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Editorial

Foreword to special issue on bioorganometallic chemistry

After a period of rapid growth, which established its foundations during the second half of the 20th century, the field of organometallic chemistry is now entering a new stage of development. Several new areas are providing opportunities for novel and innovative research. One of these, which lies at the interface with biochemistry, is the now independently recognized field known as bioorganometallic chemistry.

Research in bioorganometallic chemistry focuses on compounds of biological interest where the chemistry of the metal–carbon bonds is a central feature. One of the best-known examples of these compounds is the coenzyme of vitamin B_{12}. Although other organometallic enzymes are being discovered on a regular basis, this class of compound remains a minor component of the broad family of metalloenzymes where the metal atom is usually ligated by non-carbon heteroatoms. Supplementing the study of naturally occurring bioorganometallic compounds is the synthesis of many new, artificial organometallic compounds, the exogenous character of which can be exploited by biochemists and medical practitioners alike. Several of the pioneers of organometallic chemistry, such as Halpern, Cais and Vol'pin, had pointed out the importance of these compounds in the 1970s. E.O. Fischer himself had explored the reactivity of metal–carbene complexes with amino acids, although the goal of these early studies was to investigate the reactivity of bioligands rather than to pursue problems of biological importance.

Two areas where research in bioorganometallic chemistry is having a major impact are bioanalysis and biomedical applications, although other domains such as inactivation of proteins are also the subjects of intense research activity. Haptens, proteins or fragments of DNA and their impact on the unusual electrochemical, spectroscopic and structural properties of an organometallic moiety are central to bioanalysis studies. Breakthroughs in therapeutic applications, such as antimalarials, antibiotics, antitumour agents and radiopharmaceuticals, are envisaged in the biomedical arena. New and significant industrial applications are anticipated in the near future.

The limited stabilities of bioorganometallic compounds in water, the short half-lives of certain isotopes, and the multifunctional character of many of the molecules present new challenges for the synthetic chemist. The development of novel synthetic approaches in bioorganometallic chemistry is expected to contribute significantly to the expansion of the arsenal of the synthetic chemist. It is clear at this early stage of the discipline that the only limit to its development is the imagination of the chemist. In the words of Napoleon Bonaparte, 'imagination rules the world' (quoted in *Las Cases*, *Mémorial de Sainte-Hélène*). We may hope more modestly that this issue of the Journal of Organometallic Chemistry will serve to attract the interest of the reader and stimulate him or her to participate in this new area of exploration. I imagine that Rick Adams, the initiator of this special issue, will be very pleased with the result.

A number of the world's leading scholars in the field of biorganometallic chemistry have been invited to contribute to this special issue. The articles contained herein nicely illustrate the scope, depth and vitality of this developing field. We have great expectations for the future of bioorganometallic chemistry.

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