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Review

Mrs Jolanta Wadowska-Król, MD, was born in Katowice. She graduated from the Faculty of Medicine of the Medical University of Silesia in Zabrze and in 1968 completed basic specialist training in paediatric medicine. During this period, she started working in a district clinic in Szopienice, and then she worked in Dąbrówka Mała. She served children and youth with her help until 2011. This is how every review usually begins, with the author then focusing on the scientific achievements of the Honorary Doctor. Nevertheless, I will go off the beaten track with the review. I will discuss an exceptional person and a fundamental problem that remains relevant and sorrowful despite the passage of years.

Regarding Dr Jolanta Wadowska-Król's merit level, which materialises primarily in moral, human and social dimensions, I decided to embed my review in our Silesian region's history. I wanted to outline a broad context of the problem and weave the profile narrative of a person whose determination and commitment saved many lives, especially children's. Dr Jolanta Wadowska-Król contributed significantly to the improvement of life comfort of inhabitants of cities surrounding Szopienice. Steadfastly and against all odds, she paid heed to the question of lead poisoning in the population of children observed in the 1970s near the non-ferrous metal smelter Szopienice. She expected policymakers to act decisively in response to this situation. Then she decided to face a local problem whose international scale and impact was only revealed last year in the UNICEF's and Pure Earth's report titled *The Toxic Truth: Children's Exposure*

to Lead Pollution Undermines a Generation of Future Potential. It introduces comprehensively a global tragedy of children caused by the destructive effects of lead. It also informs about the unimaginable loss of intellectual capital of future generations all over the world.[1] One in three children has exceeded the maximum level of this metal in blood, as it turns out. These days, we are frantically looking for exemplary role models, living witnesses to the truth. The university's role is to hold to the truth, talk about it, remember it, and remind those who have made or are making the world we live in a better place. Not only will the Senate of the University of Silesia in Katowice conferring the highest dignity of Doctor Honoris Causa upon Doctor Jolanta Wadowska-Król distinguish her. It will also symbolically pay tribute to all those who, by their attitude and actions, contributed to protecting future generations from lead poisoning and who raise public awareness of this issue.

Lead is one of the first metals which humankind has, with due care, familiarised and entirely subjugated. We learned how to extract its ores, process them effectively, smelt the hidden metals and then refine them efficiently. At the beginning of the new era, besides lead in its pure form, humans could also isolate coal, sulphur, iron, silver, tin, gold, and mercury. Using available historical data and current knowledge, we can conclude that lead has accompanied man since time immemorial. We can understand his extracting and processing lead ores as an allegory of the mythical Pandora's box, which hid great misfortunes, but there was hope on its bottom. On the one hand, by filtering into the environment in other, more bioavailable forms, it revealed more often and with greater force its detrimental influence, the effects of which we can observe here and now worldwide and also very clearly in our Silesian region. On the other hand, however, it also gave hope for the rapid civilisational progress and has largely contributed to it.

Deposits of lead-rich ores were discovered in Asia Minor in 7–6.5 thousand years BC. At that time, the interest in this metal was small and was primarily a result of the desire to develop valuable silver, which co-occurs with lead in

[1] *The Toxic Truth: Children's Exposure to Lead Pollution Undermines a Generation of Future Potential*. Retrieved from the Internet: https://www.unicef.org/reports/toxic-truth-childrens-exposure-to-lead-pollution-2020 [access date: 18 May 2021].

ores rich in it. In ancient Egypt, the metal was admixed to popular cosmetics, used for the production of weights, was an ingredient of tiling, glass, enamel, and it also was used for making ornaments. Other ancient civilisations living in the area in early Mesopotamia, Syria and Palestine appreciated lead due to its surprising softness compared to other metals, discovered its usefulness as a writing material, and considered it a good material for developing construction activity. It was also a medium of exchange.

Interestingly, in China at the time, lead was used as a stimulant and a contraceptive. The fast-growing demand for this metal resulted in its large-scale extraction and processing since 3000 BC. The scale of lead production, its usefulness and, at the same time, its universality will be easier for us to learn if we compare available data about the level of production – in the times of the Roman Empire, the maximum annual production reached around 100 thousand tonnes. Strangely enough, it was only during the industrial revolution that a similar result was obtained.

