and mandible. If the head has been detached from the body and carried away by animals, a "trail" of loose teeth may be found between the body and the head.

Aside from positive identification, a study of the teeth by a forensic odontologist can give information about the sex, race, age, socio-economic status of the unidentified individual.

3. Hyoid Bone

This small bone lies in the upper part of the throat and is frequently fractured in manual strangulation. Careful screening of the earth around the upper torso will often reveal it.

4. Clavicles, Ribs, Sternum, Vertebrae

These bones are generally shown in good detail in routine chest x-rays to be found in nearly every person's medical records. The clavicles (collar bones) and ribs are frequently fractured during life and may also have been x-rayed. If no dental records can be found on a missing individual, such x-rays can often be used to establish positive identification.

The vertebrae are less frequently fractured and generally do not show up very well in routine chest x-rays. However, if the person has had x-rays of the lower spine, abdominal or pelvic region, they may be shown in superb detail and they vary enough in external shape

and internal architecture from individual to individual that they may be used for positive identification.

Signs of trauma such as fractures due to blunt force, fragmentation due to bullet wounds and cut marks from stabbing may often be seen on those bones and help establish the cause of death.

5. Scapulae

By noting certain differences in symmetry between the left and right scapulae (shoulder blades), the anthropologist can often determine whether the individual was left - or right - handed.

In adults, an approximate indication of age at death can be obtained by an examination of the scapula.

6. Innominate

- a. Sex: Differences in the shape of the innominates (hip bones) between males and females are quite pronounced, making them the best single bones for determination of sex in adults.
- b. Age: The pubic symphysis is the joint formed by the two hip bones just above the crotch. The bony surfaces of this joint undergo slow but regular changes during adult life. By studying the extent of the changes the anthropologist can accurately determine the victim's age at death.
- c. Parity: The female innominate bones undergo some minor structural alterations during the latter stages of pregnancy and childbirth. By examining the hip bones for evidence of these so-called birth scars, the forensic anthropologist can usually determine whether or not the victim has given birth to one or more term or near-term infants.

- d. Positive Identification: Along with the vertebrae of the lower spine, the innominates are often shown in good detail in pelvic x-rays taken during life. Comparison x-rays from the unknown skeleton can often be used to establish the identification of the victim.

7. Long Bones

The term long bone generally refers to the major bones of the arm (humerus, radius, ulna) or leg (femur, tibia, fibula). They can provide a wealth of information to the forensic anthropologist:

- a. Stature: The lengths of these bones are more or less directly proportional to an individual's stature during life: Tall people have long bones; short people have short long bones. Anthropologists have taken advantage of this relationship to devise equations that can accurately predict stature from long bone lengths. In general, the leg bones give more precise estimates than those of the arm.
- b. Sex and Race: Certain anatomical features and measurements of the long bones offer some clues to sex and race and can be used in cases where the skull and pelvis are not recovered.

From the above it will be apparent that the skeletal items that are usually the most informative are the skull, teeth, pelvis and the long bones. From them the individual's age, sex, race, stature can be readily determined by anthropological examination. These items, particularly the teeth, also offer the best possibility of eventually positively identifying the victim through comparison with antemortem dental and/or medical x-rays. While no bone should be ignored and every reasonable effort should be made to find them all, one may be reasonably satisfied if, after a 2 or 3 day effort, the above remains have at least been recovered.

A guideline checklist for surface and burial search procedures follows.

APPENDIX VII-A

BASIC ANTHROPOLOGICAL REMAINS SCENE SEARCH

Guideline Checklist

VICTIM NAME _____ CASE # _____
(If known or suspected ID)
LOCATION (occurrence) _____ DATE/TIME _____
SCENE INVESTIGATOR _____ ANTHROPOLOGIST _____

BASIC ANTHROPOLOGICAL REMAINS SCENE SEARCH

These guidelines are to be used in conjunction with the guideline checklists in Chapter II - Death Scene Investigation and Chapter III - Body at the Scene.

DO NOT, repeat, DO NOT attempt to conduct an anthropological remains search at night or in inclement weather! Protect the scene until the search can be performed.

- 1. ARRIVAL AT SCENE
 - a. Scene Secured/Guarded
 - b. Location (UTM, see Chapter II, Appendix B)
 - c. Initial Walk-thru/appraisal
- 2. AREA MAP
 - a. Contours
 - b. Landmarks (trees, fields, foliage, rock outcropping, water, etc.)
 - c. Grid Overlay
 - d. Legend
- 3. SEARCH PATTERN PLAN
 - a. Grid
 - b. Strip
 - c. Linear Sweep
 - d. Circular Sweep
- 4. SURFACE BONES SCENE SEARCH

*Mark location of preliminary finds with small wire flags.
Mark major bone or group of bone finds with flag & stake.*

a. GENERAL AREA SEARCH

1) Finds

- a) Bones
- b) Teeth
- c) Clothing
- d) Personal Effects
- e) Weapons
- f) Other Material Evidence

2) Per Human Find - Including Effects

- a) Assign Item Number/Flag
- b) Photograph as Found
- c) Plot on Map
 - Item Number
 - Annotation (type find - orientation)
- d) Register Documentation
- e) Review Findings
 - Repeat Search for Missing Elements
 - Pinpoint Original Location of Body

b. ORIGINAL SITE OF BODY INTENSIVE SEARCH

- 1) Establish/Stake & Fence Search Area (Main Concentration of Bones)
- 2) Metal Detector Search
- 3) Remove Plant Growth - Search
- 4) Remove Top Soil - Sift

c. Tag/Bag Each Item

d. Complete Registration On Site - Final Body Location/Orientation

e. Collect/Preserve/Package Entomological Samples

5. BURIAL SCENE SEARCH PROCEDURES

a. Systematic Area Walk-Through

1) Know Site

- a) Accidental Exposure
- b) Informant

2) Unknown Site

- a) Soil Disturbance
- b) Earth Depression
- c) Vegetation Change

b. Secure Known/Suspect Sites (20' x-20' square)

c. Suspect Burial Site Location

1) Methane Gas Detector

2) Infra-red Scanner/Photography

3) Isomagnetic Survey

4) Ultra Sound Probe

5) Trained Dog

6) Dig

a) Control Hole Procedure

- "Bite" Inspection

- "Bite" Stockpile

b) Test Hole Procedure

- "Bite" Inspection/Stockpile

- Comparison with Control Hole

c) Record Depth of All Finds

d. Site Excavation

- 1) Sink Additional Text Holes
- 2) Establish Burial Site Perimeter
- 3) Remove Soil/Sift Carefully
- 4) Record Location/Depth/Orientation of Each Finding

6. DOCUMENTATION

- a. Complete all Notes/Maps/Records/Photograph
- b. Deliver all Documentation/Findings per Local Procedure

APPENDIX VII-B

ANTHROPOLOGICAL ANALYSIS & INTERPRETATION

Guideline Checklist

VICTIM NAME _____ CASE # _____
LOCATION (occurrence) _____ CASE # _____
EXAMINER _____ DATE/TIME (other agencies) _____

ANTHROPOLOGICAL ANALYSIS AND INTERPRETATION

These guidelines are to be used in conjunction with the guideline checklists in Chapter II - Death Scene Investigation and Chapter III - Body at the Scene.

Of the approximately 200 bones and 32 teeth in the adult skeleton, only the more important are cited below, together with possible findings.

1. SKULL

- ___ a. Race (most important source for the finding)
- ___ b. Sex
- ___ c. Age
- ___ d. Cause of Death (a major source in trauma)
- ___ e. Positive Identification (especially with antemortem x-rays)
- ___ f. Photographic Superimposition (skull compared to antemortem photo)
- ___ g. Facial Reconstruction (requires expert in this field)

2. TEETH (refer to CHAPTER SIX "DENTAL EVIDENCE")

(This important evidence accounts for approximately 80% of positive identification of victims.)

