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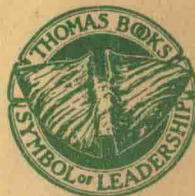
# THE PNEUMOCONIOSIS PROBLEM

*With Emphasis  
on the Role  
of the  
Radiologist*

- The tendency of over interpretation is described especially in those instances where there is thought to be a history of exposure of harmful amounts of dusts.
- Experiences with operative removal of solitary silicotic masses which were thought to be carcinoma are described.
- Some observations on anemic infarcts due to silicosis are included.
- Experiences with Caplan's syndrome (pneumoconiosis plus rheumatoid arthritis).
- International Classification of Pneumoconiosis and its impact on improving radiologic diagnosis and prediction of pulmonary disability.

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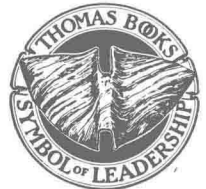
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# THE PNEUMOCONIOSIS PROBLEM

With Emphasis on the Role of the Radiologist

## Preface

On October 1, 1957, it was my privilege to give the "Caldwell Lecture" at the annual meeting of the American Roentgen Ray Society, which was held in Washington, D. C. The title of the address was: "Silicosis and a Few of the Other Pneumoconioses: Observations on Certain Aspects of the Problem, with Emphasis on the Role of the Radiologist." A portion of the prepared paper has been published in the *American Journal of Roentgenology Radium Therapy and Nuclear Medicine*, July 1958. Dr. Lawrence Reynolds and his Associate Editors have given permission for publication of the entire manuscript by Mr. Charles C Thomas.

This book is not a complete treatise on the Pneumoconioses, in fact, there are many phases of the problem of silicosis, asbestosis and coal workers pneumoconiosis that are not considered. The effort in this small book has been directed largely toward a discussion of guide lines that have been helpful to me in the interpretation of shadow patterns in the roentgenograms. We believe that we have had an unusual opportunity to learn something about the natural history of silicosis in some 500 workers of an industry which has an exposure to free silica and so far as we know there is essentially no contaminating dust. Many of these workers have been followed over 20 years.

The illustrations are larger than one can publish in a journal. This should provide the radiologist with better roentgenographic patterns of the disease.

It is my sincere hope that this book will assist in getting more radiologists interested in the pneumoconioses. The radiologist not only has an important role in the diagnosis, but increased opportunities for estimating pulmonary disability are being explored and already it has been demonstrated by some that the radiologist is capable of complementing pulmonary physiologic studies.

The author wishes to express his deep appreciation to Mr. Charles C Thomas, Mr. Payne Thomas and Mr. Warren H. Green for their generous cooperation and wise counsel in the preparation of this small book.

EUGENE P. PENDERGRASS

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THE  
PNEUMOCONIOSIS PROBLEM

With Emphasis on the Role of the Radiologist



*Dr. Scott, Dr. Furey, Members of the American Roentgen Ray Society,  
Ladies and Gentlemen:*

*This is the occasion of the Caldwell Lecture and before I begin my address, I want to express to our president, Dr. Wendell G. Scott and to the members of the Program Committee my sincere appreciation for the honor that they have conferred on me in asking me to present this lecture before the American Roentgen Ray Society. I did not have the privilege of knowing Dr. Caldwell, but those who did have testified on many occasions, of his ideals and achievements. This Society has been most fortunate in having many who have contributed much toward the advancement of medicine in general and of radiology in particular. Our heritage is one of which we justly can be proud. I have the feeling that Dr. James T. Case and others who were responsible for the inauguration of the Caldwell Lecture, not only wished to honor Caldwell, but in addition hoped that this special event might become a symbol by which we could honor all of our members and those in collateral disciplines of investigation and in industry who during their lifetime added their bit to our specialty.*

*As evidence of this premise, the senior Dr. William A. Evans<sup>13</sup> wrote the following:*