Detrimental effects of lead were discovered already in the time of the Roman Empire. Manuscripts of Vitruvius have survived, in which he relayed that the metal can permeate into drinking water. The softness of lead facilitated its processing. It was used to produce pipes and fitting components, which fostered the rapid development of the water distribution network. There is also a theory explaining the fall of the Roman Empire with the increase in lead poisoning released from the lead network distributing drinking water.[2] However, this metal may get into the water supply only if the lead pipes have contact with so-called soft water, i.e. water with a small concentration of calcium and magnesium. This problem was very clearly observed in 2014 when in Flint, Michigan, USA, the water intake from Lake Huron and the Detroit River was changed to the water intake from the Flint River, whose chemical composition resulted in significant erosion of lead pipes in the water mains. This crisis exposed a population of 100,000 people to increased lead concentrations in potable water. In water samples taken from domestic water supplies, the concentration of this metal exceeded the acceptable level two and a half times. Other types of lead

[2] A.T. Hodge: *Vitruvius, Lead Pipes and Lead Poisoning*. "American Journal of Archaeology" 1981, 85, pp. 486–491. https://doi.org/10.2307/504874.

poisoning were also reported in ancient times, such as those resulting from wine seasoning with lead acetate – a chemical compound with a characteristic sweet taste, so-called sapa. Victims of poisoning were called saturnines because their behaviour seemed to be similar to the character of Saturnus, the father of gods – those people were serious, gloomy and temperamental. In Hellenistic times, one doctor described cases of paralysis and colic, associating those acute conditions with exposure to high doses of lead. Nevertheless, the state of knowledge and familiarity with the subject at the time did not encourage the perception of lead poisoning as a problem worthy of attention and intervention. Cases of such poisoning occurred most notably in social groups of the lowest social status who were not to a sufficient degree protected by law.

In 1498, there was a ban on sapa use in a papal bull, but lead poisoning was widespread until the 18th century. Over time, the metal has found new applications. Since the invention of Johannes Gutenberg, it became indispensable material in printing. Because of that, besides metalworkers, another professional group strongly affected by lead poisoning were printers. Since the invention of the firearm, due to its properties, lead is used in the manufacture of ammunition. Venetian ceruse, also called white lead (in chemical terms, it is an alkaline lead (II) carbonate, $2PbCO_3 \cdot Pb(OH)_2$), was used until the times of the French revolution used in facial whitening cosmetics and for powdered wigs. There were also recipes for the manufacture of paints containing lead compounds. So-called lead-based paints were increasingly used to decorate the interiors of houses and temples, which increased the risk of poisoning, especially among painters. The victims were, among others Piero della Francesca, Rembrandt, or Francisco Goya. In 1473, German doctor Ulrich Ellenbog recommended that metalworkers ventilate their rooms and protect themselves by covering their mouths and noses. Many groups of workers were also advised to avoid inhaling the dust. Increasing awareness of the risk of lead poisoning in many occupational groups also made it easier to spot cases of poisoning among people who were indirectly exposed. Many doctors have outlined the clinical picture of the disease, and knowledge about it was consolidated in the 19th century.

In 1831, René Laennec indicated anaemia as a symptom of poisoning with this metal. In 1840, in the Charité hospital in Paris, a large-scale study was conducted involving as many as 1,200 cases of lead poisoning. The results

presented by Louis Tanquerel des Planches proved that inhaling lead in dust is much more harmful than the contact with its metallic form due to its easier absorption. In 1840, British neurologist Henry Burton observed another typical clinical symptom resulting from lead poisoning – a specific gum contour, so-called saturnine halo. In 1838, Jean-Étienne Dominique Esquirol studied in detail psychic disorders related to poisonings. In 1856, Alfred Baring Garrod recorded an increased number of podagra in plumbers and painters (about one-third of analysed cases), successfully relating them to increased exposition to lead compounds. Furthermore, already mentioned Louis Tanquerel des Planches was the man who introduced the term "encephalopathy" to the medical vocabulary, describing a variant of saturnine encephalopathy – brain damage resulting from lead poisoning. Under the regulation introduced in 1883 in the Kingdom of Great Britain, child labour in the production of white lead was banned. It was the first legal act in the history of such extraordinary importance because it concerned a specific occupational disease and the need to protect juvenile workers.

The 20th century, in which most of us grew up, is a time of increased civilisation's growth and intensive exploitation of lead ores. At that time, the automotive industry, which needed lead batteries (and still needs – about 2.6 kg of this metal for a piece), was developing very intensively. It also used on a large-scale lead tetraethyl to improve the fuel combustion in the engine compartment. Interestingly, lead's toxicity was already known then, as, during the studies on it, many people had become seriously ill or even died. Lead tetraethyl was added in about 1.5 g per litre to fuel known by the trade name ethyl gasoline. In Poland, ethyl gasoline was sold until 2005, while in the USA and Canada, it was withdrawn in the mid-1980s. Lead tetraethyl is still an additive to aviation fuels, but its acceptable content is up to 0.56 g per litre.