3. HYOID BONE

4. CLAVICLES, RIBS, STERNUM, VERTEBRAE

(Useful for identification and detection of trauma.)

5. SCAPULAE

- ___ a. Right or Left-handed
- ___ b. Age

6. INNOMINATES

- ___ a. Sex (Best bones for this determination)
- ___ b. Age (Excellent for this finding)
- ___ c. Parity (To determine if victim is female and has given birth)
- ___ d. Positive Identification

7. LONG BONES

- ___ a. Stature (Especially, the leg bones.)
- ___ b. Sex/Race:

CHAPTER EIGHT

DEATH CERTIFICATE

CHAPTER EIGHT

DEATH CERTIFICATE

KEY WORDS

Death Certificate . . . Report of Death Investigation . . . Graves'

Registration . . . Death Registration . . . Registration Area Concept . . .

Nomenclature . . . Classification . . . Underlying Cause.

I. TERMINOLOGY

There are certain terms that are used in the following text that have special significance. It is necessary to fully understand the definition of these terms in order to appreciate the significance of the narrative.

Death Certificate: A paper document that is used for registering that a death has occurred. The document must also contain information about that particular death. It is a certification that a death has occurred; a method of timely documentation of death.

Report of Death Investigation: A paper document that is used for recording the significant details that have been developed or discovered while investigating that death in question. It is certification that a death has occurred and that an investigation has been conducted for that death.

Graves' Registration: A record that a grave has been opened and used for final disposition of a dead body. One of the earliest means of documenting that a death has occurred.

Death Registration: A record that a death has occurred. A mechanism of documenting a death at the time death has occurred in contrast to a tabulation of deaths that occurred over a time span of several months or several years.

II. INTRODUCTION/PROLOGUE

At the conclusion of a death investigation a variety of documents will have been completed. Among these documents is a record known as a death certificate. This document is not to be confused with a report of death investigation which should be completed by a Coroner or Medical Examiner. The death certificate has a totally different purpose from the report that a death investigator prepares about an investigation just completed. The report of death investigation is the subject of a different section of this chapter. The death certificate will often be completed and signed by the same person who completes the death investigation report but not necessarily so.

III. HISTORY

Problem solving must be preceded by problem recognition, problem estimates, and problem magnitude. The event, death, has long been recognized as a problem. Many civilizations assumed that since death was a fact of life it could not be addressed. The postponement of death (prevention of premature death) made the problem one that admitted to a solution.

The first step of European civilizations was taken by English and European clergy in Graves' Registration. This was later expanded into a registration of deaths by cause as it became recognized that death was due to identifiable disease conditions. The death registration was adopted by English law as a means of protection of rights of survivors (i.e., property distribution), since proof of death was required in order for property distribution to occur.

With the colonization of the North American continent, the mind set of European culture mandated that this concept be followed by the colonies. The development of the U.S. Constitution embodied a separation of church and state as well as a decentralized form of government. The separation of church and state caused

death registration functions to be assumed by governments. Because of the decentralized form of government there was no role for the Federal government in this process.

During the latter part of the 18th Century, the idea developed that a study of death could be a useful means of advancing our knowledge for delaying deaths. In order to make full use of this idea there needed to be a method developed for actually measuring on a timely basis the number of deaths that occurred in a geographic area.

England began a National Death Registration system in 1836. They had been preceded in their efforts by several countries including France, Austria, and Sweden. This effort had been fueled by epidemics that allied public panic with rational scientific thought. In addition to Europe, there were several cities within the United States that had been performing death registration. The registration efforts by these cities had also been stimulated by local epidemics that caused the formation of Urban Health Departments. Death registration thus followed closely the occurrence of epidemics that caused the development of Boards of Health.

The development of a Federal Death Registration system was not in concert with the U.S. Constitution. There was, however, a Federal role in the census process, since an accurate census was necessary for representative governments. In 1850 a method was devised for including death enumeration as a part of the decimal Federal census. It was clear to many that this method (census tabulation of deaths) was a poor substitute for the preferred method (death registration), but it was considered better than no method.

During this same time period death registration was being performed by local governments in several United States' cities and two states. The awareness that

health was a legitimate governmental field was clouded by two opposing views in the medical community. These two views dealt with the causes of epidemics. One view could be described as the "contagion theory", which held that epidemic diseases entered our country through ports of immigration. Diseases and the micro-organisms that caused them entered through infected persons and animals. If this theory were true, then temporary isolation of immigrants should prevent epidemics. The opposing view, "sanitation theory", held that poor sanitary conditions of living were responsible for epidemics. In the latter event only an improvement of sanitary conditions would prevent epidemics. Death registration was proposed by the latter group as a means of proving that improved sanitary conditions would cause a decrease in deaths for the area so improved.

The Civil War probably delayed the expansion of death registration, but also provided a stimulus for increased interest by many groups. Several studies during that period revealed that more deaths were due to disease than wounds of war and broadened the national awareness that death registration had a health as well as legal function.

Cooperative efforts among the American Medical Association, the American Public Health Association, and the United States Census office developed the concept that came to be known as the Registration Area Concept (1880). This effort was also supported by the Conference of State and Provincial Boards of Health and by a resolution of Congress. The Census office was to become a permanent federal bureau in 1902.

During the preparation for the 1900 census, a model law was drafted by the above groups that was to be recommended to the various states. This was to be the beginning of the American System of Death Registration. Before 1900 the United States was the only civilized country of the Western world without a

centralized death registration system. The main features of this system, which is unique in that it rests entirely upon voluntary cooperation between the States and the Federal Government, and combines graves' registration and death registration concepts, are:

1. The controlling law for a registration area must be a state statute and not municipal or county ordinance.
2. A disposal permit must be issued on each dead body.
3. A local registrar may issue this permit only if a completed death certificate is presented which is on a standard form.
4. The local registrar files the death certificates with the State registrar on a regular basis.
5. Standard nomenclature for causes of death will be used.
6. Detailed instructions are to be provided by the State to all parties involved in this process.
7. The Federal Government may purchase the data from states that qualify as a registration area.
8. From this data the Federal Government can prepare uniform tables of data for each registration area.

From 1900 to 1933 each registration area was defined and qualified. In 1933 the last state was accepted as a registration area.

In 1946 the functions of coordinator were given to a National Office of Vital Statistics and the office transferred to the Public Health Service.

Attempts to achieve uniformity have generally been concentrated into four areas. These are:

1. A Federal agency to coordinate and develop a registration area concept
2. Support for a model law and model regulation to be passed by all states

3. Promulgation of a standard death certificate form to be used by all registration areas, and
4. Support and development of a standard nomenclature for use in giving the cause of death.

The current Federal agency is known as the National Center for Health Statistics. The current revision of the model law and regulations is a 1977 revision. The standard death certificate is a 1978 revision. The standard death certificate contains items that are considered minimum if a state or area is to be included in the registration area. The registration area may include on their death certificate an item not required by the minimum or may modify a minimum item if the modification meets certain requirements. The revision of the U.S. Standard Death Certificate occurs at intervals of about 10 years. The elements of the 1978 revision are shown at Appendix VIII - A.

The use of a standard nomenclature for cause of death is closely tied with efforts of physicians and other scientists to properly classify disease. These efforts are unlikely to ever be finalized since our knowledge of disease is constantly changing.

IV. PURPOSE AND USES

- A. General - The death certificate has three functions. The quality, accuracy and value of these functions will vary tremendously depending upon the care used by the person who completes these documents. The three functions are:
 - (1) Proof that a person is dead;
 - (2) Opinion regarding the cause of death;
 - and (3) Correlation (characterization about the deceased while alive that may be used to study the patterns of disease and death in a population).

- B. Proof of Death - The death certificate provides a document that can be used to establish that a legal entity (person) no longer exists. This proof is the sine qua non that sets in motion many events. The document presumes that a body has been identified as representing the identity portrayed. It is not necessary that an entire body has been found. It is sometimes not necessary that a body has been found at all. It is, however, necessary that the medico-legal certifier has established to a reasonable medical certainty that the identified person is dead. The documentation to support this conclusion should be contained in other records and documents so the certifier can provide proof if subsequently challenged.

