

obituary

Lars Onsager

With the death of Lars Onsager on 5 October 1976, the scientific community lost one of its most imaginative and colorful members. Onsager was born in Oslo, Norway in 1903. Although he received his degree in chemical engineering in 1925, as a student he devoted more attention to mathematics and the basic physical sciences than normally expected of chemical-engineering students.

As an undergraduate, he solved most of the problems in Edmund Taylor Whittaker and G. N. Watson's *Modern Analysis* and mastered the Debye-Hückel theory of electrolytes, which had just appeared. Onsager's first major publication (written while he was a young graduate student) was an extension and clarification of the Debye theory of conductivity of strong electrolytes in which he emphasized the importance of the Brownian motion of the solute ions on the conductivity. This was a prelude both to a paper on transport properties of electrolytes, written in collaboration with R. Fuoss, and also to his classic research in 1931 on irreversible thermodynamics and the reciprocal relations.

In recognition of his contributions to the theory of electrolytes, Onsager was appointed Sterling Fellow in Chemistry at Yale University in 1933. The chemistry department was uneasy about the awarding of this postdoctorate fellowship when they realized that Onsager had never received a PhD. For the record they suggested that he present his then current work as a thesis. His dissertation on properties of Mathieu functions was hardly a suitable topic for a chemistry thesis, yet the Yale mathematicians came to the rescue by agreeing that the dissertation was an outstanding contribution to the subject. Onsager became a regular staff member at Yale in 1934 and not only continued his brilliant theoretical work but also made vital contributions to the planning and interpretation of experiments in a number of areas, such as electrolyte chemistry, isotope separation and low-temperature physics.

Onsager's derivation of the partition function of the Ising Model for a two-dimensional ferromagnet was published in 1944. The instant recognition of the importance of this research, which started modern developments in the theory of critical phenomenon, is reflected in a letter that Wolfgang Pauli wrote to H. B. G. Casimir immediately following World War II. Pauli responded to Casimir's concern about being cut off for so long from the theoretical physics of the Allied countries by stating that nothing much of interest had happened except for Onsager's solution of the Ising problem.



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Many of Onsager's original contributions first appeared as "riders" on presentations and publications of others. For example, his solution of the Ising problem was first given as a discussion remark following a paper by G. H. Wannier at a meeting of the New York Academy of Sciences, 28 February 1942; his formula for the spontaneous magnetization of the Ising lattice was written on a blackboard at Cornell University, 23 August 1948, following a lecture by L. Tisza at a phase-transition meeting; his theory of wavefunctions for liquid helium (which was rediscovered by Richard Feynman) was published as a discussion remark following a paper by Gorter at the IUPAP meeting in Florence in 1949. His theory of the spectrum of turbulence was for many years recorded only as an Abstract in the *Bulletin of The American Physical Society*.

Through his appointment as J. Willard Gibbs Professor of Theoretical Chemistry at Yale, Onsager was recognized to be a natural follower of the Gibbs tradition. Onsager received numerous awards including the Nobel Prize in Chemistry (1968), the Rumford Gold Medal and the Lorentz Medal. In addition to being a member of the National Academy of Sciences, he was a foreign member of many distinguished European societies.

Since his retirement from Yale University in 1972, Onsager had been a Distinguished University Professor at the University of Miami Center for Theoretical Studies. His most recent research interests were concerned with proton hopping in water and in ion transport through membranes associated with nerve fibers. His clarity of thought and his creative style of looking at nature continued until his last moments.

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