The metallurgical industry, including the non-ferrous metal industry, has thrived for decades in Upper Silesia thanks to the proximity and availability of ore deposits and large coal reserves. The Royal Smelter Frederic (Königliche Friedrichshütte), which operated in 1786–1933 in Strzybnica (at that time neighbouring Tarnowskie Góry), obtained significant quantities of silver and lead. The raw material was transported from the nearby silver Frederic mine. The production in 1905 reached its maximum. The following were obtained:

12,475 tonnes of silver, 41,611 tonnes of lead and 658 tonnes of litharge. In 1858, Georg von Giesche's Erben bought back from Guido von Donnersmarck the interests in an opencast mine Biały Szarlej. It carried out intensive mining of lead ores (calamine, lead sulphide) in opencast workings and obtained large amounts of so-called lead glance, lead ore (galena, lead sulphide).

Along with lead carbonate, galena occurred in the red seam with a thickness of about 14.5 metres. The acquisition of the Biały Szarlej mine took place when calamine ores depleted, but the economic conditions and the company's potential enabled exploitation and effective processing of lead ores. At that time, a decision was made to launch a lead smelter in Szopienice. The Walter Croneck lead smelter of the Giesche concern was located in Burowiec, present-day district of Szopienice. It was put into service on 21 October 1864. Its launching lasted about a year. The application for a relevant licence was analysed in detail for possible harmfulness for humans and the environment. It happened due to the objection to constructing the lead smelter raised by the director of the Szczęście Luizy coal mine in fear of the health of miners living in the nearby area.

Eventually, the county doctor did not find a threat to the environment, pointing to the use of appropriate precautions – 117-metre long water channel absorbing production dust and 61-metre high smokestack. However, despite the protection measures and technological developments in place, the work in the smelter was hazardous to health. In 1896–1904, the average employment in this plant was 145 employees, in 36.76% of which each year lead poisoning was observed. In 1878, after 44 years of launching the Wilhelmina smelter and 14 years from launching the Walter Croneck smelter, the metallurgists were provided with a dedicated hospital with a maximum of 47 beds. On the occasion of the Giesche company's 200th anniversary, in 1908 the new smelter hospital (Hüttenlazarett) dedicated for smelter and mine workers was opened in Roździeń, close to the Heintze shaft belonging to the Luisenglück (Luiza's Luck) mine, whose present address is Korczaka 27. The facility is named "the old mental hospital," although it had been a municipal hospital whose part was the psychiatric ward. However, in 1913, a special school was opened in Szopienice. It is now the Primary School no. 55 in Katowice, which has operated in this location since 1937.

In 1936, in its old premises, 99 children started their education. The 1931 population census showed that in the municipality Szopienice-Rozdzień, there were 23,632 registered residents, of whom 3,500 children were subject to the seven-year compulsory education. Their childhood was not easy due to prevalent poverty, so many had to mature before their age. Employment of juvenile workers in the smelter was quite common and fully accepted. There were even positions in which children were employed. We now know about at least one of them – so-called shatterers. The work of a child employed in this position consisted in a multi-hour breaking with a hammer of used muffles removed from the hot-blast stoves and refining furnaces, in which metals and their alloys were processed. In 1900, there were 115 children under-16 officially employed in the smelter.[3]

Interestingly, in the amendments to the law introduced in 1878, twelve-year-old children and older were allowed to take employment. After numerous objections and interventions, in 1892 the legislator finally allowed child labour for children who turned ten years old. Until World War I, these legal conditions remained unchanged, and children worked in the zinc-lead smelter complex on all positions – from the blende roasting plant to the zinc rolling mill. Furthermore, they had free access to the smelter area because the industrial complex was only fenced in 1871. The first year of production at Walter Croneck smelter was closed with 1,429 tonnes of lead, 259 tonnes of litharge (lead monoxide) and 1,098 kilogrammes of silver with the employment of 50 workers. In 1970, the production reached 7,300 tonnes of soft lead and 19,000 tonnes of lead alloys.