The ordinary, or non-medico-legal, death is usually supported by Emergency Room records, hospital records or other health related documents. The death that is the subject of an official inquiry must be documented by the medico-legal officer who is conducting the investigation. This may include a documentation of skin wounds, marks or blemishes that can be compared to prior photographs or other records or witnesses. It may include dental or other x-rays that have been matched with x-rays made during the life of the deceased. It may be documented by a witness who was well acquainted with the deceased while living. It is not a safe practice to only rely upon eye-witness identification as the sole means of documentation. It is a recommended, safer procedure to obtain objective data from the eye witness that can be verified by examining the body.

- C. Cause of Death - The definition of death has been debated, discussed, studied and legislated. It is not the purpose here to elaborate the various opinions and arguments about "When is a person dead?". It is the purpose here to presume that a person is dead and that the identity of the deceased

has been established.

The second function of the death certificate is to provide a document on which a certifier can record his opinion about the medical disease of condition that directly caused the absence of life in the deceased. Why did he die?

The death certificate provides space to give a sequence of events that culminated in death or to give two parallel conditions that both contributed to death. It is frequently difficult to describe a complex medical condition with a few words. This is especially true if this medical condition is so poorly understood or so little studied that no name has been assigned to the disease considered responsible for death.

Some persons will have many serious diseases present and when they die the certifier cannot choose among them for the single disease that caused death. In this situation the death certificate provides the space to give two conditions, one that is primary and one that is secondary.

There are many incorrect ways to certify causes of death, and there are many correct ways for the proper certification of some deaths. Using the typical case, examples of these situations are as follows:

(1) Assuming that no autopsy was performed and no additional facts are added to the typical case, the medical part can be completed as in the first example.

Example 1.

PART I IMMEDIATE CAUSE		[ENTER ONLY ONE CAUSE PER LINE FOR (a), (b), and (c)]	
USE OF DEATH	CONDITIONS IF ANY WHICH AVE RISE TO IMMEDIATE CAUSE STATING THE UNDERLYING CAUSE LAST	(a) <u>Aortic Stenosis</u> DUE TO, OR AS A CONSEQUENCE OF	Interval between onset and death <u>1</u> Year
		(b) <u>Rheumatic Heart Disease</u> DUE TO, OR AS A CONSEQUENCE OF	Interval between onset and death <u>1</u> Years
		(c)	
PART II OTHER SIGNIFICANT CONDITIONS- Conditions contributing to death but not related to cause given in PART I (a)		AUTOPSY (Yes or No) 26 <u>NO</u>	WAS CASE REFERRED TO CORONER (Yes or No) 27

This example states that the disease condition of Aortic Stenosis was the disease condition that caused death and that Rheumatic Heart Disease was the disease that caused the Aortic Stenosis to be present.

(2) Further assuming that no additional data was provided, the death certificate could be completed as in the second example.

Example 2

PART I IMMEDIATE CAUSE		[ENTER ONLY ONE CAUSE PER LINE FOR (a), (b), and (c)]	
USE OF DEATH	CONDITIONS IF ANY WHICH AVE RISE TO IMMEDIATE CAUSE STATING THE UNDERLYING CAUSE LAST	(a) <u>Rheumatic Aortic Stenosis</u> DUE TO, OR AS A CONSEQUENCE OF	Interval between onset and death <u>1</u> Years
		(b)	Interval between onset and death
		(c)	
PART II OTHER SIGNIFICANT CONDITIONS- Conditions contributing to death but not related to cause given in PART I (a)		AUTOPSY (Yes or No) 26 <u>NO</u>	WAS CASE REFERRED TO CORONER (Yes or No) 27

This example merely combines the two conditions into a single diagnosis.

CONTINUED

3 OF 4

(3) This example shows a completed death certificate that is incorrect.

Example 3

CAUSE OF DEATH	PART I IMMEDIATE CAUSE [ENTER ONLY ONE CAUSE PER LINE FOR (a), (b), and (c)]		Interval between onset and death
	(a) DUE TO, OR AS A CONSEQUENCE OF	Pulmonary Edema	Minutes
	(b) DUE TO, OR AS A CONSEQUENCE OF	Cardiac Failure	Months
PART II OTHER SIGNIFICANT CONDITIONS - Conditions contributing to death but not related to cause given in PART I (a)		AUTOPSY (Yes or No)	WAS CASE REFERRED TO CORONER (Yes or No)
		26 NO	27

This example is incorrect for it does not give a recognized disease condition for the cause of death. Since there is a history of Rheumatic Heart Disease, it becomes reasonable to assume that the cause of events on lines (a) & (b) are due to the Rheumatic Heart. If one were to put Rheumatic Aortic Stenosis on 25(c), then example #3a would be correct.

The primary group is to include what is known as the underlying cause. This represents the disease that was most responsible for causing death. It should be a generally recognized medical entity.

The secondary disease is not caused by or did not result from the primary (underlying) disease.

The certifier believes that this secondary disease was of such serious nature that it contributed to death at this time.

Example 3a

CAUSE OF DEATH	PART I IMMEDIATE CAUSE [ENTER ONLY ONE CAUSE PER LINE FOR (a), (b), and (c)]		Interval between onset and death
	(a) DUE TO, OR AS A CONSEQUENCE OF	Pulmonary Edema	Minutes
	(b) DUE TO, OR AS A CONSEQUENCE OF	Cardiac Failure	Months
(c) DUE TO, OR AS A CONSEQUENCE OF		Rheumatic Aortic Stenosis	Years
PART II OTHER SIGNIFICANT CONDITIONS - Conditions contributing to death but not related to cause given in PART I (a)		AUTOPSY (Yes or No)	WAS CASE REFERRED TO CORONER (Yes or No)
		26 NO	27

(4) Assume now that in addition to the data contained in the typical case there was an autopsy performed. The autopsy revealed that the heart was enlarged with small myocardial scars; the scarred, stenotic aortic valve was present; and a large, saddle pulmonary embolus was present which originated from the veins of the right lower extremity. The death certificate would now be completed as in the fourth example.

Example 4

CAUSE OF DEATH	PART I IMMEDIATE CAUSE [ENTER ONLY ONE CAUSE PER LINE FOR (a), (b), and (c)]		Interval between onset and death
	(a) DUE TO, OR AS A CONSEQUENCE OF	Pulmonary Embolus	Minutes
	(b) DUE TO, OR AS A CONSEQUENCE OF	Aortic Stenosis	1 Year
(c) DUE TO, OR AS A CONSEQUENCE OF		Rheumatic Heart Disease	Years
PART II OTHER SIGNIFICANT CONDITIONS - Conditions contributing to death but not related to cause given in PART I (a)		AUTOPSY (Yes or No)	WAS CASE REFERRED TO CORONER (Yes or No)
		26 YES	27

This method would be giving the opinion that there was a connection between the Rheumatic Heart Disease, the Aortic Stenosis, and the Pulmonary Embolus. The exact pathogenesis of this relationship would be that that the valvular disease caused congestive heart failure; this caused stasis of blood in the lower extremity; and this caused the venous thrombus to form.

(5) In another example this sequence could be correct.

Example 5

CAUSE OF DEATH	PART I IMMEDIATE CAUSE [ENTER ONLY ONE CAUSE PER LINE FOR (a), (b), and (c)]		Interval between onset and death
	(a) DUE TO, OR AS A CONSEQUENCE OF	Pulmonary Embolus	Minutes
	(b) DUE TO, OR AS A CONSEQUENCE OF		
(c) DUE TO, OR AS A CONSEQUENCE OF		Rheumatic Heart Disease with Aortic Stenosis	
PART II OTHER SIGNIFICANT CONDITIONS - Conditions contributing to death but not related to cause given in PART I (a)		AUTOPSY (Yes or No)	WAS CASE REFERRED TO CORONER (Yes or No)
		26 YES	27

In this situation the certifier is stating that death was contributed

to by both diseases, but in his opinion the heart disease did not cause the pulmonary embolus. This could be a correct conclusion. In any event, this is the conclusion of the certifier. In this situation, the cause of the pulmonary embolus is unexplained and should have some explanation to make it clear that the pulmonary embolus was not trauma related.

