THE PATHOLOGY OF TRAUMA

BY

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Second Edition, Enlarged and Thoroughly Revised, With 126 Illustrations

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PREFACE TO SECOND EDITION

There are several reasons for revising the first edition of this book at this time. One is that much of any book dealing with applied science is obsolete within a few years after publication, and a full decade has elapsed since the preparation of the first edition. Another is that a great deal of new information pertaining to injuries by mechanical violence and their complications became available from the various published studies of the casualities that resulted from military action during the last world war. Still another is that the author has modified his views in certain matters because of his own progressively enlarging experience.

The author is greatly indebted to General Elbert DeCoursey for the preparation of a foreword concerning trauma in relation to civil and military medicine. A new chapter dealing with certain special objectives of the medicolegal autopsy has been added. Those sections of the first edition which have undergone the most drastic revision include injuries by gunfire, injuries incident to explosions, trauma and infection, injuries of the organs of respiration, and injuries of the central nervous system. Former graduate students who have collaborated in the revision, and to whom the author is greatly indebted, include:

Dr. Lester Adelson – *Mechanical Injuries of the Cardiovascular System.*
Dr. Frank R. Dutra – *Mechanical Injuries.*
Dr. Russell S. Fisher – *Mechanical Injuries of the Central Nervous System.*
Dr. Richard Ford – *Mechanical Injuries of the Skeletomuscular System.*
Dr. Howard C. Hopps – *Trauma and Infection.*
Dr. Angelo Lapi – *Mechanical Injuries of the Respiratory System.*
Dr. Michael Luongo – *Mechanical Injuries of the Urogenital Tract.*
Dr. Joseph Spelman – *Mechanical Injuries of the Liver, Gall Bladder, Bile Passages, Pancreas and Spleen.*

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FOREWORD

THE steady swell in the ranks of those who suffer injury through mechanical means is a matter of increasing concern in all walks of life. There has been no ebb in the flow of patients to the first-aid stations of industrial plants and to emergency hospitals. Reports from city morgues grow more voluminous each year with dryly factual lists of newer ways in which machines take their toll and in which man inflicts violence on his fellow man. In our country, some 90,000 deaths from accidental causes—not to speak of hundreds of thousands of injuries, many of them disabling—can be expected to occur annually, and this figure does not include homicides and suicides.

Warfare makes capital of injury; and although from the standpoint of fighting-manpower logistics it is true that missile wounds inflicted by the enemy become a major problem, the incidence of mechanically-induced injury, accidental and otherwise, behind the fighting lines and back as far as the basic training camps, is higher than is commonly realized. In World War II, strategic bombing caused mass injury among populations of cities far from the theatre of war. This was not the result of fragmenting missiles but of collapsing buildings, falling timbers, flying glass, and raging fires. The explosions of atomic bombs added another factor—that of total body ionizing radiation injury—but even here most of the deaths and injuries were mechanical or thermal, ionizing effects accounting for a relatively small percentage. Injuries to lungs, gastrointestinal tract, and ear drums, common in the vicinity of explosive detonations, were rare among the survivors of the Hiroshima and Nagasaki bombings, probably because the air blast pressure was not sufficiently high to produce them. The problem to be faced in civilian defense programs, therefore, is principally that of mechanical and thermal injury. Injuries incurred in warfare and in civil life parallel each other and whatever is learned from one source is applicable to the other.

Of the few compensations which war brings to society, one of the most outstanding has been the increased understanding of the mechanisms of injury and the physiological responses to injury. Electro-encephalographic studies performed near the battle front in Korea within an hour of infliction of brain injuries, and the direct visualization through the lucite calvarium of the movements of the brain of experimental animals after an impact to the head, are two examples of the experimental approach to the knotty problems of cerebral concussion and shock. Distinct progress has been made also in the field of wound ballistics. For instance, the type of wound incurred depends largely on projectile velocity. Inasmuch as air slows down all projectiles, the velocity of a shell fragment with its irregular shape and surface decelerates much more rapidly than a modern bullet with its aerodynamic shape. Recent

observations that the majority of battlefield wounds are caused by missiles of relatively low velocity travelling at less than 2000 feet per second have contributed materially to the development of successful body armor for troops.

By bringing together data from so many fields—industry, transportation, war, and crime—and relating them all to the basic discipline of pathology, Dr. Moritz has provided a highly useful book. Events have moved rapidly since the first edition of the *Pathology of Trauma* was published in 1942 and thus the time is ripe for this second edition. The author has prepared it in the light of the deadliness of recently employed instruments of war and of the hazards inherent in the advances in mechanization made in the last decade. His revision is, however, not based on these tangible factors alone, but on the new interpretation of the physiological changes caused by trauma. He also takes into consideration the psychosomatic complications of trauma, a subject which first received widespread attention during World War II.

A most valuable addition to the present volume is the final chapter on the *Medicolegal Autopsy,* written from the author's wide experience with actual police cases. As elsewhere in the book, there are lucid explanations and suggestions for investigation, including the pertinency of special tests. This chapter brings them together and adds others as a guide for the prosector who, in the performance of the medicolegal autopsy, cannot afford to overlook any shred of evidence of medical or legal significance. Not only physicians, but also attorneys, officers of the law and even writers of fiction will find practical leads for assessing the significance of what is seen, for seeking collateral evidence, and for estimating probabilities when skeletal remains are the only source of evidence.

With the broadness of scope of pathology of trauma it is natural that this discipline should forge ahead in some respects and lag behind in others. Pathologists pointed the way to the understanding of the renal shutdown following muscle contusion from the crushing force of falling buildings during the bombings of cities. They have placed peripheral nerve surgery on a sound basis. They have lent the means for identifying disorders which mimic those due to trauma. Their word is often decisive in adjudications in the medicolegal realm. As the author indicates, emphasis needs to be placed on experimental pathology. It seems evident that the future role of pathology in the understanding of the mechanisms of trauma and its detection and treatment lies not only in the continuance of meticulous observation in the field of gross pathology and microscopy, but also in effecting a closer collaboration with the physiologist, the biochemist, and the physicist.

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Brig. Gen., MC, USA

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