Learning about the history of metallurgy and industry in the Silesia and Katowice area, we will see that the Silesian landscape appeared as a promised land. However, besides coal, iron, zinc, and lead tycoons, ordinary people lived there. It was a dichotomic landscape full of industrial complexes with grandiosely protruding smokestacks. They overshadowed the whole neighbourhood with grey smoke and made ordinary people invisible. The economic situation

[3] E. Wilczok: *150 lat hutnictwa metali nieżelaznych w Szopienicach. Dzieje Huty Metali Nieżelaznych „Szopienice" i jej załogi*. Huta Metali Nieżelaznych "Szopienice", Katowickie Towarzystwo Społeczno-Kulturalne, Katowice 1984.

at the time, with its economic fluctuations, seemed to promote only the investors. There have been rapid highs but also spectacular lows. The dynamic changes in external conditions hit various branches of the economy with different strength and a different degree. The situation was even tenser because of the multicultural character of the region. Nevertheless, those changes created new opportunities and unlimited possibilities for entrepreneurs in the Silesian area. They favoured great merges, creating vast fields for implementing unique solutions and technologies and providing new investment opportunities guaranteeing quick profits and wealth. Despite rapid industrial growth and these great opportunities, poverty, deplorable living conditions, and unimaginable environmental conditions were commonplace among workers and their families. In 1913, earnings of women were at least three times lower in relation to men. Standard working time until the end of 1905 was 12 hours, which under new regulations was shortened to 10, and for those working in the most demanding conditions to 8 hours.

At this point, it is worth reminding the actual data related to the emissions of sulphur dioxide in the processes of zinc and lead production. Very high level of emissions of this gas was the reason for further development of the industrial complex in Szopienice with the plant producing this gas. Only one smelter, Liebe–Hoffnung (Love–Hope) in Nowa Wieś (Wirek, a district of Ruda Śląska), operating since 1925, emitted whole sulphur dioxide directly to the atmosphere. In the production at 6 thousand tonnes of blende per year, there were 1.5 thousand tonnes of sulphur in the form of sulphur dioxide released to the atmosphere annually. It was possible to recycle this environmentally harmful gas in the production of sulphuric acid. In the concession application, Director-General Berhardi pointed that the sulphuric acid plant would enable more than two-and-a-half times reduction in sulphur dioxide emissions to the level of 600 tonnes per year while increasing the effectiveness of the roasted blende to 10 thousand tonnes. Eventually, in 1874 a blende roasting plant was built, together with a sulphuric acid factory known under the Recke smelter.

Sulphuric(VI) acid with a concentration of 50% (so-called chamber acid) was produced there. It was produced with concentrations in the range of 60–66%. In 1900 alone, 32,000 tonnes of sulphuric acid were produced. In 1970, the annual emissions of all dust emitted to the atmosphere by the Non-ferrous Metals

Work Szopienice were estimated at 7,124 tonnes, of which lead dust was 1,098 tonnes. If these figures are to be taken as reliable, with the production of soft lead at 7,333 tonnes and 10,014 tonnes of lead alloys (total 26,347 tonnes of products), the loss of lead released as dust to the atmosphere was at 4.17%. At the same time, among the workers, 94 cases of lead poisoning were observed (about 2.74%), while still in 1960, there were 240 cases (constituting 6.5%). In the following years, the lead emissions as dust decreased significantly, reaching 771 tonnes per year in 1974. The mining of zinc-lead ores was very intensive. It increased until 1980 owing to the beginning of the exploitation of deposits Olkusz in 1967 and Pomorzany in 1974. In 1979–2004, zinc-lead ores 4.7–5.2 million tonnes were extracted annually, while the soil in the exploitation area still contains significant amounts of heavy metals.[4]

At this point, we come back to the activities of Dr Jolanta Wadowska-Król. After graduation, she began working as a paediatrician in a district clinic caring for the children of workers living in the area near smelters in Szopienice. This year marks the 47th anniversary of the first lead poisoning case observed by her in children. According to her studies, it was common there, or even epidemic. In a group of about 5,000 children under the age of 18, living in the vicinity of the lead smelter in the street quarter: Obrońców Westerplatte, Rzemieślnicza, Makarenki, Zjednoczonej Partii (now gen. Józefa Hallera) and further, and also within a radius of 400 metres from the smokestack, she observed recurrent anaemia, abdominal pain, headache, joint pain, colic, diarrhoea, and loss of hearing. She concluded that about 13% of the examined children were intellectually disabled and that none of those in which lead poisoning was confirmed finished higher education. It is worth noting that the acceptable blood level of lead was 30–35 microgrammes per decilitre (a microgramme is a millionth of a gramme). By contrast, today's norm is 5 μg/dL. As evidenced by the results of her study, lead levels in children were exceeded three to four times (140 μg/dL).