D. Correlation - In constructing the death certificate, most persons agreed that this document would be a valuable resource from which the health and disease patterns of U.S. citizens could be studied. From this type of study it would be possible to find occupations that would be especially hazardous or living locations that had a higher than normal incidence of a particular class of diseases. This data is recorded on the historical part of the death certificate and is usually provided by the next of kin to the funeral director for recording on the death certificate. Much of this type of information is also useful as a part of the death investigation report.

V. PLACE IN DEATH INVESTIGATION BY CORONER OR MEDICAL EXAMINER

In every death that is investigated and accepted by a medico-legal death investigation system, a death certificate must be completed.

The items that are required by a death certificate are usually required on a good medical investigation report. The completion of a death certificate can usually be performed as a clerical function using the death investigation report. The official who signs the death certificate needs to review the death certificate with care prior to signing for transposition errors. These may lead to conflicts between the death investigation report and the death certificate which will later cause embarrassment to the investigator.

APPENDIX VIII - A

DEATH CERTIFICATE

"ELEMENTS"

APPENDIX VIII - A

ELEMENTS OF CURRENT U.S. STANDARD CERTIFICATE OF DEATH

Following are the elements of the 1978 Revised U.S. Standard Certificate of Death¹ (Much of the material requested is for research study purposes.)

A. DECEASED

To identify the individual to whom the certificate applies.

1. Full Name (First, Middle, Last)
2. Sex
3. Date of Death (Month, Day, Year)
4. Race (As Stated by Informant)
5. Age
 - a. Under One Day (Hours and Minutes)
 - b. Under One Year (Months and Days)
 - c. All Above One Year (Year Only - Last Birthday)
6. Date of Birth (Month, Day, Year)
7. Place of Death
 - a. County of Death
 - b. City, Town or Location of Death
 - c. Hospital/or Other Institution
 - 1) Name of Hospital or Other Institution
 - 2) Or Address at Which Died
 - d. Status At Hospital or Other Institution
 - 1) DOA - Dead on Arrival

¹U.S. Department of Health, Education, and Welfare, Medical Examiners' and Coroners' Handbook on Death Registration and Fetal Death Reporting, Washington, D.C.: U.S. Government Printing Office, 1978

2) OP/Emer.Rm - Outpatient/Emergency Room

3) IN - Inpatient

8. State of Birth (If not U.S.A., Name Country)
9. Citizen (Name Country)
10. Marital Status
 - a. Married (If Separated, Use "Married")
 - b. Never Married
 - c. Widowed
 - d. Divorced
 - e. Unknown
11. Surviving Spouse (If Wife - Maiden Name)
12. U.S. Armed Forces
 - a. Veteran (Yes or No)
 - b. Status Unknown
13. Social Security Number
14. Occupation/Industry of Deceased
 - a. Usual Occupation (Before Retirement)
 - b. King of Business
15. Residence of Deceased
 - a. State
 - b. County
 - c. City/Town/Location
 - d. Street and Number (or RFD, Box, Route)
 - e. Inside City Limits (Yes or No)

B. PARENTAGE

To aid in identification and tracing family trees.

1. Father (First, Middle, Last Name)
2. Mother (Maiden Name - First, Middle, Last)

C. INFORMANT

To correct or complete this certificate.

1. Name (First, Middle, Last)
2. Mailing Address

D. DISPOSITION

1. Burial, Cremation, Entombment - If donated to research, etc.
enter "Removal"
2. Name (Of Place for 1., above)
3. Location (Of 2., above)
4. Funeral Service Licensee
 - a. Signature of Body Custodian who Completes Death Certificate
 - b. Facility Name
 - c. Facility Address

E. CERTIFIER

Completed ONLY by Medical Examiner or Coroner on the Basis of Examination and/or Investigation.

1. Signature (With Degree or Title)
2. Date Certificate Signed (Spell out Month)
3. Hour of Death (Local Time, Show A.M. or P.M., Show DST if Daylight Saving Time)
4. Pronounced Dead
 - a. Date (Month, Day, Year)
 - b. Exact Time

5. Name and Address of Certifier

F. REGISTRAR

1. Signature
2. Date (When Certificate Officially Filed)

G. CAUSE OF DEATH

See Discussion in Body of Chapter.

CHAPTER NINE

EVIDENCE MANAGEMENT

EVIDENCE MANAGEMENT

KEY WORDS

Chain of Custody . . . Good Faith . . . Material . . .
Prejudice . . . Preservation . . . Retention.

I. THE CHAIN OF CUSTODY

In cases where non-testimonial evidence is presented in court it is also necessary to establish continuity of possession and protection from contamination.

Proof will usually be required to show conclusively that the evidence being presented is precisely the same evidence as that discovered in the course of the investigation and that it has not been contaminated.

This means that exacting procedures must be established relative to the recovery, marking or tagging, packaging of and accounting for evidence collected in conjunction with an unexpected death.

Ideally, only the individual who discovered the evidence and the forensic specialist responsible for the analyses will have been custodians of the evidence from the moment of discovery to presentation of the evidence as an exhibit in court.

Minimally, custody of evidence procedures should provide for the following:

A. Photographing/Sketching/Video Taping

1. Close-up of the evidence, in situ.
2. Relative location in Death scene.

B. Marking/Tagging

1. Marking
 - a) Date
 - b) Item Identification (Code)
 - c) Collector's I.D.
2. Tagging
 - a) Date
 - b) Item Identification (Code)
 - c) Item Description

C. Recording

1. Notebook
2. Investigation Report
3. Evidence Form
4. Provision for chronological recording of custody

D. Packaging

Damage, destruction, tamper and contamination proof

E. Storing

1. Investigation stage
2. Forensic science analyses stage
3. Court case stage

F. Disposition

See next section

II. PRESERVATION OF PHYSICAL EVIDENCE

The law requires the introduction of the best evidence in both civil and criminal trials. Obviously, physical specimens or the analytical results therefrom are a rich source of such evidence. If the physical specimens are destroyed before their utilization in the judicial process, the opposing party may be denied opportunity to test the scientific validity of the physical specimen or the analytical results produced. The law, therefore, seeks to preserve physical specimens. If the party possessing the physical specimen destroys that specimen in bad faith, the destroying party can be denied its legal rights in the prosecution of a crime or in the assertion of a civil claim. The defendant who likewise destroys physical specimens faces the same sanctions. Intentional, reckless or negligent destruction of physical specimens is always illegal and often unconstitutional. It represents bad faith on the part of the party possessing the physical specimen.

Of special concern are criminal prosecutions where the state, in good faith, has failed to preserve material physical evidence. What factors are significant to determine whether the due process rights of the accused have been violated or at what point may the state, in good faith, destroy physical evidence without violating the due process rights of the accused?

The factors that are significant to a due process determination following a good faith failure by the state to preserve evidence are:

1. the materiality of the unavailable evidence;
2. the possible prejudice to the defendant resulting from such loss;
3. the procedural formalities surrounding the loss or destruction;
4. whether the attempt by the defense to discover such evidence was made with due diligence.

A case by case analysis of the constitutional decisions is required to determine whether a due process violation has resulted from the destruction of evidentiary physical specimens by the state. The relevant factors are:

1. the defendant's opportunity to discover the evidence prior to its destruction;
2. the degree to which conviction or exoneration would rest upon the unavailable evidence concerned.

