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HISTORICAL AND LEGAL ASPECTS OF INDUSTRIAL DISEASE

W. Keith C. Morgan

Throughout the Early and Middle Ages manual labor was frowned on as unworthy of a gentleman and the worker in the mechanical arts was felt to be socially inferior. This philosophy prevailed even in the Hellenic civilization. Xenophon in his treatise "Economicus" quotes Socrates as saying the mechanical arts carry a social stigma. It was not until the days of Rousseau, Carlyle, and Marx that manual work became accepted as a respectable vocation. Consequently, diseases peculiar to the working classes attracted little attention until the Renaissance, and it was not until the middle of the sixteenth century that the first attempt was made to relate disease to specific trades.

In the Hartz mountains of Silesia and Bohemia, silver and gold were discovered around A.D. 1000 and mining in this area became the main occupation for the next several centuries. It was in these metal mines that the first observations were made that led to the recognition of dust as an industrial hazard. The earliest account of metal mining was published by George Bauer, commonly known as Georgius Agricola. A Saxon by birth, he was born two years after Columbus rediscovered America. He attended the Universities of Bologna and Venice and in 1526 took up the practice of medicine at Joachimstal. He died in 1555 and it was not until the following year that *De re metallica* was published.[1] This work dealt with all aspects of the mining and smelting of gold and silver. The mining machinery used, the type of ventilation, and the manner in which drainage was effected were all described by him, as were the diseases and accidents to which miners were prone. He was aware of the dangers of inadequate ventilation, and death by suffocation was correctly attributed by him to this cause. Agricola described the harmful effects of

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dust in these words: "On the other hand, some mines are so dry that they are entirely devoid of water and this dryness causeth the workmen even greater harm, for the dust, which is stirred and beaten up by digging, penetrates into the windpipe and lungs and produces difficulty in breathing and the disease the Greeks call asthma. If the dust has corrosive qualities, it eats away the lungs and implants consumption in the body. In the Carpathian mines, women are found who have married seven husbands, all of whom this terrible consumption has carried away." To avert the unpleasant effects of dust, Agricola recommended the use of ventilating machines.

Some ten or so years after the publication of *De re metallica*, a further monograph appeared devoted to the occupational diseases of gold and silver miners. The author of this was Aureolus Theophratus Bombastus von Hohenheim, who fortunately was, and is, known by the sobriquet "Paracelsus." This contentious but gifted person studied medicine in Ferrara. In 1515 he was awarded his medical degree and spent the next ten years roaming Europe, enlisting in various armies and living a life of lechery and debauchery. In 1527 he returned to Basle University as a lecturer. A dyed-in-the-wool iconoclast, Paracelsus wrote in German rather than Latin.[2] His lectures were characterized by mordant wit and irreverence; he was daring enough to burn the works of Galen in public and to question the rituals of alchemy. Paracelsus was the first person to realize the benefits of mercury for syphilis and perhaps was the originator of the aphorism, "One night with Venus is followed by seven years with mercury." In 1528 he was compelled to leave Basle and he resumed his nomadic life. He found refuge in 1536 in Salzburg, where he enjoyed the patronage of Prince Ernst of Bavaria. Unfortunately, he met his end in a tavern brawl two years later.

As an astute observer he noticed that cough, shortness of breath, and wasting diseases were more prevalent in certain mines. He attributed these symptoms to either "vapors," "The Heavenly Bodies," or "The Workings of the Gods" rather than dust inhalation. Nonetheless, on other occasions he was more discerning and gave the first good description of erethism, recognizing, moreover, that the disease was produced by the ingestion of mercury.

About a century after Agricola made the first observations concerning the relationship of occupation to disease, Bernardino Ramazzini was born. He was destined to become the Father of Occupational Medicine and lived for over eighty years (1633–1714). He owes his reputation to his treatise *De morbis artificum diatriba*, which was published in 1700.[3] This work is to occupational medicine as Harvey's *De motu cordis* is to physiology.

