Comments by Joan van der Waals, retired Professor of Physics at the University of Leiden, November 2015

[Note: Joan is mainly a female name in the English language, but is a male name in Catalan, Occitan, and Dutch. It is related to the names John. – Editor's comment]

In today's publish or perish world this may be strange, but Johannes Diderik van der Waals's thesis on the continuity of the gaseous and liquid states unquestionably is his breakthrough contribution to science. In Britain, it induced Maxwell and Andrews (with the help of his daughter Bessie!) to study the Dutch language, as it was not published van der Waals in any scientific journal. If you want further information about the way in which his ideas became known to the international scientific community you could turn to two books (translations) which we owe to John Rowlinson's efforts:

J.D. van der Waals: on the continuity of the gaseous and liquid states. Edited with an Introductory Essay by J.S. Rowlinson, North-Holland ,1988.
The kernel of this book is a new English translation of the thesis, expanded with a treasure of historical remarks and its significance for molecular science. See in particular section 7, p. 89 ff.

A.Ya. Kipnis, B.E Yavelov and J.S. Rowlinson: Van der Waals and Molecular Science, Clarendon Press, Oxford 1998
This book is an expanded version in English of the original biography (in Russian) of van der Waals by Kipnis and Yavelov. The preface stresses the breakthrough importance of the thesis.

Because of the unavailability of the thesis, a lengthy abstract in German was published by E. Wiedeman in the first issue of the Beiblätter der Annalen der Physik in 1877; a full translation in German followed in 1881. A translation in English by R. Threlfall appeared in 1890, followed by a French translation in 1894. If you have access to the book by Kipnis et al., note 33 on p.148,149 provides a nice illustration of the quest for copies of the thesis after Wiedeman's publication.

Let me finish with several impromptu remarks.

1. Perhaps you wonder about my relationship to J.D. van der Waals. He and my great-grandfather were cousins.

2. At the time van der Waals developed his ideas, he had a full-time job as a high-school teacher, followed some lectures at the university, and was the conscientious father of a family with three children. Hence he must have written his thesis largely in the evenings at home, most of the time under the light of candles or that of a smoky oil wick, I imagine. In a way, van der Waals was too early. Gas and electric light were as yet far into the future only. Recently I realized that just at that time Edison was working on the invention of the electric lamp and others

on the thorium oxide-soaked sockets which would make gas lighting a success. The professors at the university had little idea of what he was doing but a student, Lorentz, grasped its importance.

Also in other respects his life was quite different from that of to-day's Ph.D. students. His father was a simple carpenter with a family of 10 children and he started in life with little more than the most elementary schooling. In those days the knowledge of Latin was a prerequisite for entering a university and van der Waals worked his way up step-wise via a chain of teaching degrees of increasing difficulty, in a great number of subjects. He finally was allowed to enter the university by special permission and, subsequently, to defend his thesis.

3. Some people wonder why van der Waals's legacy in The Netherlands is claimed by the physicists, rather than the chemists. First of all: van der Waals's Nobel Prize was in physics. Here in Europe, a large part of the work in the border area between chemistry and physics traditionally is done by physicists in the departments of physics and finds its outlet in journals like the *Journal of Physical Chemistry* and the *Journal of Chemical Physics*. I'm an example: I studied physics and mathematics, did my Ph.D. research in a physical chemistry laboratory, then did research for 22 years in Shell (in the company of outstanding real chemists) and ended up with another 22 years as a professor of (molecular) physics here in Leiden. But my interactions in the United States were mainly with scientists in chemistry departments, with people like Harden McConnell, Wilse Robinson, Clyde Hutchison, and Ed Wasserman (also later when he was president of the ACS!) Unfortunately, my closest personal friend amongst all of them, Bob Silbey of MIT died last year.

4. As to me: it may interest you to know how I was first introduced in a grandiose manner into the USA thanks to the generosity of the ACS. On the occasion of the Diamond Jubilee of the Society [the 75th birthday of the ACS in 1951], the ACS organized a project for inviting a group of young chemists from war-stricken Europe to see chemistry at work in the US. We not only attended the Jubilee meeting in New York, but then went on a grand tour of the North-Eastern USA. We visited places as far apart as Woods Hole, the Kodak Research Laboratories, Ford at Detroit, and finally went by night train to Washington, on the way impressed by the smoke and glow of the (erstwhile) blast furnaces near Pittsburgh. It was the beginning of a scientific career in which I frequently visited or even worked for extended periods in the US.

My last contribution was an editorial honoring of E. Dandy Sloan, former director of the Gas Hydrate Institute at the Colorado School of Mines at the occasion of his 70th birthday, published in *Journal of Chemical Engineering Data* (**2015,** *60*, 214). Much of Sloan's work was based on the foundation I had laid in the 1950s when I developed what one might facetiously call the equation of state of clathrates, and gas hydrates in particular (*Adv. Chem. Phys.* **1959,** *2*, 1). This was the only excursion I made into my great ancestor's field of thermodynamics.