The case law in this area tends to mesh the various factors. No one factor in the case of good faith destruction appears to be controlling. This result may be caused by the courts' difficulty in rationally and solidly supporting an argument which has its basis in the "shifting sands" of what is fundamental fairness in criminal justice. Although each court strives toward that goal, each has a somewhat unique approach to its attainment. The little statutory law existing in this area is discussed later. Relatively few statutory and case law guides exist concerning the time limits after which physical evidence can be destroyed:

- A. Vermont Statutes Annotated 23 V.S.A. §1203 (concerning blood or breath-alcohol analysis)
- "...A sufficient amount of breath or blood, as the case may be, shall be taken to enable the person, at his option, to have made an independent analysis of the sample, and shall be held for no more than 30 days from the date the sample was taken or the date of arraignment, whichever occurs later. Any time within that period, the respondent may direct that the sample be sent to an independent laboratory of his choosing for an independent analysis..."

- B. California Health and Safety Code:
(Concerning retention of Breathalyzer ampoules in conformity with the decision in People v. Hitch 527 P. 2d 361 (1974))

"§436.64. Destruction of Ampoules

Any ampoules and their contents employed in a breath alcohol analysis test may be destroyed by the law enforcement agency in possession of them one year after the date of collection of the breath sample."

- C. California Health and Safety Code:
(Concerning retention of blood specimens)

"§1219.1 Blood Collection and Retention

(g) In order to allow for analysis by the defendant, the remaining portion of the sample shall be retained for one year after the date of collection.

- 1) In coroner's cases, blood samples shall be retained for at least 90 days after the date of collection..."

"§1219.2 Urine Collection and Retention

(c) In order to allow for analysis by the defendant, the remaining portion of the sample shall be retained for one year after the date of collection...."

Earlier California Administrative Code provisions (1971) had mandated retention of blood and urine specimens, obtained for analysis of alcohol therein, "...until the case has been adjudicated."

- D. In Garcia v. District Court, 589 P. 2d 924 (1979), the Colorado Supreme Court mandated that a person submitting to a breath test for alcoholic influence "must be given a separate sample of his breath at the time of the test of the alcoholic content of his breath..."

E. In Baca v. Smith, 604 P. 2d 617 (1979), the Arizona Supreme Court mandated with respect to breath tests for alcoholic influence that "...the Intoximeter sample will be preserved for seven days for delivery to him or his agent and that thereafter it will be destroyed..."

In reality, the trend of judicial decisions is to recommend the formalization of procedures surrounding the taking and testing of evidence in the criminal field.

The duty of the prosecution to preserve evidence for access by the defendant is a derivative of the duty of the prosecution to disclose evidence favorable to the accused upon request. This non-suppression rule was first expounded by the U.S. Supreme Court in Brady v. Maryland, 373 U.S. 83 10 L.Ed. 2nd 215, 83 S.Ct. 1194 (1963). In Brady, the prosecution in a murder case suppressed defendant's companion's extrajudicial statement in which he admitted the actual killing. The defendant had requested all such statements. The Supreme Court held that this suppression of evidence constituted a violation of the accused's rights. The court thereby cleared the way for effective criminal discovery, and provided a method for the equalization of information available to both sides in a criminal proceeding. The court makes clear that its prime goal is the achievement of fairness. This is evidenced by its rejection of the good faith/bad faith distinction in the suppression of evidence, and its assertion that any suppression by the state of favorable evidence is a violation, 373 U.S. at 87.

In holding that, "before a request for discovery has been made, the duty of disclosure is operative as a duty of preservation", the Court of Appeals in United States v. Bryant made the logical and necessary extension of the Brady rule, 439 F.2d 642 (D.C. Cir. 1971) at 651. Bryant involved the intentional

non-preservation of a highly relevant tape recording of a conversation. This testimony was the crucial element in the prosecution's case. No effort to preserve the tape had been made to which the court stated, "(o)nly if evidence is carefully preserved during the early stages of investigation will disclosure be possible later," 439 F. 2d 642 at 651. The thrust of the court's analysis is made clear in its holding that "in the future unless the government can show that it has promulgated, enforced and attempted in good faith to follow rigorous and systematic procedures designed to preserve all discoverable evidence," sanctions like those imposed in a non-disclosure case will be invoked, 439 F. 2d 642 at 652. Therefore, the only time that a good faith loss might serve as an excuse is where procedures have been set up and followed; negligence is no excuse.

In People v. Wallace, 102 Mich. App. 386,301 N. W.2d 540, (1980), the Michigan Court of Appeals used the device of remand to determine the adequacy of the initial preservation procedures used by the police, at 543. The evidence destroyed here consisted of a police officer's notes dealing with the confession of the accused. The court states that the adequacy of the procedure used will determine what sanction, if any, is to be employed. Thus, this court supports the Bryant procedural analysis.

To the contrary is the earlier case of United States v. Sear, 468 F.2d 236 (9th Cir. 1972). In this case a technician negligently disposed of a blood sample to be used in a drunk driving conviction purportedly because his refrigerator was full. The court stated that the Bryant case was inapposite because here the negligence was "unintentional," 468 F.2d 236 at 238. The court's view that the technician's actions were "unintentional" is an arguable point and the better view seems to be that the court simply made an error in interpreting the

Bryant court's use of the word "intentional" to mean "bad faith destruction." Further given the early date of this case, the court may have been attempting to illicit more guidance from the D.C. Circuit on this matter.

If evidence is material to the issue of guilt or punishment, and there is a "reasonable possibility" that the missing evidence would be favorable to the defendant, the due process concerns of "suppression" will be triggered into action. State v. Lovato, 94 N.M. 780, 517 P.2d 169 at 171 (1980); People v. Hitch, 12 Cal. 3d 641, 527 P.2d 361 at 367, 117 Cal. Rptr. 9 (1974); People v. Nation, 26 Cal. 3d 169, 604 P.2d 1051, 161 Cal. Rptr. 299 at 302 (1980). In Lovato the state failed to produce a blood alcohol kit pursuant to defendant's discovery motion in a prosecution for vehicular homicide while driving under the influence of intoxicating liquor or while driving recklessly. Testimony pertaining to results of the test run on the blood alcohol kit was held inadmissible. In Hitch a Breathalyzer test ampoule, its contents, and a reference ampoule had been intentionally, though nonmaliciously, destroyed. The California Supreme Court adopted prospectively this rule: "where the ampoules and its contents cannot be disclosed because of intentional though nonmalicious destruction by police officers, the results of the tests will be inadmissible unless the prosecution can show that the government agencies involved have established, enforced and attempted in good faith to adhere to rigorous and systematic procedures designed to preserve such evidence." The Nation case built upon the Hitch decision in a prosecution for lewd and lascivious conduct on a child under 14 years of age while armed with a firearm. The state had recovered a semen sample of the accused but had failed to preserve it adequately. The California Supreme Court held that the authorities must take reasonable measures to adequately preserve such evidence and to make it available to the defense.

Having eliminated bad faith as the reason for loss or destruction of the evidence in each of these cases, each court approaches the problem by way of a straightforward Brady analysis. In other words, the question becomes whether disclosure would be required if the evidence still existed and were in the hands of the prosecution. Each court recognized the difficulty of answering this question given the circumstances as they are. In Hitch and Lovato, both dealing with drunk driving charges, each court finds that the mechanisms used to determine the blood alcohol content of each defendant was evidence so clearly related to the issue of guilt, that it could be termed automatically material. This finding demands that in any future case, such evidence must be preserved if it is to be used at trial. Further, it presupposes that loss of the evidence necessarily prejudices the defendant.