*The early second period of pioneering in American roentgenology was graced by several who by virtue of their noble character and unusual professional attainments have been canonized by those who continued in the work for which these made the supreme sacrifice. One who will change the direction of his life current to follow an ideal conceived after comparative success in a given endeavor, must possess unusual attributes. Such was Eugene W. Caldwell of New York (Fig. 1). Already a master mind in the field of electrical engineering and physics, upon becoming interested in Röntgen's work, he early appreciated its importance both medical and otherwise. The better to serve its advancement in the field of human relief, Caldwell qualified himself as a physician. Thus trained in two highly technical and scientific spheres, he began a career which added greatly to the efficiency and completeness of roentgen equipment and accessories and its proper adaptation for demonstrating various medical and surgical lesions.*

*Dr. Evans goes on and describes the work of others and concludes with the following statement: "With Leonard, these three, Caldwell, Dodd and Kassabian, succumbed to roentgen injuries incident to their constant studies. The American Roentgen Ray Society, conscious of their beneficent influence, honored Leonard by the establishment of the 'Leonard Prize' an award granted at intervals for meritorious studies in some phase of roentgenology and commemorates the influence of Caldwell by the 'Caldwell Lecture.'"*

*The subject of my address is concerned with certain aspects of silicosis and some of the other pneumoconioses. Many of you know of my interest in this problem. This is the fourth time that I have used this subject in a named lectureship—the Preston M. Hickey Memorial Lecture<sup>119</sup> before the Wayne County Medical Society, April 6, 1942; The Russell D. Carman Memorial Lecture<sup>121, 122</sup> before*



*the Minnesota State Medical Association, June 12, 1950; and the Ross Golden Lecture<sup>125</sup> in New York, March 21, 1955, before the New York Roentgen Society.*

*My own experience on the effects of dust inhalation on the lungs dates back to 1919, when following World War I, Dr. Henry K. Pancoast re-embarked on the studies which he, Dr. T. Grier Miller and Dr. H. R. M. Landis began in 1916.<sup>114</sup> Together, we carried out many studies over the succeeding years. Dr. Pancoast was the first radiologist in this country and one of the few in the world who early made a real effort to learn something about pneumoconiosis. In so doing, he developed many friends outside of radiology in the fields of public health, pathology, chemistry, physics, engineering, law and industry. For me, meeting and getting to know others interested in dust hazards has been a most rewarding experience.*

*E. P. P.*

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Fig. 1. The upper group picture was made of some of the members of the American Roentgen Ray Society in 1913. Number 89 is Eugene W. Caldwell; number 93 is Thomas A. Groover; and number 96 is Rollin Stevens. In the lower picture, made in 1911, number 3 is Eugene W. Caldwell and number 2 is Russell Boggs.



## History of Pneumoconiosis

The history of pneumoconiosis is one of the most fascinating in medicine. One of the earlier recorded references is Pliny's<sup>127</sup> (23-79 A.D.) description of the devices used by refiners to prevent inhalation of the "fatal dust" (Fig. 2). In the Renaissance, physicians and mining engineers were aware that the metal miner suffered from shortness of breath and died prematurely. I have always been impressed with the work of Georgius Agricola<sup>2</sup> published in 1556 (Fig. 3). The Latin edition of this book was translated into English in 1912, by former President and Mrs. Herbert C. Hoover. The edition was limited, but one can find a copy in some of the medical libraries.

Ramazzini<sup>132</sup> in 1705, is credited with being the first to deal adequately with occupational disease (Fig. 4). He was professor of physick at Padua; his book was published in Latin and was later translated into English.

Since the eighteenth century, the publications have increased tremendously, so much so, that today it is almost impossible for a single individual to be familiar with all phases of the subject. In 1945, I<sup>120</sup> described some of the important works being done in Great Britain, South Africa, Australia, Canada, Germany, Italy and the Netherlands as they concerned the radiologists. There are many other countries like Japan<sup>163, 164, 165, 166</sup> and India,<sup>111</sup> where excellent work on pneumoconiosis is being done and reported.

Although the effect of various dusts on the lungs had been recognized previously by other writers, Zenker<sup>167</sup> in 1867 is given credit for having coined the word "pneumonokoniosis" (Fig. 5).

