

# Bo Lindell's History of Radiation, Radioactivity, and Radiological Protection

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**Abstract.** After retiring from his position as head of the then Swedish Radiation Protection Institute (SSI), Professor Bo Lindell compiled four books on the history of radiation, radioactivity, and radiological protection. These huge tomes, which cover the time from ancient Greece until 2008, were indited in Swedish. The Nordic Society for Radiation Protection felt that this mine of information was worthy of a larger readership, and decided to launch a translation project. In addition to significant funds from the Society itself, monetary and in-kind support for the project was obtained from NKS (a joint Nordic nuclear safety research organisation), the five Nordic radiation/nuclear regulatory authorities, and IRPA. The books have now been translated, and are available as full-size paperbacks at printing-cost price only, and as PDF files which can be downloaded completely cost-free.

**KEYWORDS:** *Educational, fact-filled, personal, entertaining, readable*

## 1 INTRODUCTION

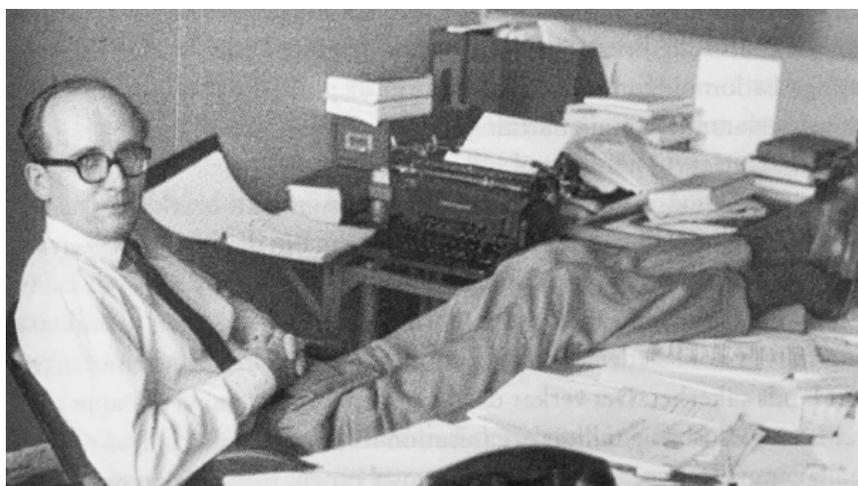
There are rather few studies of the history of radiological protection, and those that are available are, in one way or another, limited in scope, and mostly not very recent. Therefore, Bo Lindell's The History of Radiation, Radioactivity, and Radiological Protection in four volumes [1-4] fills a gap. It provides an excellent overview of the understanding and developments concerning radiation since ancient Greece until very recently; and at the same time it portrays vividly and often amusingly many of the key personalities, events, and organisations involved.

These four books, Lindell's *magnum opus*, were originally written in Swedish, and were published from 1996 to 2011 by the Swedish quality publisher Atlantis.

The Nordic Society for Radiation Protection, NSFS, which is the joint Associate IRPA Society of the five Nordic countries concluded that it just didn't do that these important books would remain effectively unavailable to the international radiological protection community. In 2012, the Society initiated a project to translate the entire set into English.

## 2 PROFESSOR BO LINDELL, 1922-2016

**Figure 1:** Bo Lindell in a most uncharacteristically relaxed pose during his stint as a Scientific Secretary at UNSCEAR. Note his bekoed typewriter – to the great confusion of UNSCEAR's typists he always personally typed his notes and manuscripts!