"However, the majority of appellate decisions concerning retention, preservation, and reanalysis of Breathalyzer ampoules fail to follow the Hitch mandate." Among the contrary holdings are:

State v. Teare
342 A 2d 556 (New Jersey, 1975)

Edwards v. State
544 P 2d 60 (Oklahoma, 1975)

State v. Grose
340 NE 2d 441 (Ohio, 1975)

State v. Watson
355 NE 2d 883 (Ohio, 1975)

People v. Godbout
356 NE 2d 865 (Illinois, 1976)

State v. Shutt
363 A 2d 406 (New Hampshire, 1976)

People v. Stark
251 NW 2d 574 (Michigan, 1977)

State v. Canaday
585 P 2d 1185 (Washington, 1978)

State v. Preston
585 SW 2d 569 (Missouri, 1979)

State v. Helmer
278 NW 2d 808 (South Dakota, 1979)

State v. Young
614 P 2d 441 (Kansas, 1980)

State v. Sutherburg
402 A 2d 1294 (Maine, 1980)

State v. Bush
595 SW 2d 396 (Missouri, 1980)

State v. Newton
262 SE 2d 906 (South Carolina, 1980)

Turpin v. State of Texas
606 SW 2d 907 (Texas, 1980)

State v. Phillipe
402 So 2d 33 (Florida, 1981)

As noted above, the California Court in People v. Nation, 161 Cal. Rptr. 299 at 302 (1980), relies on this "reasonable possibility" standard in the context of a prosecution for lewd and lascivious conduct. The semen sample here was found to be material given this standard, as were the Breathalyzer ampoules and blood samples in some of the drunk driving cases. In Nation it is held to be the duty of the state to take reasonable steps to preserve, in a probably case of sexual assault, any semen sample found on or near the victim, 161 Cal. Rptr. 299 at 302. Clearly this evidence is easily identified as material in that it goes directly to the issue of the identity of the attacker. The underpants of a rape victim have likewise been held to be so connected to the crime as to require no further showing of materiality. State v. Havas, 95 Nev. 706, 601 P.2d 1197 at 1198 (1979)

In Nation, the burden is discharged by virtue of the transfer of possession of the sample to the defendant. The prejudice to the defendant is again abundantly clear. Lack of access to this concrete bit of evidence could prove to be the deciding factor in a case of competing credibility. Its exculpatory possibilities cannot be overstated, and the decision to use or not to use, has been placed by the courts in the hands of the defendant. "Moreover, the courts have distinguished, as in Nation, between mere retention of material evidence and proper preservation thereof, requiring the latter to an extent adequate to maintain the evidentiary value of biological specimens by "reasonable steps to preserve that evidence."

In addition, it has been held that no proof of actual prejudice to the defendant need be shown, where the destruction of evidence is the result of state testing and the charge is the unlawful possession of a controlled substance. People v. Dodsworth, 60 Ill. App.3d 207, 376 N.E.2d 449 (1978) at 451. A heavy burden then shifts to the state to show why destruction in testing was necessary. In Dodsworth, the state failed to prove necessity, and the conviction was reversed. These cases view a finding of materiality as necessarily including a finding of prejudice to the defendant pursuant to a Brady analysis. In rape, unlawful drug possession, and drunk driving cases this dual sided coin of materiality/prejudice is well illustrated.

The factor of due diligence is discussed at length in issue two below. It is mentioned here to serve solely as a reminder that this factor weighs heavily when considering what, if any, sanction to impose upon the state in the case of good faith destruction of evidence.

It is clear that if obviously material evidence is destroyed prior to trial while the defendant remains without counsel a violation of due process is likely

evidence used in a charge of unlawful possession of a controlled substance by her acknowledgement of their (the pills') contents. In so doing she waived the materiality of the pills, their content was no longer an issue, 580 P.2d 265 at 269. Further the court pointed out the time frame distinction between the instant case and that of Wright, supra. The many months' delay between defendant's signing the confession and the request for discovery weigh heavily in favor of a finding that the state has met its burden, 580 P.2d 265 at 270. Through these two cases destruction after a reasonable length of availability to the defense may be viewed as safe practice by the state.

In the final situation of an award of a new trial, where evidence was destroyed after a first conviction but before a second trial discovery, a compromise decision was reached in Commonwealth v. Chapman, 255 Pa. Super. Ct. 265, 386 A.2d 994 (1978). The government destroyed physical evidence between the first and second trials in a rape prosecution. The items destroyed were: two pieces of cardboard found at the rape scene, a pair of shoes taken from the defendant, a pair of panties taken from the victim, soil samples from the scene, a greeting card envelope handled by the rapist and defendant's fingerprint card. Test reports or recorded observations were available to demonstrate what defendant presumably would have demonstrated had the evidence not been destroyed. The court held that because the defense had failed to investigate the particular evidence prior to the first trial it was required to "cede some ground. Due process is, after all, the legal concept that embodies our notions of what is fair," 386 A.2d 994 at 1005. Under this analysis, the court allows for necessary flexibility in the due process area, without cutting off, via technicalities, an otherwise sound prosecution.

To undergird a definitive right for the criminal defendant to obtain

to be found. Such was the situation in State v. Wright where investigators destroyed all evidence found at the murder scene, including the body, prior to any identification or use. Here no effort was made to preserve the evidence even for use in identifying the victim, 87 Wash.2d 783, 557 P.2d 1 (1976). The court in Wright suggests that in the future the state should petition the trial court for disposition instructions if defendant is unrepresented by counsel, 87 Wn. 2d 783 at 793. Because discovery may be had at any time prior to trial, and preservation is a tool to insure effective discovery, there seems a logical requirement that preservation continue until at least that point.

In the case of destruction of evidence following a guilty plea that was later overturned, the fact that the defense had an opportunity to discover the evidence prior to the original sentencing saved the court from a forced dismissal. State v. Hughes, 119 Ariz. 261, 580 P.2d 722 (1978). In Hughes, the prosecution sent the police a routine letter that the defendant had pled guilty and was sentenced. The letter stated that the prosecution no longer had any interest in the property being held in the homicide case; sandals, knife, clothing of both the victim and defendant, food items and photographs of footprints. The evidentiary items were then either destroyed or sold at auction. The decision hinges on the defense's failure to make even a discovery request prior to the day of trial. The court states that this serves as "an intimation that the lost evidence was not considered exculpatory," 580 P.2d 722 at 724. Therefore, preservation until after sentencing, coupled with lack of due diligence on the part of the defense, may protect the prosecution against a finding of a due process violation based on the destruction of evidence.

This same reasoning was followed in State v. Scriver, 20 Wash. App.388, 580 P.2d 265 (1978). Here defendant was found to have waived her right to examine

to be found. Such was the situation in State v. Wright where investigators destroyed all evidence found at the murder scene, including the body, prior to any identification or use. Here no effort was made to preserve the evidence even for use in identifying the victim, 87 Wash.2d 783, 557 P.2d 1 (1976). The court in Wright suggests that in the future the state should petition the trial court for disposition instructions if defendant is unrepresented by counsel, 87 Wn. 2d 783 at 793. Because discovery may be had at any time prior to trial, and preservation is a tool to insure effective discovery, there seems a logical requirement that preservation continue until at least that point.

In the case of destruction of evidence following a guilty plea that was later overturned, the fact that the defense had an opportunity to discover the evidence prior to the original sentencing saved the court from a forced dismissal. State v. Hughes, 119 Ariz. 261, 580 P.2d 722 (1978). In Hughes, the prosecution sent the police a routine letter that the defendant had pled guilty and was sentenced. The letter stated that the prosecution no longer had any interest in the property being held in the homicide case; sandals, knife, clothing of both the victim and defendant, food items and photographs of footprints. The evidentiary items were then either destroyed or sold at auction. The decision hinges on the defense's failure to make even a discovery request prior to the day of trial. The court states that this serves as "an intimation that the lost evidence was not considered exculpatory," 580 P.2d 722 at 724. Therefore, preservation until after sentencing, coupled with lack of due diligence on the part of the defense, may protect the prosecution against a finding of a due process violation based on the destruction of evidence.

This same reasoning was followed in State v. Scriver, 20 Wash. App. 388, 580 P.2d 265 (1978). Here defendant was found to have waived her right to examine

evidence used in a charge of unlawful possession of a controlled substance by her acknowledgement of their (the pills') contents. In so doing she waived the materiality of the pills, their content was no longer an issue, 580 P.2d 265 at 269. Further the court pointed out the time frame distinction between the instant case and that of Wright, supra. The many months' delay between defendant's signing the confession and the request for discovery weigh heavily in favor of a finding that the state has met its burden, 580 P.2d 265 at 270. Through these two cases destruction after a reasonable length of availability to the defense may be viewed as safe practice by the state.