Undoubtedly, the observation of acute cases in the smallest children, on such a large scale, must have been an enormous burden for Dr Jolanta Wadowska-Król. To illustrate, at least in a small way, the cases she had to deal with in her

[4] J. Cabała: *Metale ciężkie w środowisku glebowym olkuskiego rejonu eksploatacji rud Zn-Pb*. Wydawnictwo Uniwersytetu Śląskiego, Katowice 2009.

practice, and how much lead can change a child's behaviour in an extremely short time, I will describe the case of a four-year-old boy in which the blood level of lead exceeded 200 μg/dL. The reason for his acute poisoning with this metal was not direct exposure to lead resulting from living near a smelter or in the highly contaminated area but contact with toys painted with lead paint. The parents sought medical attention concerned about the accompanying symptoms in their child, worsening over less than a week. They were, among others: acute abdominal pain, lack of appetite, weight loss of more than two kilogrammes, worsening of motor coordination, hand tremors, a significant reduction in attention span, cessation of reactions to one's name, hearing loss, slurred speech, walking without bending the knees (so-called stork walk), strong hyperactivity, deterioration of behaviour, a considerable reduction in reaction time up to a significant loss of motor coordination. In the course examination, the boy was found to have significant cognitive deficits and dangerously elevated protein in the urine, which indicated renal damage. These symptoms were linked to lead poisoning, which was confirmed by the blood test results. It is estimated that the daily dose of lead ingested with food is about 0.8 μg per kilogramme of body weight. For an adult, we are talking about a daily dose of at least 50 μg. The efficiency of lead absorption from the digestive system in adults is dramatically different compared to young children. In the case of infants, absorption may reach up to 50% on the ingested dose, whereas in adults, it is only 5–10%. Essentially, children absorb 4 to 5 times more lead than adults. Furthermore, they breathe and eat more than adults per kilogram of body weight. They are also particularly vulnerable during early development due to childhood habits, such as placing their hands in the mouth or staying outside and hygiene habits not fully formed. It was estimated that little children could inhale 100 to 400 mg of dust daily. As much as 99% of lead in the blood binds with erythrocytes. 92% is deposited in bones, with the mother's placenta not being the barrier for this metal.[5] About 1–2% of lead remains in the bloodstream, about 5% deposits in the brain and 70% in bones and other organs. By showing similarity to safe cal-

[5] M. Jakubowski: *Ołów i jego związki nieorganiczne, z wyjątkiem arsenianu(V) ołowiu(II) i chromianu(VI) ołowiu(II) – w przeliczeniu na Pb, frakcja wdychalna. Dokumentacja proponowanych dopuszczalnych wielkości narażenia zawodowego.* „Podstawy i Metody Oceny Środowiska Pracy" 2014, 80, pp. 111–144.

cium, this metal easily crosses the blood-brain barrier and reaches its maximum concentration approximately 24 hours after exposure. After direct ingestion, the concentration of this element circulating in the bloodstream is reduced by half after about thirty days. Lead accumulated in the child's brain only after one to two years becomes half-removed. Despite the reduction in blood levels of this metal, the risk of further poisoning remains as it takes years for it to be released from the bones into the bloodstream. Only after 10–20 years, the lead content accumulated in a child's bones may be reduced by half. The most hazardous fraction for health is lead in the form of dust. Its acceptable concentration in the cubic metre of air is 5 μg, while lead content in the air at 1 μg relates to its level in blood at 3 to 19 μg/dL. While in the case of adults, the effects of poisoning with this metal are only caused by relatively high doses, in children, due to the great sensitivity of the developing central nervous system, it is impossible to establish its safety level. The blood level currently considered to be acceptable is 5 μg/dL. Any disruption to the formation of connections in the child's brain, of which thousands can be formed in a single second, has severe consequences later on, including social deficits. Devastating effects of lead primarily result from disturbances in processes of conducting stimuli by neurotransmitters, impaired growth of neurons and formation of synapses in the cortex and disrupted organisation of ion channels. Consequently, it is said about the noticeable neurological changes that induce severe problems in children from the earliest years, which also persists in the school years. In particular, they have attention deficit disorder, impairment of cognitive and social processes, hyperactivity, emotional difficulties, or even aggressive tendencies. The results presented in the literature suggest that the occurrence of lead in blood is the cause of the decline of IQ scores. It has been observed that in the case of persistent high lead concentration in blood at 1 μg/dL, the decline of IQ scores was about one point. The clinical image of childhood lead poisoning is often related to the increased number of cases of autism. Autism was first described in 1991 by Eugen Bleuer, and in 1943 an American psychiatrist Leo Kanner defined early childhood autism. The year after, Hans Asperger, an Austrian paediatrician, observed autism in school-age children, especially in boys exposed four times more than girls. Although even today, it is difficult to define the aetiology of this disorder clearly, and it is difficult to diagnose it, there could be observed

