

## Review

# BERNARDINO RAMAZZINI'S *DE MORBIS ARTIFICUM DIATRIBA* OR THREE HUNDRED YEARS FROM THE BEGINNING OF MODERN OCCUPATIONAL MEDICINE

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This review opens with the most important examples from the history of medicine until the end of the 17<sup>th</sup> century, which anticipated the affirmation of occupational medicine as separate medical discipline. The article remembers the famous Italian physician Bernardino Ramazzini (1633-1714) and his book *De morbis artificum diatriba* (*Diseases of Workers*) published in Modena in 1700 in which he described the effects of work on health for some fifty professions. By doing that, Ramazzini had laid scientific foundation to modern industrial hygiene, that is, today's occupational medicine. The authors conclude that even 300 years after the first publication of *Diatriba*, Ramazzini is still relevant, and that it deserves much greater attention than it is given on occasions such as this year's anniversary.

**KEY WORDS:** *classification of work-related disorders, history of occupational diseases, industrial hygiene*

It is difficult to determine the exact beginning of occupational medicine as an intentional activity with the aim to protect the health of workers from the harmful effects of work. The first records go as far back as old Egypt where miners tried to protect themselves from dust by wrapping themselves in sacks and by using primitive masks made of animal bladder. In the ancient Greece, *Aristotle* observed characteristic disturbances of runners. *Pliny* described manufacturers of mercury and sulphur. *Juvenal* and *Plautus* wrote about tailors and blacksmiths. Describing the diseases of miners, porters, gardeners, riders and sailors, *Hippocrates* came to a conclusion that many trades involved great hardships for those worked. Later in the ancient Rome, *Celsus*, *Pliny*

and *Galen* came to a similar conclusion (1).

Medieval city statutes keep records regulating the work of different manufacturers (bakers, millers, butchers, innkeepers, and tanners), primarily from the viewpoint of public health. At that time, artisans, manufacturers, and salesmen founded guilds with the first simple forms of insurance against disease and death. In fact, their solutions provided prototypes for later health and social insurance.

In 1556, *Georgius Agricola* in his impressive book on mining *De re metallica* (2) described work conditions in underground mines and in smelters. He observed characteristic diseases and injuries of miners and proposed preventive measures such as ventilation and wearing handkerchiefs over the

face. A year later, *Paracelsus* described a number of disturbances related to the work and life of miners and explained them as the consequences of harmful action of the working environment. Thanks to the realistic descriptions of pneumoconioses and similar diseases, his dissertation became the first monograph dedicated to professional diseases (3). In the 17<sup>th</sup> century, *Giovanni Maria Lancisi* gave the basis for the development of hygiene, *John Graunt* introduced statistical methods in hygiene and social medicine, and the philosopher *Leibnitz* proposed the foundation of health offices with the task to study and control infectious and other diseases (4).

The year 1700 was by all means one of the most important years at the time, as it was the year when the Italian physician *Bernardino Ramazzini* published his masterpiece *De morbis artificum diatriba* (*Diseases of Workers*) in Modena (5). This masterpiece by all means provided firm grounds for the development of modern occupational medicine (6).

This review relies on data collected from general textbooks on the history of medicine, reviews of the history of occupational medicine (7, 8), on the reprint of *Diatriba* with the comprehensive study of *Pazzini* (9), and several recent contributions on Ramazzini's life and work (10-12).

## SHORT BIOGRAPHY OF BERNARDINO RAMAZZINI

Bernardino Ramazzini (Figure 1) was born on 5 November 1633 in Carpi near Modena, Italy. He studied medicine in Parma and graduated in 1659. After that, he practiced in Roman hospitals for a while. He was offered the position of the leading physician in the little duchy of Castro, but he fell ill with malaria and withdrew to convalesce at his home in Carpi. As he got better, he accepted another offer, now from the neighbouring Modena, where he acquired the reputation of a competent practitioner and medical theorist. He was elected full professor (*professore primario*) of theoretical medicine at the local university in 1682 (at the age of 49 years). Eighteen years later, at the time of



Figure 1 Bernardino Ramazzini (1633-1714), Italian physician, founder of occupational/industrial medicine

Ramazzini's most intensive publishing activity, the Venetian Republic offered him professorship of practical medicine at the Faculty of Medicine in Padua, which he readily accepted. Followed the days of unusually vivid professional activity. He became one of the leading professors at the Padua University School of Medicine. With time his delicate health started to get worse. The greatest problem for Ramazzini was his amblyopic condition which progressed rapidly by the end of his life, as he would not stop working. Although he became practically blind at the time, he not only continued to hold lectures, but he also published new professional studies. The reader may find it interesting to note that his grandsons helped him to accomplish his work. They would read new publications to him and write what he dictated to them. This is how Ramazzini not only lived to see his old age, but also remained active until the last day. Ramazzini died on 5 November 1714, just as he was preparing to hold another lecture at his school. He was buried in a small, plain church in Padua, and his grave is visited by a rare scholar of the history of medicine or occupational physician.