In the final situation of an award of a new trial, where evidence was destroyed after a first conviction but before a second trial discovery, a compromise decision was reached in Commonwealth v. Chapman, 255 Pa. Super. Ct. 265, 386 A.2d 994 (1978). The government destroyed physical evidence between the first and second trials in a rape prosecution. The items destroyed were: two pieces of cardboard found at the rape scene, a pair of shoes taken from the defendant, a pair of panties taken from the victim, soil samples from the scene, a greeting card envelope handled by the rapist and defendant's fingerprint card. Test reports or recorded observations were available to demonstrate what defendant presumably would have demonstrated had the evidence not been destroyed. The court held that because the defense had failed to investigate the particular evidence prior to the first trial it was required to "cede some ground. Due process is, after all, the legal concept that embodies our notions of what is fair," 386 A.2d 994 at 1005. Under this analysis, the court allows for necessary flexibility in the due process area, without cutting off, via technicalities, an otherwise sound prosecution.

To undergird a definitive right for the criminal defendant to obtain

physical specimens which may become evidence for the prosecution, state legislatures could enact legislation prescribing procedures to enforce the right. Ohio did so in 1977 in Revised Code Sec. 2925.51 (E) in the area of drug offenses and controlled substances:

(E) Any person who is accused of a violation of this chapter or of Chapter 3719, of the Revised Code is entitled, upon written request made to the prosecuting attorney, to have a portion of the substance that is the basis of the alleged violation preserved for the benefit of independent analysis performed by a laboratory analyst employed by the accused person, or, if he is indigent, by a qualified laboratory analyst appointed by the court. Such portion shall be a representative sample of the entire substance that is the basis of the alleged violation and shall be of sufficient size, in the opinion of the court, to permit the accused's analyst to make a thorough scientific analysis concerning the identity of the substance. The prosecuting attorney shall provide the accused's analyst with the sample portion at least fourteen days prior to trial, unless the trial is to be held in a court not of record or unless the accused person is charged with a minor misdemeanor, in which case the prosecuting attorney shall provide the accused's analyst with the sample portion at least three days prior to trial. If the prosecuting attorney determines that such a sample portion cannot be preserved and given to the accused's analyst, the prosecuting attorney shall so inform the accused person or his attorney. In such a circumstance, the accused person is entitled, upon written request made to the prosecuting attorney, to have his privately employed or court appointed analyst present at an analysis of the substance that is the basis of the alleged violation, and, upon further written request, to receive copies of all recorded scientific data that result from the analysis and that can be used by an analyst in arriving at conclusions, findings, or opinions concerning the identity of the substance subject to the analysis.

A further right could be granted to the defendant if the sequestering of a physical specimen is impossible or the specimen is destroyed in laboratory testing. All scientific documents pertaining to the tests on the unavailable or destroyed specimen could be made available to the defendant as provided by Ohio Revised Code Sec. 2925.51(F):

(F) In addition to the rights provided under division (E) of this section, any person who is accused of a violation of this chapter or

of Chapter 3719, of the Revised Code that involved a bulk amount of a controlled substance, or any multiple thereof, or who is accused of a violation of section 2925.11 of the Revised Code, other than a minor misdemeanor violation, that involves marijuana, is entitled, upon written request made to the prosecuting attorney, to have a laboratory analyst of his choice, or, if the accused is indigent, a qualified laboratory analyst appointed by the court present at a measurement or weighing of the substance that is the basis of the alleged violation. Also, the accused person is entitled, upon further written request, to receive copies of all recorded scientific data that result from the measurement or weighing and that can be used by an analyst in arriving at conclusions, findings, or opinions concerning the weight, volume, or number of unit doses of the substance subject to the measurement or weighing.

It appears that for physical specimens which provide a major quantity of criminal prosecutions such as drugs or controlled substances, statutory law can be utilized to excellent advantage. Where, however, the physical specimen is unique -- an individual's blood or semen, the murder weapon, soil, hair, fibers, paint chips, etc. -- sequestering of the specimen for independent analysis by the defendant may prove to be more difficult. The very least which the defendant should be entitled to would be what is provided in Ohio R.C. Sec. 2925.51 (F) above.

The current law appears to give defendant the most protection in judicial decisions based on interpretations of the constitutional right to due process in criminal prosecution. Physical specimens for evidentiary purposes can never be destroyed by the prosecution in bad faith. The rules for good faith destruction will continue to evolve through the common law court decision method. The watchword is, "Keep your eyes on the courts."

CHAPTER TEN

JURISDICTION

CHAPTER TEN

JURISDICTION

KEYWORDS

Federal Jurisdiction . . . Exclusive Jurisdiction . . .
Concurrent Jurisdiction.

I. INTRODUCTION

The responsibility for the investigation of sudden, unexplained or unnatural deaths falls within the purview of the medical examiner or coroner -- *except in a few notable cases*. These cases are determined by Where they occur and/or Who died and/or How they died.

Federal interests in death investigations generally arise under federal laws relating to national defense or security and interstate commerce.

Deaths of both military and civilian personnel occurring on federal land or property may give rise to federal jurisdiction. These properties include military installations, national parks, post offices, Veterans Administration hospitals and the like. Deaths which occur on thoroughfares through federal property such as on highways or railroad property generally do not fall within exclusive federal jurisdiction.

Under federal law, the federal jurisdiction in certain cases may be exclusive, in others concurrent jurisdiction is shared with local agencies.

The cases most frequently encountered involve deaths:

- on federal lands, particularly military installations
- resulting from military aircraft accidents
- of certain members of the executive and congressional branches of U.S. government
- resulting from mass transportation disasters

II. MILITARY INSTALLATIONS

Deaths on military installations may fall under exclusive federal jurisdiction or concurrent jurisdiction. This will depend on the nature of the acquisition of the property and federal security requirements determined at the time of acquisition.

Where the federal government has exclusive jurisdiction it has the sole authority in the investigation of all sudden, unexplained or unnatural deaths occurring at the military installation. Deaths on military installations of civilians as well as military personnel can fall under exclusive federal jurisdiction.

The potential for conflict exists in cases of shared or concurrent jurisdiction. Concurrent jurisdiction only involves the investigation of military deaths. Under concurrent jurisdiction, only the medical examiner or coroner can exercise jurisdiction over civilian deaths on military installations.

It is critically important that local officials and military officials be aware of each other's authority and any limitation to that Authority. Procedures for handling such cases should be formulated in advance.

III. MILITARY AIRCRAFT ACCIDENTS

No clearcut authority exists for investigation of deaths resulting from military aircraft accidents. Because of national security and technical expertise considerations, military handling of the investigation may be preferred. In the absence of specific federal legislation defining this authority, this area of potential conflict or confusion should be anticipated.

IV. FEDERAL OFFICIALS

The Federal Bureau of Investigation has exclusive authority to investigate the death of the President, President-Elect, Vice President, Vice President-Elect¹ or any member of Congress or member of Congress-Elect² who dies unexpectedly or due to trauma. The FBI may request assistance from any local, state or federal agency.

V. MASS TRANSPORTATION DISASTERS

The National Transportation Safety Board (NTSB) has overall jurisdiction³ to investigate transportation accidents including:

- Civilian Aircraft Accidents
- Highway Accidents - (as selected by NTSB)
- Railroad Accidents
- Pipeline Accidents

The NTSB may decline to become involved in the investigation of fatal light aircraft accidents. Responsibility then lies with the local medical examiner or coroner. The NTSB always exercises its jurisdiction in major mass transportation disasters. It often calls upon local and state agencies in carrying

¹ 18 U.S.C. 1751

² 18 U.S.C. 351

³ 49 U.S.C. 1441

out its investigations. For instance, the NTSB may turn over the bodies to the medical examiner or coroner for identification, autopsy and certification of death.