a surprising parallel between the symptoms induced by lead poisoning and the symptoms that accompany autism. As we know, autism is a complex medical condition, and therefore we talk about autism spectrum disorders. The most common component in the autism spectrum is usually ADHD (attention deficit–hyperactivity disorder). For children in the 8–15 age group diagnosed with ADHD, one case in four can be associated with lead poisoning. Furthermore, accompanying hearing impairment, speech delay, impaired verbal expression or asocial behaviour are also mentioned in this context.[6] In addition to these difficulties, other disabilities result from functional disorders of the central nervous system, such as sensory integration disorders. They impair sensory processing, which results in severe impairment in cognitive processes. The theory of sensory integration was introduced as late as in the mid-1970s by an American psychology doctor Anna Ayres who launched the era of sensory integration therapy, which is now included in early childhood development support. Besides lead and other heavy metals poisoning, other neurotoxic environmental factors heavily impact children development, including the occurrence of symptoms of the autism spectrum.[7] We can read about this challenging condition in the book by Olga Ptak titled *Who Stole Tomorrow?* written not only from the point of view of a parent but also an autistic child. The author makes a difficult attempt to understand her child, going on a journey to explore the world of a peculiar boy whose brain works according to different rules: "My name is Leo. I'm five, but I don't know exactly how much it is. I have a lot of interesting thoughts which are fidgeting in my head, and I'd like to tell you about them, but I don't know how. My head is healthy, only the antenna in it is broken. Radios have antennas, with which they catch thoughts and speak them aloud, but I can't do

[6] J. Caravanos, R. Dowling, M.M. Téllez-Rojo, A. Cantoral, R. Kobrosly, D. Estrada, M. Orjuela, S. Gualtero, B. Ericson, A. Rivera, R. Fuller: *Blood Lead Levels in Mexico and Pediatric Burden of Disease Implications*. "Annals of Global Health" 2014, 80, pp. 269–277. https://doi.org/10.1016/j.aogh.2014.08.002.

[7] G. Bjorklund, A. Skalny, Md.M. Rahman, M. Dadar, H. Yassa, J. Aaseth, M. Skalnaya, A. Tinkov: *Toxic Metal(loid)-based Pollutants and Their Possible Role in Autism Spectrum Disorder.* "Environmental Research" 2018, 166, pp. 234–250. https://doi.org/10.1016/j.envres.2018.05.020; J. Kałużna-Czaplińska, W. Grys, J. Rynkowski: *Czynniki neurotoksyczne w środowisku życia dzieci przyczyną zaburzeń rozwojowych w aspekcie autyzmu*. „Nowa Pediatria" 2008, 3, pp. 50–57.

this that way. In me, the words lose themselves somewhere on the road through the wires in the body and can't remind me of themselves when I need them. Then, everybody look at me and wait, so I say any word so they stop standing over me. Sometimes it turns out that antenna lets a right word in my head, but there's a different one coming out from my mouth, and I don't know why."[8]

Or perhaps lead poisoning is a long-gone problem that should not concern us now? Unfortunately, we cannot stay calm in this matter. As I mentioned before, in the UNICEF's and Pure Earth's report published last year titled *The Toxic Truth: Children's Exposure to Lead Pollution Undermines a Generation of Future Potential*,[9] we read that globally, one in three children has a lead concentration in blood exceeding 5 μg/dL. The report shows that there is mass poisoning in children. The scale of this phenomenon has never been recognised or analysed in detail before. In Poland, the lead concentration in blood over 5 μg/dL is observed on average in 268 thousand children and youth aged 0–19 and over 10 μg/dL in 34.9 thousand children. In 2019, 7,314,600 children aged 0–18 years were reported in our country, so 3.66% of them had lead concentrations in blood exceeding the accepted level. The increased lead level in blood in children results in about 3,790 untimely deaths.[10] Global lead contamination is a cause of 900 thousand deaths per year. This number of deaths is similar to the number of people dying from HIV/AIDS but much greater than the number of deaths caused by malaria (620 thousand), war and terrorism (150 thousand), or natural disasters (90 thousand). However, deaths are just a tiny part of the havoc wreaked in the population by lead poisoning. Keeping in mind the devastating effect of lead, especially in small children, it should be stressed that this wording mentioned in the title's report of the irretrievably lost potential of future generations and wasted human capital is very accurate. The full text of the report and the analysis of facts make me sad and provoke me to ask additional questions, which requires in-depth analysis and appropriate action. Indeed, many of you begin to wonder to what extent environmental factors have shaped us as

[8] O. Ptak: *Kto ukradł jutro? Czyli dlaczego nie jest jak z obrazka*. Wydawnictwo Albus, Poznań 2019, p. 5.