## ABOUT *DE MORBIS ARTIFICUM DIATRIBA* (DISEASES OF WORKERS)

From 1679 to 1714, Ramazzini published a score of studies and books on a variety of subjects. These include lucid discussions about epidemiology, climatology, balneology, pharmacology, and hygiene. Ramazzini's overall bibliography however, includes far more publications, because some titles were issued in several editions and as many translations. The latter is particularly true for *De morbis artificum diatriba* (Figure 2) and nine posthumous editions of *Opera omnia*, that is, from 1716 to 1828.

Antonio Capponi printed the first edition of *Diatriba* in Modena in 1700 (5). The book begins with eight pages of introduction in which the author extends his thanks to public officials, and dedicates his verses to the reader (*Auctor ad librum*). Follow 360 pages with 42 chapters. The reader may wish to note that due to an error in numeration (Chapter 8 is skipped), the book counts 42 chapters plus the last chapter, *Caput ultimum*.

The second edition was extended by new chapters (13). Editions and translations that followed brought few corrections and extensions. As an independent title, *Diatriba* saw 21 editions altogether, in Latin, English, Italian, French, German, Dutch, and Russian. It was also included in all nine editions of *Opera omnia*.

In short, these chapters describe the diseases of the following professions: miners, gilders, healers by inunction (physicians who rub mercury in syphilitics), chemists, potters, glass-makers, painters, sulphur-workers, blacksmiths, plasterers and lime workers, apothecaries, cleaners of cesspits, fullers, oilmen, cheese-makers, lutestring-makers, tobacco-workers, corpse-workers, midwives, nurses, vintners and brewers, starch-makers, corn-sifters and measurers, stone-cutters, laundresses, hemp, flax, and silk-workers, bathmen, salt-workers, workers who stand, sedentary workers, runners, horsemen, porters, athletes, workers on minute objects, voice-trainers and singers, farmers, fishermen, and soldiers. The second edition included the diseases of the learned, of printers, writers and notaries, confectioners, weavers, coppersmiths carpenters, razor and lancet grinders, brick-makers, well-

diggers, sailors and rowers, hunters, and soap makers.

## DISCUSSION

It is immediately evident that Ramazzini was not consistent in systematisation because he did not find it important. The reader is invited to view this book as a variegated mosaic of practical experience and lucid observations of a top-notch medical expert who - in the best tenor of Hippocrates - did not separate theory from practice and who was well aware of differences between the academic and bedside approach. Ramazzini often corroborated his findings by quoting contemporary as well as antique authors, which shows the breadth of his learning. Thanks to his outstanding medical knowledge, classical erudition, and peculiar and elevated style, each chapter of *Diatriba* is a complete and meticulously treated case study. Together, these chapters

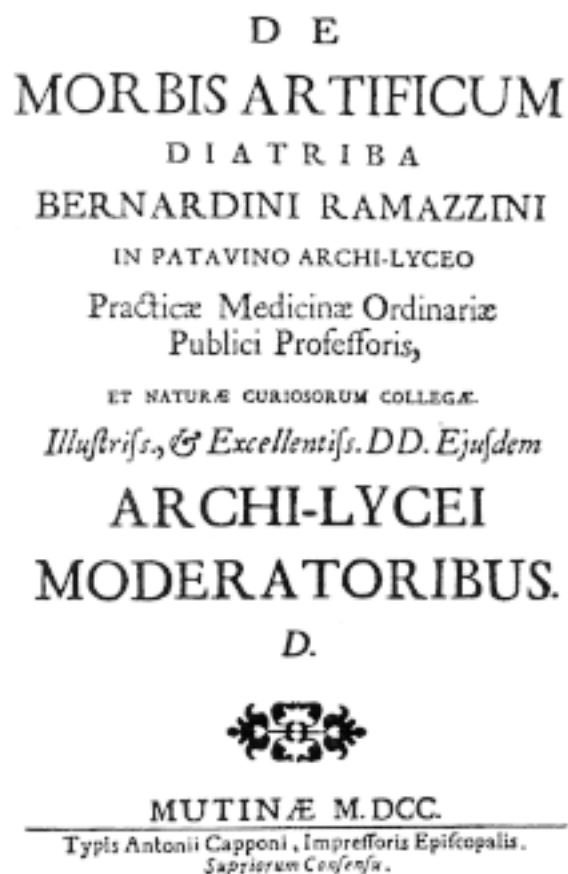


Figure 2 Title page of *De morbis artificum diatriba* (Diseases of Workers), Modena (1700)

make an independent whole which includes practically all professions of that age.