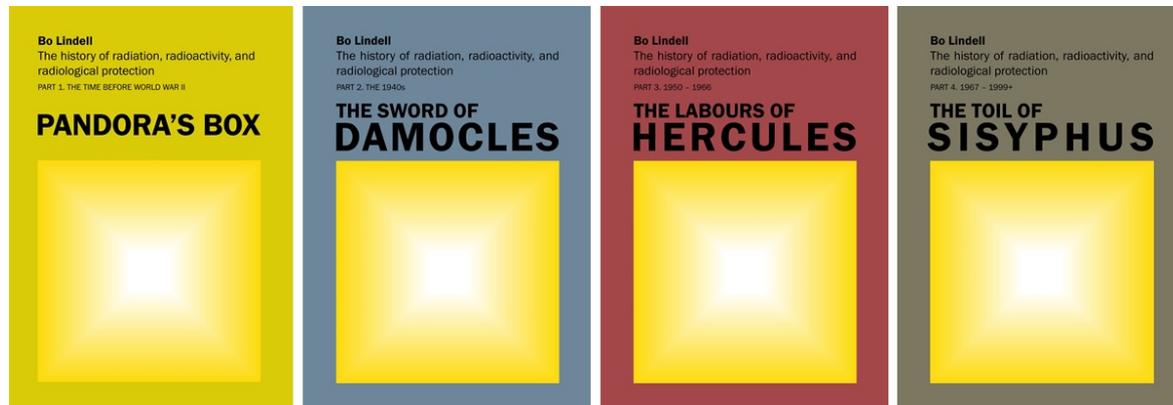
Professor Bo Lindell (former UNSCEAR Scientific Secretary, see Fig. 1 above, inaugural laureate of the IRPA Sievert Award, and, perhaps his best remembered distinction, former Scientific Secretary and then Chair of ICRP) retired from his position as head of the Swedish Radiation Protection Authority in 1982 but remained actively involved in radiological protection until shortly before his passing in 2016. During his ‘retirement’, he researched and wrote a history in four volumes of radiation, radioactivity, and radiological protection, comprising over 2 600 printed pages. The style is witty, entertaining, and spiced with many anecdotes about the personalities involved. Lindell’s description of the development of nuclear weapons (described by a reviewer as ‘exciting as a thrilling detective story’) is a unique and well-thought-out compilation from many sources; the other parts are based largely on first-hand participation.

Lindell was extremely well placed to write this history. He met many of the early pioneers in the field such as Lauriston Taylor, Gioacchino Failla, and Hermann Holthusen, and became one of the leaders of the next generation, devising the current System of Radiological Protection together with his best friend Dan Beninson, John Dunster, and David Sowby. This personal experience brings his stories and the characters in them to life, making the books a fascinating and essential read for anyone interested in the history of science, expert or layman alike, especially those interested in radiological protection.

### 3 LINDELL’S HISTORY BOOKS

Lindell’s History (Fig. 2 below) provides a complete and comprehensive summary which is totally unparalleled in the realm of radiation and radiological protection, and which has few comparable counterparts in any field of science. In Lindell’s own words, in the Foreword to *Sisyphus*: ‘Although I am not an historian, the narrative is a *story of a history* and gives an account of the way things *were* and what people *thought* in the relevant years. It does not show the way things *are* and what people *know* at the time of writing.’

**Figure 2:** The complete suite of Lindell’s four books



#### 3.1 Pandora’s Box

The first book, Pandora’s Box, covers observations and perceptions of radiation all the way from ancient Greece, via Paracelsus and the ‘mountain sickness, through Röntgen’s 1895 discovery, until the demonstration of nuclear fission in the late 1930s. Once x-rays had been discovered, ionising radiation rapidly became an indispensable and ubiquitous tool in medicine – but careless use of this tool also entailed a risk of serious harm, as vividly described in the book.

#### 3.2 The Sword of Damocles

The second book, The Sword of Damocles, deals with developments during the 1940s, dominated by the enormous efforts spent on atomic bomb research, but this was also the time when much of the current philosophy in radiological protection was founded. While not primarily based on first-hand

experience, Lindell has based his book on accounts by those who were directly involved as well as previously classified documents and rare and little known sources. The result is a unique, carefully reasoned, comprehensive, and gripping account.