[9] *The Toxic Truth…*

[10] *Global Pollution Map*. Retrieved from the Internet: https://lead.pollution.org/ [access date: 18 May 2021].

individuals and society. To what extent such and not other individual character traits are due to genetics, acquiring in the process of socialisation specific role models, and to what extent they result from undesirable chemical induction? Do children from Silesia had, and what is the most important, have a chance for harmonious development and what every parent wants – realising full intellectual potential? Was the intellectual potential of industrial Silesia hurt during all those years due to significant environmental pollution? What price have we and future generations paid? Already mentioned UNICEF's and Pure Earth's report reflects on consequences of lead poisoning observed as neurological and cognitive deficits, mental disorders, excessive aggression or increased crime.

Fascinating is the economic analysis presented by the World Bank, which estimated the cost resulting from the decrease in IQ score, deaths of adults and increased exposition of adults to lead. Thus, for Mexico, the loss of one IQ point was valued per year at, on average, 59,543 MXN. In Europe, the loss of earnings due to childhood lead poisoning is estimated at 55 trillion USD. For countries such as Argentina, Bolivia, Mexico or Pakistan, lead poisoning translates into a reduction in the gross domestic product by 0.91%, 1.56%, 1.36% and 2.54%, respectively. Interestingly, estimations for the USA for 2009 indicate that one dollar invested in limiting the lead exposure in paints translates into profits of USD 17 to 221. This is due to reduced crime prevention, subsequent health care, special education or professional care in people with attention deficits or hyperactivity, and remitted earnings and additional tax revenue. Tests of soil samples taken in the vicinity of Szopienice in 2012 still show significant lead concentrations – up to 15,305 mg of lead per kilogramme of soil dry matter.[11] At this moment, the acceptable lead content in milligrammes related to soil dry matter is 50 to 100 mg/kg of soil dry matter, depending on the soil type.[12] Despite the action taken to remove the contaminated top-soil from the smelter area, lead dust emitted over the years accumulated in the environment and is still being released.

[11] G. Dziubanek, R. Baranowska, K. Oleksiuk: *Metale ciężkie w glebach Górnego Śląska – problem przeszłości czy aktualne zagrożenie?* „Journal of Ecology and Health" 2012, 3, pp. 169–176.

[12] Regulation of the Minister of Agriculture and Rural Development of 21 March 2002 on the acceptable concentrations of heavy metal polluting soil. Journal of Laws 2002 no. 37 item 344.

I think that while observing what happened around her, Dr Jolanta Wadowska-Król must have asked herself similar questions. Her high sensitivity to the misfortune of helpless little children and ability to foresee social impact were for sure a driving force for her firm actions, which required a tremendous amount of courage. First and foremost, thanks to her, it was possible to provide proper medical treatment for children poisoned with lead in sanatoria, primarily in Rabka and Istebna, and allow them to return to new homes with much better sanitary conditions. Separating little patients from the source of contamination and, in the most severe cases, administering chelation therapy saved many of them from permanent disability. This same theme became the main subject of Michał Jędryka's book titled *The Lead Children: Forgotten epidemic* – its author was one of the patients Dr Jolanta Wadowska-Król took care of.[13] Although, as he mentions, he added some themes, the narrative takes even accidental readers for a walk in the streets of Szopienice, getting them to those days and events. One can get the impression that despite the tragedy quietly unfolding, the children of Szopienice were enjoying their childhood as much as they could, but today we know for sure that a future has been taken away from them that no one will ever know. The Szopienice smelter complex continues to function despite passing events such as World War I, then Silesian Uprisings, the Upper Silesia plebiscite, World War II. Only after 157 years, the children there met Dr Jolanta Wadowska-Król. She was already seen as someone special. Due to her high activity and determination, the authorities and system classified her as dangerous. I get to know the Honorary Doctor through reading the interviews she has given.

I am convinced that she has not looked for appreciation or publicity, and as she says, she was just doing her job. Although she became the face of this sad story, she stresses that she did not act alone. She could not count on a wide and open help or a widespread understanding but was the most supported by Mrs Wiesława Wilczek, with whom she worked in the clinic and shared one common secret. Many people helped her in different ways, along with the closest family members and Professor Bożena Hager-Małecka. Given the circumstances and

[13] M. Jędryka: *Ołowiane dzieci, zapomniana epidemia*. Wydawnictwo Krytyki Politycznej, Warszawa 2020.