Most of Ramazzini's clinical descriptions are so clear that they are still accepted without reserve. The case in point are his descriptions of mercury poisoning in goldsmiths and mirror manufacturers, lead poisoning in potters or his description of symptoms of pneumoconiosis (14) and work-related spine deformities (15). Ramazzini does not stop there, but suggests viable means of prevention. His instructions for the use of protective gloves and masks deserve particular mention. How original and new Ramazzini's instructions for personal hygiene, bathing, and gymnastics (16) were for that age is best shown by the affirmation of his ideas in Johann Peter Frank's handbook *System einer vollständigen medizinischen Polizey* (17). It was the first systematic handbook of social medicine and public health drawing on the ideas of the 18<sup>th</sup> century Enlightenment which were also included in Gerhard Van Swieten's law "Normativum de re sanitatis" of 1770. Ramazzini's role in the Croatian history of medicine is largely reflected in the first book of John the Baptist Lalangue *Medicina ruralis illiti Vrachtva ladanyzka (Rural Medicine)* published in 1776. This book was the first professional medical book in Croatian (Kajkavian dialect) (18). Ramazzini's ideas and recommendations are comprised in Lalangue's consideration that work was the major cause of diseases in the population he observed and cured in his everyday practice (19).

Even though most of the text discusses the diseases caused by physical factors, there is an interesting long and instructive appendix listing to the diseases of different occupations from merchants and artisans (20) to salt-workers (21), midwives and nurses (22), and "the learned". There is one more appendix dedicated to the diseases of religious sisters. The chapter which may confuse the reader at the first glance is the one about Jews. Not for long, though, because it addresses diseases associated with certain traditionally Jewish professions such as fullers. Ramazzini was shocked by the tight and poorly aerated and lit working space associated with problems with vision, headaches (23), and hoarseness. The continuing chapters are largely dedicated to acute and chronic respiratory

symptoms.

Throughout the book, Ramazzini masterfully discusses possible connections between work and human health, that is, between harmful environmental factors and the development of characteristic occupational diseases (24). Beside the above mentioned diseases, Ramazzini specifically addresses occupational dermatoses (25, 26).

It is worth noting that Ramazzini often stresses the public importance of the frequent recurrence of work-related and environment-related diseases, anticipating thus modern epidemiology and environmental medicine (27, 28).

By describing work-related ailments of his era, Ramazzini gave a more or less complete overview of the contemporary society describing it, for the first time, through new social categories, that is, from workers who empty lavatories to writers, musicians, soldiers, friars, and sovereigns.

## CONCLUDING REMARKS

Ramazzini's work received great attention during his lifetime, and the interest for the subject grew in decades that followed his death. Today, three centuries away from the publishing of his capital work, we should ask ourselves are his observations and messages still current? The answer is a clear yes. Countless studies of Ramazzini's *Diatriba* confirm that he has given foundation not only to occupational medicine, but also to related medical disciplines such as epidemiology, environmental health, sports medicine, and other branches of modern medicine. In addition, scientific gatherings dedicated to his work and associations such as Collegium Ramazzini and several institutions around the world named after him best illustrate how current his ideas and work are.

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**Sažetak****DE MORBIS ARTIFICUM DIATRIBA BERNARDINA RAMAZZINIJA ILI TRISTO GODINA OD POČETKA MODERNE MEDICINE RADA**

U uvodnome dijelu, koji obuhvaća razdoblje povijesti medicine do 17. stoljeća, autori podsjećaju na nekoliko primjera koji su prethodili afirmaciji medicine rada kao samostalne medicinske discipline. Slijedi podsjećanje na znamenitoga talijanskog liječnika Bernardina Ramazzinija (1633.-1714.) koji je u svojoj knjizi *De morbis artificum diatriba (Rasprava o bolestima zvanja)* izdanoj u Modeni 1700. opisao kakav utjecaj ima pedesetak najrazličitijih zanimanja na zdravlje ljudi koji se njima bave. Tom knjigom postavio je znanstvene temelje modernoj higijeni rada, odnosno današnjoj medicini rada. U raspravi je dan kraći osvrt na brojne primjere u recentnoj literaturi u kojima se istražuje i afirmira Ramazzinijevo djelo, ne samo u kontekstu medicine rada nego i drugih područja moderne medicine poput zdravstvene ekologije i sportske medicine. Kao zaključak nameće se spoznaja da je i danas, 300 godina od izdanja ovoga kapitalnog djela, Ramazzini i dalje aktualan te da zavređuje znatno veću pažnju od kurtoazne, kakva je primjerice nedavna obljetnica.

**KLJUČNE RIJEČI:** *higijena rada, klasifikacija bolesti vezanih uz rad, povijest profesionalnih bolesti*

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