Anyone who takes the time to read a little about the pneumoconioses cannot help but be impressed with certain facets of the total problem. Some of these are of real importance to the radiologist. Most of the diagnoses begin with an interpretation of the roentgenograms. A radiologist with a broad background of diagnostic training and experience can be a tremendous asset in the care that these dust affected workers receive because there are many diseases that produce shadows in the lungs that simulate silicosis and asbestosis. There is no part of radiology in which there is a greater opportunity for contributing real service to the health of the community and of the nation. The retrospective studies of chest roentgenograms made on industrial workers provide a most satisfying experience, not only in studying the natural history



of the pneumoconioses, but other pulmonary and cardiac diseases. The monetary compensation for the radiologist is well worth his salt if he applies himself.

Over the years I have talked with young men who have trained with us, in an effort to stimulate interest in the field of the pneumoconioses, and only a few have responded. For the most part, radiologists have been satisfied with a casual acquaintance with the subject. The information that these men are

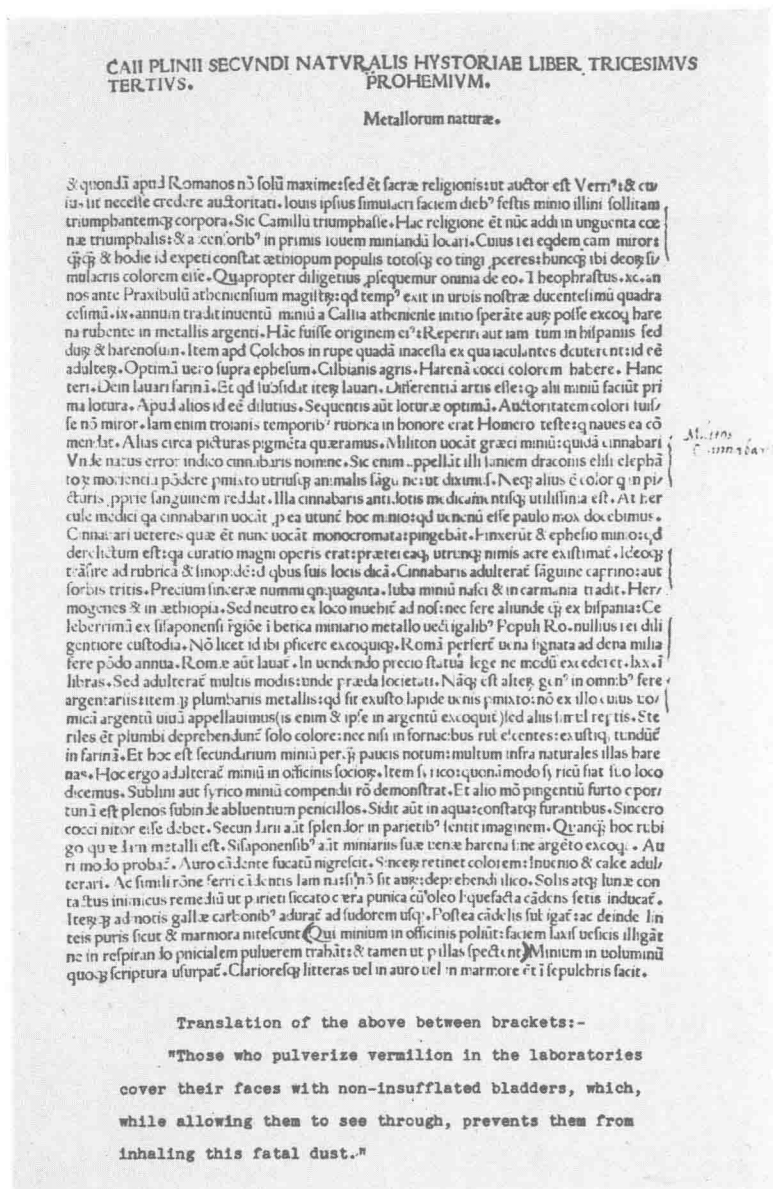


Fig. 2. Reference Pliny's article with translation of a sentence concerned with protection.