the time in which the Doctor had to work – which she stresses herself – even the passive attitude of her environment was in her favour. She achieved her goal – children and their families were safe. The final effect must have surprised not only her. The smelter, which had operated for 150 years in Szopienice, which endured World War I, World War II and other significant historical events or changes in regulations, was finally closed. In 2011–2016, the site remaining after the plant (approximately 7 hectares) was reclaimed, with 120 thousand tonnes of sludges for reprocessing being hauled. Another 80 thousand tonnes of waste was dumped in a basin covered with top-soil.[14] Now there is a moon-like landscape left after the smelter, with only a couple of buildings and ruins, among which the old, majestic water tower driven into the ground still reminds of its site notwithstanding the running time. The period when the smelter complex in Szopienice operated was described in detail in a book *150 Years of Non-ferrous Metal Smeltering in Szopienice*, written by Emanuel Wilczok[15] – a graduate of the Higher School of Education in Katowice (located at the time in the building at Szkolna 9 in Katowice, today's seat of the Institute of Chemistry) and a PhD of the University of Silesia. Unfortunately, the colossal work of Dr Wadowska-Król was not realised in its scientific aspect, despite her attempts at publishing the results of her work as a doctoral dissertation. The problem of lead poisoning in children, including children living in the Polish People's Republic and earlier in Szopienice and neighbouring districts, has been an uncomfortable subject, even for the most enlightened and cultured. As Henri-Frédéric Amiel put it: "Moral indifference is the malady of the cultivated classes."

It makes me wonder why it had taken so long for someone to finally recognise the misery of this region and its youngest citizens? Looking at the old photographs of the Szopienice smelter complex enveloped in smoke from smokestacks, one may say with a sneer that it was difficult to see the problem of people living there clearly because of the smoke. For decades, even before World War II, the fate of the children living nearby the smelter had not been systematically and appropriately noticed. The employer's attention was focused

[14] G. Grzegorek, A. Frużyński, P. Rygus: *Kopalnie i huty Katowic*. Prasa i Książka, in co-operation with the Coal Mining Museum, Katowice–Zabrze 2017.

[15] E. Wilczok: *150 lat hutnictwa metali nieżelaznych w Szopienicach…*

only on the staff taking up employment of their own will. Even after World War II, despite the fundamental change in living and working conditions of the residents, acquisition of new workers' rights, rapidly developing social facilities, smelter's environmental impact and its effect on children were powerful. I shudder to think what the lives of children there actually were like until World War II. How was it like, in the shadow of the smelters from Szopienice? How much they suffered, along with the whole region? What Dr Wadowska-Król faced in the 1970s in Szopienice is seen by many as a standard operating mode of the system functioning in the People's Republic of Poland. In my opinion, such an interpretation is only a feckless and poor excuse. The in-depth analysis of the history of Silesia and reading the UNICEF's and Pure Earth's report leave no doubt that being able to recognise the problem of lead poisoning in children and youth does not result from the system of government in force at the given time. It is instead associated with some economic aspects. They must be so prevalent that the rights of the individual, including the rights to live with dignity, happiness and even future, are undermined despite various legal conditions in force in the 21st century. Ironically, Dr Wadowska-Król did not find allies easily among people who were directly exposed to lead poisoning. Being the primary provider for many generations of workers and their families, the smelter changed their way of thinking not only for economic reasons. The Honorary Doctor had to confront the state, region and plant authorities, workers of the time, and tradition and customs formed in decades. What was even worse, she also had to confront timeless and trans-systemic laws of economics.

Since the 1970s, the state of knowledge regarding lead poisoning and its social implications changed significantly. Nevertheless, despite the wide availability of information, even via the Internet, there is a great need for regular and extensive information, awareness-raising and education of the new generations. The World Health Organisation joined a few years ago with the International Lead Poisoning Prevention Week campaign[16] – the most recent event within its frame took place on 25–31 October 2020. In the USA, the action of removing

[16] *About International Lead Poisoning Prevention Week 2020*. Retrieved from the Internet: https://www.who.int/campaigns/international-lead-poisoning-prevention-week/2020/about [access date: 18 May 2021].

old lead-based paint coatings, which are the most common cause of childhood lead poisoning, was launched in 1978, but there are still some new cases – so you can see that the problem is still there. The acquisition of new knowledge should be followed by developing appropriate social policies and actions to build a healthy society with a high intellectual potential, which will also translate positively into economic indicators. Therefore, it is necessary to adopt a long-term and sustainable development strategy encompassing various environmental and social aspects.

Keeping in mind the service of Dr Jolanta Wadowska-Król to the children's health protection, her care for the natural environment, steadfast attitude, and significant contribution to shaping the bright future of the new generations of the Katowice and Silesia region, I fully support the application for the Conferment of the Dignity of Doctor Honoris Causa upon Her by the Senate of the University of Silesia in Katowice.

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