Ramazzini studied medicine at the University of Parma where he qualified in 1659. After several years in practice in Rome, he became Professor of Medicine at the University of Modena. He held this position

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for eighteen years and continued on in Modena for a further twelve years. His researches there were an inspired blend of public health and epidemiology and he wrote extensively on malaria and lathyrism.

In 1700 he moved to Padua as Professor of Medicine. By this time he was known throughout Europe. Over the next few years his eyesight failed and in 1707 he asked to retire. He was successfully dissuaded, and as a token of the esteem in which he was held was elected President of the Venetian College. He died in 1714 of a stroke.

During his life he looked into the health problems and conditions of work of numerous occupations, including potters, metal miners, apothecaries, and sulfur workers. It was through his efforts that the vital question "What is your job?" became part of any medical history.

From the time of Ramazzini there has been a gradual increase in the awareness of the dangers of certain occupations but until Victorian times preventive measures were largely voluntary and depended largely on the conscience of the employer. With the advent of the Industrial Revolution, the problem of industrial injury and disease increased tenfold. It became obvious that the health of the worker had to be safeguarded and, moreover, that this could be effected only by legislation. The hideous conditions in which the British laboring class worked and lived remained largely unknown and ignored until reformers such as Shaftesbury, Owen, Chadwick, and Simon called them to the attention of the government and people. Dickens' graphic descriptions of mill and factory working life disposed the growing middle class to the need for social and industrial reform. Without adequate morbidity and mortality statistics, truly appalling death rates in certain industries were known only to a few persons. In Sheffield, cutlery trade workers were dying of silicosis with as little as five years' exposure. The condition became known as "grinders' rot." A detailed and excellent account of the various social and industrial reforms which took place in nineteenth century Britain and slightly later in America is to be found in Donald Hunter's book *The Diseases of Occupations*.[4]

In the nineteenth century the only recourse open to a workman who was injured while at work was to bring a common law action against his employer. Since he had neither the understanding nor the money to finance such litigation, successful actions were rare. To help the workmen, employer's liability statutes came into effect. These made provision for financial compensation in the case of industrial disease or injury, but the employer had three powerful defenses against such actions. Thus, an employer was not held responsible (1) if he could show either that another worker was wholly or partly responsible for the injury, (2) if the injury occurred as a result of the worker's own negligence, or (3) if the workman knew of or should have known that such injury or illness was an inherent risk in his occupation. With such defenses available to the employer, it was indeed unusual for a worker to win his case.

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The years between 1890 and 1920 saw the introduction of workmen's compensation in both Britain and the United States. These laws introduced a new concept, namely that the worker had a right to adequate compensation for industrial injury and sickness. The cost of medical care for industrial injury was also included in the compensation. Awards made through workmen's compensation make no attempt to apportion blame or responsibility for injury. Such compensation was and continues to be financed by employers, each paying a certain premium into a state or federally administered fund. The cost of industrial injury and disease is therefore borne by the consumer. The introduction of workmen's compensation laws was a tremendous social advance, but in the United States there is little doubt that additional legislation is necessary to extend the cover to all workers. In certain states only 50 per cent of workers are covered and in some cover is voluntary. Disability awards vary according to the state and in some states well recognized industrial diseases are not covered by the workmen's compensation laws. During 1932–1934 over four hundred workmen were reported to have died from acute silicosis after working on the Gauley Bridge tunnel in southern West Virginia.[5,6] The bodies were buried in secret so that exhumation was impossible, thereby preventing possible legal action based on autopsy evidence. Not a single worker received compensation for the illness he contracted and the families were equally unfortunate. These happenings occurred despite the existence of a workmen's compensation law in the state concerned.

With the passage of time, more and more industrial hazards are being recognized. In the last few years, the hazards of exposure to asbestos, detergent enzymes, and polyurethane foams have been described. Inevitably there is a delay in the introduction of preventive measures designed to control such diseases, and it is usually even longer before legislative action which gives them official recognition comes into effect. There is little doubt that with advancing technology, new industrial hazards will develop and as such their initial recognition will depend on somebody asking the time-honored question "What is your job?"

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