Once again, coordination and cooperation between local and federal officials is mandatory.

VI. OTHER FEDERAL JURISDICTIONAL CASES

A wide variety of federal agencies and regulatory bodies may have, at least, limited jurisdiction in the investigation of death in specialized cases. These agencies include:

- Bureau of Mines and Reclamation
- Environmental Protection Agency
- Consumer Product Safety Commission
- Bureau of Indian Affairs
- U.S. Army Corps of Engineers
- Veterans Administration

The role these agencies play may be very limited or quite extensive. It is critically important to be familiar with applicable laws, statutes and regulations.

VII. LOCAL AND STATE JURISDICTION

Very frequently, on the local level, several agencies may be concurrently or consecutively involved in the medico-legal investigation of death. Law enforcement, emergency medical and medical examiner or coroner agencies should have coordinated plans for proper handling of cases where one or more are involved. These plans must recognize the inherently inter-agency, team approach which is necessary for a competent death investigation system.

SELECTED

BIBLIOGRAPHY

SCENE INVESTIGATION

Criminal Investigation and Physical Evidence Handbook. State of Wisconsin. Department of Justice, Madison, 1973.

Fox, R.H. and Cunningham, C. Crime Scene Search and Physical Evidence Handbook. U.S. Government, Printing Office, Washington, D.C., 1973.

Major Crime Investigation Guidelines. Triad Associates, Inc. P.O. Box 7879, Colorado Springs, Colorado 80933.

Moenssens, A.A.; and Inbau, F.E. Scientific Evidence in Criminal Cases. Foundation Press, Mineola, New York, 1973.

Saferstein, R. Criminalistics, An Introduction to Forensic Science, 2nd ed. Prentice-Hall, Englewood Cliffs, New Jersey, 1981.

Soderman, H. and O'Connell, J.J. Modern Criminal Investigation. Funk and Wagnalls, New York, 1962.

The Science of Fingerprints. Federal Bureau of Investigation, U.S. Government Printing Office, Washington, D.C.

Thornton, J.I., ed. Crime Investigation, 2nd ed. John Wiley & Sons, New York, 1974.

FORENSIC PATHOLOGY

Fisher, R.S. & Petty, C.S. (eds). Forensic Pathology, A Handbook For Pathologists. National Institute for Law Enforcement & Criminal Justice, G.P.O., Washington, D.C., 1977.

Petty, C.S., Curran, W.J. (eds) Modern Legal Medicine, Psychiatry, and Forensic Science. Charles C. Thomas, Springfield, ILL, 1980.

Ryan, H.F. Maine Medical Examiner's Manual. Office of the Chief Medical Examiner, Augusta, Maine, 1980.

Spencer, J.D. "Medical Examiner/Coroner Jurisdiction in Cases Involving Federal Interests." Journal of Forensic Sciences 27 (April 1982) pp. 408 - 411.

Spitz, W.V., and Fisher, R.S. (eds). The Medico-Legal Investigation of Death. Charles C. Thomas, Springfield, Ill., 1977.

U.S. Department of Health, Education & Welfare. Death Investigation: An Analysis of Laws & Policies of the United States, Each State and Jurisdiction. Publication (HSA) 78-5252, Rockville, MD., 1978.

U.S. Department of Health, Education & Welfare. Medical Examiners' & Coroners' Handbook on Death Registration & Fatal Death Reporting. Publication 78-1110, G.P.O. Washington, D.C., 1978.

U.S. Department of Health, Education & Welfare, Public Health Service. Model State Vital Statistics Act & Model State Vital Statistics Regulation. Publication (PHS) 78-1115. Hyattville, MD., May 1978.

U. S. Department of Health, Education & Welfare, Public Health Service, National Center for Health Statistics. The 1968 Revision of the Standard Certificates. June, 1968.

FORENSIC TOXICOLOGY

AMA Drug Evaluations. AMA, Department of Drugs. Publishing Sciences Group, Inc., Acton, Mass., 1973.

Baselt, Randall C. Disposition of Toxic Drugs and Chemicals in Man. Biomedical Publications, Connecticut, 1978.

Clarke, E.G.C. Isolation and Identification of Drugs. Vol 1 & 2. The Pharmaceutical Press. London, 1969.

Cravey, R.H. & Baselt, R.C. (eds). Introduction to Forensic Toxicology, Biomedical Publications, Daves, California, 1981.

Cravey, R.H. "The American Board of Forensic Toxicology", Journal of Analytical Toxicology, 2 (1978) pp. 163 - 164.

Curry, A.S. Advances in Forensic and Clinical Toxicology. Chemical Rubber Company, 1972.

Curry, A.S. Poison Detection in Human Organs. Charles C. Thomas, Springfield, Illinois, 1969.

Davies, D.M. Textbook of Adverse Drug Reactions. Oxford University Press, 1977.

Diamond, B.A. Monoclonal Antibodies. New England J. of Med. 304,22, 1344. 1981.

Foltz, R.L. GC-MS Assays for Abused Drugs. NIDA Monograph 32, NIDA Rockville, Maryland.

Garrett, E.R. and Hirtz, J.L. Drug Fate and Metabolism. Marcel Dekker, 1978.

Goodman, L.S., and A. Gilman. The Pharmacological Basis of Therapeutics. Fourth edition. Macmillan, New York, 1979.

Gudzinowicz, B.J. Gas Chromatographic Analysis of Drugs and Pesticides. Marcel Dekker, Inc. 1967.

Handbook of Analytic Toxicology. Ed Irving, Sunshine, Chemical Rubber Company, Cleveland, 1969.

Johnson, E.L. and Stevenson, R.S. Basic Liquid Chromatography. Varian Associates, Palo Alto, California, 1978.

Kennett, R.H., McKearn, T.J., Bechtol, K.B. Monoclonal Antibodies. Plenum Press, New York, 1980.

McFadden, W.H. Techniques of Combined Gas Chromatography-Mass Spectrometry. John Wiley & Sons, 1976.

McNair, H.M. and Bonelli, E.J. Basic Gas Chromatography. Varian Associates, Palo Alto, California, 1969.

NIDA. NIDA Research Monograph Series on Drugs of Abuse. NIDA, Rockville, Maryland.

Parke, D.V. The Biochemistry of Foreign Compounds. Pergamon Press, 1974.

Stockley, I.H. Drug Interactions and Their Mechanisms. The Pharmaceutical Press, London, 1974.

Thienes, C.H., and T.J. Haley. Clinical Toxicology. Lea and Febiger, Philadelphia, 1972.

FORENSIC ANTHROPOLOGY

Boss, W. III. "The Excavation of Human Skeletal Remains, in Field Handbook on the Human Skeleton" by R. Spier, Missouri Archaeological Society, 1982.

Kerley, E.R. "Forensic Anthropology." In Legal Medicine Annual 1973. Edited by Cyril H. Wecht. Appleton-Century-Crofts, New York, 1973.

Krogman, W.M. The Human Skeleton in Forensic Medicine. Charles C. Thomas, Springfield, Ill., 1962.

Stewart, T.D. Essentials of Forensic Anthropology. Charles C. Thomas, Springfield, Ill., 1979.

FORENSIC DENTISTRY

Cottone, J.A. and S.M. Standish (eds). Outline of Forensic Dentistry. Year Book Medical Publishers, Chicago, 1982.

Furuhata, T. and K. Yamamoto. Forensic Odontology. Thomas, Springfield, 1967.

Gustafson, G. Forensic Odontology. Staples Press, London, 1966.

Harvey, W. Dental Identification and Forensic Odontology. Kimpton, London, 1976.

Luntz, L.L. and P. Luntz. Handbook for Dental Identification. J.B. Lippincott Co., Philadelphia, 1973.

Sopher, I.M. Forensic Dentistry. Thomas, Springfield, 1976.

END