### **3.3 The Labours of Hercules**

The Labours of Hercules, the third tome, treats the period from 1950 to 1966 when the intensity of Rolf Sievert's Herculean efforts peaked, a time of huge scientific progress. But the book is not just about Sievert and his achievements. It covers the early development of nuclear power in many countries, and nuclear weapons proliferation. The global radioactive fallout caused by US 'superbomb' testing in the Pacific, and the extensive damage caused by great releases of radioactive substances in the Urals where the Soviet Union produced plutonium for their nuclear weapons, are covered in detail. Radioactive fallout from nuclear weapons testing caused much anxiety and was a significant factor behind more profound collaboration between neighbouring non-nuclear countries, such as the Nordic countries. The book also discusses the scientific backdrop setting, such as the clarification of the shape and function of the DNA molecule, which was one of the most significant scientific discoveries of the century. This was also a time when radiation therapy against cancer improved thanks to new, effective appliances such as 'cobalt cannons' and accelerators.

### **3.4 The Toil of Sisyphus**

The final volume, The Toil of Sisyphus, on the time from 1967 until 2008, is characterised by Lindell's own participation as one of the world leaders in radiological protection. During this period, Lindell became a leading member of both UNSCEAR and ICRP, and in addition participated very actively in several other international and national organisations dealing with radiation. Lindell used this central position to ensure that both ethical and practical concerns were taken into account in the development of the current System of Radiological Protection, which is largely his own creation. While the book's title alludes to the nuclear power industry's difficulties in gaining acceptance, the book covers all aspects of radiation and radiological protection during a period of significant political and societal turmoil. Treating the period when he was deeply personally involved, Lindell's narrative gives a profound, amusing, and sometimes touching account of all salient events concerning contemporary radiological protection.

## **4 THE TRANSLATION PROJECT**

It was obvious from the beginning that a project of this magnitude could not rest solely on voluntary work; a professional translator had to be involved, but would be supported by an editorial group of unpaid experts with ties to Lindell and his work. Through the *fasttranslator* organisation, we were able to secure the services of Helen Johnson, a proficient young British translator who had been a student in Sweden. To cover the translator's costs, the Society allocated a significant amount of its own funds and also turned to the five Nordic regulatory authorities for radiological protection, to their joint nuclear safety research organisation NKS, and to IRPA, to seek additional funding. After detailed explanations, all of these organisations kindly agreed to support the project financially and in-kind by participating in the editorial group.

The Nordic Society for Radiation Protection never wavered in its conviction that the translation project was worthwhile. However, the project did not always run completely smoothly. Like most ambitious projects, its initial time schedule was absurdly optimistic and had to be revised several times and the project ended after about twice as long as initially aspired. However, in contrast to most big projects, this one actually stayed within budget. That had two main reasons: first, the translation agency honourably stood completely by their word and their tender; second, the print-on-demand outfit chosen could offer true cost-only pricing with no added profit margin. At a more amusing level, the translation aims to use British English, but on several occasions, the editorial group also encountered quite confusing evidence of the old quip that America and Britain are separated by their common language.

## 5 WHERE CAN YOU OBTAIN COPIES OF THE BOOKS?

A condition set by the co-funding sponsor organisations, and gladly accepted by the project group, was that the resulting translations had to be made available electronically for cost-free downloading, and in book form at the cost price of printing only.

In line with those requirements, printed paperback copies of the four books are available at printing-cost price only (i.e., from £5 for Pandora to £9 for Sisyphus) through Amazon. You can go to any Amazon site, and enter ‘Lindell Pandora’, ‘Lindell Damocles’, etc., in the search box to obtain them. PDF files of all four books are downloadable, totally cost-free, from the web sites of the Nordic Society for Radiation Protection, *nsfs.org*, and of Nordic Nuclear Safety Research, *nks.org*.

## 6 ACKNOWLEDGEMENTS

This paper is based largely on our earlier paper on the same topic [5].

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