Division of the History of Chemistry
American Chemical Society

Citation for Chemical Breakthrough

First observation of spin-spin couplings in liquids,
a crucial step in transforming NMR spectroscopy
into one of the most powerful tools in chemical science.

Physical Review **1951**, *84*, 589-590.

Coupling among Nuclear Magnetic Dipoles in Molecules*

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(Received September 10, 1951)

MULTIPLE nuclear magnetic resonance lines have been reported in several liquids, such as the Sb resonances[1] in aqueous $NaSbF_6$, and the P^{31} and F^{19} resonances[2] in $POCl_2F$, $POClF_2$, and CH_3OPF_2. Suggested interpretations of these effects include hindrance to molecular rotation[1–3] and second-order magnetic dipolar interactions.[4] We feel that new measurements of ours, together with the previously published results,[2] exclude both of the above suggestions, in general, and we would like to propose the hypothesis that the splittings come from a second-order interaction between the nuclear magnetic moments and some magnetic field internal to the molecule.

The interaction that we propose is of the form $A\boldsymbol{\mu}_1\cdot\boldsymbol{\mu}_2$, where A is a constant independent of temperature and H_0. Such a form can actually be obtained from arguments of rotational invariance alone, and thus would result from any form of coupling through molecular magnetic fields.

Presented to the University of Illinois, 2016.