

Guest Editorial

From Silicosis to Silica Hazards: An Experiment in Medicine, History, and the Social Sciences

This special issue of the *American Journal of Industrial Medicine* looks back to the International Conference on silicosis that took place in Johannesburg 85 years ago [International Labour Office, 1930]. Held in 1930, this scientific gathering marked a turning point in the medical and economic history of pneumoconiosis. Moreover, this Conference, ground breaking in its own right, also laid the foundation for the International Labour Organization international convention on silicosis that followed four years later in 1934 [International Labour Office, 1934].

This meeting of experts from all over the industrialized world was convened by a most surprising duo: the Transvaal Chamber of Mines on the one hand, and the International Labour Office (ILO) on the other. The experts' charge was to define the nosology for and delineate the etiology of silicosis, but they were also called upon to determine the basis of financial compensation for the disease and to make recommendations for the best ways to "manage" silicotic workers who might be compromised by silicosis, yet still able to work. That the conference attracted representatives of virtually every industrialized nation, most traveling a great distance to South Africa just as the worldwide Depression had begun, also signaled the broad social and economic international importance of silicosis.

At that time of the Conference, following on the use of automatic drills, the working of deeper pits, the large scale commercial introduction of silica abrasives, and the massive growth of an exposed workforce, silicosis was killing or disabling tens of thousands of miners and other workers worldwide. Indeed, by 1930 silicosis was well on its way to take its place as the most lethal and sustained epidemic of occupational disease in the 20th century. The proceedings of the International Conference on silicosis served as a forewarning of the danger at hand, but also a rule book dictating how that emerging epidemic should be managed. The official biomedical parameters of silicosis were codified in 1930 in Johannesburg, but these considerations were tempered by various socioeconomic forces. These included especially the monetary value of mining and other industries involving silica and the power relationships among governmental representatives, business owners, organized labor, and unrepresented laborers (in particular South African Black workers). The purely biomedical elements of silicosis, without directly acknowledging these sociopolitical aspects, were meticulously spelled out in a series of resolutions, each of them voted on by the delegates in attendance. The consequences of this pivotal conclave have reverberated down the decades: occupational medicine still deals with its legacy to this very day.

One after-effect of the Conference grew out of its self-imposed restricted focus. The forum deliberately excluded from its frame of reference nearly any consideration of coal worker's lung disease beyond what might be related to silica contamination of the coal mine workings. This compartmentalization had a lasting impact on how coal worker's pneumoconiosis came to be conceptualized in different locales, contributing to half a century of clinical and compensation heterogeneity among France, the UK, Belgium, and the United States, as well as other countries. Additionally, the Conference focused largely on the fate of White miners employed in South African gold mines, shaping the experts' assessment of the silica exposure-

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*Correspondence to: P.A. Rosental, Sciences Po, 27 rue Saint-Guillaume, F-75007 Paris. E-mail: rosental@sciencespo.fr

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response relationship. Yet these White miners typically were employed continuously over a period of years, whereas intermittently employed Black “laborers” constituted the bulk of the South African mining workforce. These high-turnover workers experienced the heaviest exposure, typically returning home to rural villages where their subsequent silica-related illness remained essentially invisible. This experience, therefore, did not inform Conference deliberations on disease risk or the progression of silicosis.

The Conference was keen to fix the definition of silicosis as a 3-level disease starting with the identification of discrete nodules in the lungs and progressing to ever greater involvement. This was defined as first, second, and third stages, the latter marked by massive fibrosis and with co-infection with tuberculosis playing a clear role in progression (Conference resolutions 18-20). This may have fitted well with the criteria of South African compensation schemes, but it required that other observations of silica-associated lung disease be discounted or ignored altogether. The rigidity of the three-stage formulation of the “natural history” of silicosis as laid down in Johannesburg persisted for the remainder of the 20th century. This rigidity, repeatedly evident in the proceedings of the Conference, did not allow for variants in the clinical manifestations of silica-associated disease. In practice, this limited the diagnostic options for mine and other company physicians who were to play a central role in any financial compensation for silicosis over the ensuing years. Ultimately, over-reliance on the three-stage model tended to impede the biomedical study and medicolegal acceptance of phenomena such as acute silicosis, silica-associated rheumatologic disease and other systemic auto-immune diseases, other granulomatous and fibrotic reactions to inorganic particles (including but not limited to crystalline silica), silica promotion of mycobacterial infection even when radiographic evidence of silica-related fibrosis is not present, and, ultimately, a causal association between silica inhalation and bronchogenic carcinoma. These silica-associated diseases fell beyond the scope of the Conference because by equating “silicosis” with all possible silica adverse health effects, it essentially excluded consideration of alternative manifestations of disease.

The 1930 Johannesburg International Conference on silicosis has much it can teach us and also much that it needs to answer for. This special issue of the *American Journal of Industrial Medicine* engages in an interrogation of the Conference by bringing together its own set of experts from some of the same as well as different fields of research as were represented at the original gathering. These investigators return to the sources of our medical knowledge on silicosis in order to nourish contemporary medical research through critical re-examination of the historical basis of the 1930 Conference and its follow-up.

