# This Week's Citation Classic

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**Sternhell S.** Long-range $H^1$-$H^1$ spin-spin coupling in nuclear magnetic resonance spectroscopy. *Rev. Pure Appl. Chem.* **14**:15-46, 1964.
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**This review dealt primarily with struc-tures, i.e., stereoelectronic pathways, which exhibit the title phenomenon. Ten types were recognized and some hypotheses were formulated about the mechanisms of such interactions. The review cited 306 references. [The *SCI®* indicates that this paper has been cited over 530 times since 1964.]**



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"While nuclear magnetic resonance spectroscopy (NMR) has a large range of applications in molecular sciences, the most obvious and still by far most often quoted applications derive from the relationship between the principal NMR parameters (chemical shifts and spin-spin coupling constants) and molecular structure.

"I had the good fortune to be associated with the development of this method from its early stages. In fact, my arrival at Imperial College, London, in 1958 as a PhD candidate with Sir Derek Barton, F.R.S., coincided with the arrival of one of the first commercial NMR instruments in the United Kingdom, the Varian HR-40 placed in the charge of Lloyd Jackman, a fellow Australian and then reader in organic chemistry at Imperial College. Early in 1962 I found myself in charge of the first NMR instrument in Australia (a Varian A60) and became involved in a variety of collaborative structural problems as well as in my own research, which became more NMR oriented. It became obvious to me (as well as to others) that spin-spin coupling was of special value in determining structures, because it gave information not only on the nature of structural fragments but on their *connectivity.* Once this was realised, it also became clear that the greatest limitation of this method was the attenuation of interproton spin-spin coupling with the number of bonds separating the coupled nuclei and therefore that 'longrange' coupling (arbitrarily defined as coupling between protons separated by four or more bonds) should greatly increase the power of the method by 'connecting' more remote structural fragments.

"A survey of scattered results then available and our own work rapidly established the basic outline of a classification system for long-range interproton spin-spin coupling and thus the existence of specific stereoelectronic paths for significant interactions. The much cited item was a critical review containing some unpublished data, some hypotheses, and the outline of a classification system.

"I have little doubt that this review has been much cited because it represented an advance in a *method,* which is widely applicable. Interestingly, in spite *of* the fact that long-range coupling is now routinely observed and utilised, no one besides myself appears to be interested in carrying out overall systematic work in this field as a whole, or in reviewing it. I have written a number of much cited surveys in this area, but have not undertaken a comprehensive review since 1969.

"I predict some increase in interest in long-range interproton coupling with the increase of effective resolution due to routine utilisation of proton FT NMR, large data tables, and deconvolution techniques."