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REASONS

Van der Waals: known for his forces.

A force in physical  
chemistry

**Van der Waals and Molecular  
Science**

by A. Ya. Kipnis, B. E. Yavelov and  
J. S. Rowlinson

*Oxford University Press: 1996.*

*Pp. 313. £60, \$105*

**Charles Tanford and Jacqueline Reynolds**

Theoretical physical chemistry is difficult. It strives to emulate the virtues of theoretical physics — conceptual clarity and mathematical rigour — but must also make provision for the individual characteristics of every chemical substance to which its equations may be applied. Compromise is inevitable, often leading to the inclusion of parameters hopelessly beyond our ability to calculate or measure. The most notorious of these are the dimensionless ‘activity coefficients’ introduced by Gilbert Newton Lewis, which could mean (mechanistically) whatever the user wanted them to mean.

Johannes Diderik van der Waals (1837–1923) was a mathematician and physicist who devoted his life to one of the central problems in physical chemistry — the behaviour of real gases and condensed phases and the transition between the two. His

familiar equation of state formed part of his doctoral thesis, presented to the faculty at the University of Leiden in 1873 and described in the book as “the great event of his life”. His equation is clearly a step above Lewis’s extreme empiricism, and his parameters have a qualitatively clear meaning and appropriate dimensions: ‘van der Waals forces’ and ‘van der Waals radius’ are household words to physical chemists to this day. His derivation, although not as rigorous as one might like, contributed greatly to the understanding of molecular events and led to the idea of continuity between gaseous and liquid states. He received a belated Nobel prize for physics in 1910, long after his seminal work was actually done.

*Van der Waals and Molecular Science* was originally published in 1985 in Russian, by Kipnis and Yavelov alone. The present version is a translation, with J. S. Rowlinson as a third author. There are two new chapters, which admirably and succinctly summarize modern concepts in the field and relate them to van der Waals’ more “pictorial” views of 120 years ago.

The main body of the text is less well focused than the added chapters. It is neither a biography in the strictest meaning of the word nor a history of the development of the field of non-ideal gases and solutions, but falls somewhere between the two. An attempt is made to provide a picture of contemporary science and science education in the late nineteenth century, with an emphasis on Dutch science; this includes perhaps more detail than one might want about van der Waals’ colleagues in the Netherlands. Characters and their associated biographical material are frequently inserted willy-nilly in the text, disrupting the principal story line and contributing little to the understanding of either the man or his ideas.

One interesting feature is a lengthy chapter on Russian reactions to van der Waals and his work, affording a rare glimpse into the Russian scientific scene around the turn of the century. Names unfamiliar to English or American readers abound and we learn about much that is curious, an example being the election of van der Waals (who never visited Russia) as an honorary member of the Imperial St Vladimir University in Kiev in 1902, on the occasion of the twenty-fifth anniversary of his Amsterdam professorship.

Most of the book (and especially the two new chapters) is highly mathematical and will be hard going for the general reader. It will be a useful reference for the specialist in molecular physics because of its somewhat unconventional Dutch and Russian frame of reference, but is not sufficiently comprehensive to be considered definitive for the history of the subject as a whole. □

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Plagues past and  
present

**Yellow Fever Black Goddess: The  
Coevolution of People and Plagues**

by Christopher Wills

*Addison-Wesley: 1996. Pp. 318. \$24*

**Virus X: Understanding the Real  
Threat of the New Pandemic  
Plagues**

by Frank Ryan

*Harper Collins: 1996. Pp. 388. £20/Little  
Brown \$24.95*

**Valerius Geist**

Plagues are not nature’s “solution” to the problem of human overpopulation, writes Christopher Wills. Like it or not, we shall have to address that challenge quite independently of plagues. Wills is more optimistic than Frank Ryan about our ability now and in the future to deal with plagues.

The history and nature of plagues is the subject of both authors’ books, although Ryan’s is a little narrower in scope, dealing primarily with emerging viral diseases. Beyond that the similarities end. Wills’s book is reminiscent of Hans Zinsser’s famous *Rats, Lice and History* (Little Brown, 1935) — it is to the point, scholarly, disinterested and rich in technical detail. In contrast, Ryan’s is written like a detective thriller, emphasizing the human element in hunting down plagues.

Wills’s work is eminently suitable as supplementary reading for introductory courses on evolution, human biology, science in human affairs, environmental science and related subjects. Wills writes like a seasoned professor instructing students. His style is pleasantly chatty, with ample war stories and anecdotes to make his points. It is the better book in imparting and explaining technical information; his treatment of AIDS is masterly. At the same time his historical examples illustrate science as a human endeavour with shortcomings and triumphs. Scientists do not appear as magicians.

Ryan’s book should have greater appeal to non-scientists and, if widely read, could become a significant instrument in policy formation. It is a good volume for managers and planners, as it entertains and binds the reader with its “who did it?” spell, while imparting hard knowledge. It is difficult to put down.

Besides being spellbinding, Ryan’s book is intellectually the more adventurous. It appears that Ryan, immersed in current knowledge about viruses, began to see a greater, strategic vision, though one not necessarily shared by the busy specialists and harassed practitioners whose attention was consumed by the daily grind at the tactical