All of the participants in this special issue have carefully read the proceedings and reports of the 1930 Conference, considering these in light of the medical knowledge that would have been current at that time, as well as critiquing them based on modern insights into the pathology and epidemiology of silica-related disease, as well as an expanded consideration of the sociopolitical aspects of the disease. All have paid close attention to the choices made in 1930, to the avenues of research that were opened by the reports and resolutions of the Conference, as well as the ones that were unintentionally or even deliberately closed. This analysis of the 1930 Conference represents an unprecedented interdisciplinary experiment in which clinical experts, epidemiologists, and historians have joined with sociologists, biologists, and geophysicists to rethink the longstanding categorizations of silicosis that are the direct legacy of the 1930 Conference. These scholars even question some of the precepts of current medical thinking on the hazards of silica.

Whatever its shortcomings, the 1930 Johannesburg Conference marked a tremendous advance in occupational health whose impact should not be taken for granted. Its deliberations and findings were to the benefit of workers all over the world: they informed a generation of physicians treating occupational lung disease, gave guidance to the social insurances schemes that bore some of the costs of industrial diseases, and led to the improvement of working conditions and the promotion of sanitary prevention over the decades that followed. Perhaps more than anything, the single outstanding act of the 1930 Conference was officially recognizing, on an international scale, that silicosis was indeed an occupational disease. From this formal recognition, there could be no other but the obvious conclusion than the precept that sick workers had to be compensated, a simple yet powerful statement that “attention must be paid.”

It also should be remembered that even as the delegates in Johannesburg deliberated, they knew that the stakes were huge. Pneumoconiosis was endemic to two of the most strategic industries of the time: coal and gold mining. Increasing the cost of either commodity by raising the labor costs of their extraction or, even worse, by causing a scarcity in available workers through disablement, would have been unacceptable to powerful, vested economic interests. Moreover, there certainly was no direct representation of the powerless among the Conference delegates themselves, who constituted an elite group of experts, wherever their individual sympathies may have lay. Thus, in the final analysis, the resolutions of the Conference represented compromise more than consensus, reflecting a fundamental and inescapable imbalance of power.

In the final analysis, there was not only substance but also symbolic importance to the work of the 1930

Conference. It can be argued that silicosis was to twentieth century chronic, industrially related disease what cholera was to nineteenth century epidemic infectious illness. Neither cholera nor silicosis was the leading cause of death in their respective eras, yet both are paradigmatic examples of the social and scientific assumptions that framed the contemporaneous professional and public understanding of disease. It was in connection with silicosis that many of our most basic ideas regarding the modern relationship between the human environment and chronic disease were clearly articulated. Indeed, in the interwar period, in all industrialized countries with a strong mining industry, as well as for the International Labour Organisation, silicosis emerged as a major issue, epitomized by its characterization in the United States as the “king of occupational diseases” [McCord, 1940]. Further, our modern understanding of asbestos-related diseases, as well as of coal worker’s pneumoconiosis and byssinosis, was built on the work of the Conference.

Although less central today, silicosis nonetheless has retained a place in an ongoing discourse regarding the occupational health risks in an industrial society. The model of silicosis continues to pose as series of questions: What are the responsibilities of government, management, and the worker for the risks of work? What role should government play in regulating the workforce? How can (and even should) occupational diseases be distinguished from diseases of non-industrial origin? Is occupational disease an acceptable and normal condition of a modern industrial society? What are the maximum levels of toxic substances to which workers should be exposed? And who—professionals, governments, labor, or business—should have the determining say in setting those levels? Finally, and most importantly for the 21st century, is the question of how we define an occupational disease. Should it be defined in terms of a person’s ability to work or should it be defined as a bodily insult, irrespective of socioeconomic impact on the worker? These are the questions that societies and professional communities have had to confront throughout the twentieth and now into the twenty-first century, in nearly every corner of the world. The dialogue between history and medicine displayed in this issue of the *American Journal of Industrial Medicine* helps to inform this important and ongoing debate.

Paul-André Rosental

Centre for European Studies and Centre for History, ERC
Grant Silicosis Sciences Po, Paris

Interdisciplinary Laboratory for Evaluation of Public
Policies (LIEPP), Sciences Po, Paris and National Institute
for Demographic Studies (INED), Paris

David Rosner

Department of Sociomedical Sciences, Mailman School of
Public Health and Department of History, Columbia
University, New York

Center for the History and Ethics of Public Health, Columbia
University, New York, New York

Paul D. Blanc

Division of Occupational and Environmental Medicine,
University of California San Francisco, San Francisco,
California

REFERENCES

International Labour Office. 1930. Silicosis. Records of the International Conference held at Johannesburg 13-27 August 1930. (Studies and Reports Series F Industrial Hygiene No. 13). United Kingdom: International Labour Office (Geneva), 1930. Available at: http://www.ilo.org/public/libdoc/ilo/ILO-SR/ILO-SR_F13_engl.pdf (Accessed May 28, 2015).

International Labour Office. 1934. C042 - Workmen’s Compensation (Occupational Diseases) Convention (Revised), 1934 (No. 42) Geneva: ILO. Available at: http://www.ilo.org/dyn/normlex/es/f?p=NORMLEXPUB:55:0::NO::P55_TYPE,P55_LANG,P55_DOCUMENT,P55_NODE:CON,en,C042,%2FDocument (Accessed May 1, 2015).

McCord C. 1940. Grindstones. *Hygeia*, 18, 8:744.

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