

Foreword

We are so divided. By the formal structure of university instruction—organic chemistry, inorganic chemistry, physical chemistry. By the incredible and unnecessary specialization of our journals. The molecular bounty we have ourselves created seems simply overwhelming—no wonder we seek compartmentalization in self-protection: It is easy to say, 'I'm an expert in Field x. And while I will listen to a seminar in y or z (when I have time), please . . . let me be happy just in keeping up with my own field.'

The dangers of specialization are obvious—inbreeding, lack of scope, a kind of rococo elaboration of chemical complexity within a field. And we know that new ideas often come from an almost metaphorical importation of a way of thinking or a technique from another area.

Meanwhile, all along, nature persists in subverting the compartmentalizing simplicity of our minds. Through enzymes whose seeming magic is done by metal atoms and clusters at the active site, inorganic chemistry and biochemistry are rejoined. Transition metal carbides put organic carbon into some most unusual, patently inorganic environments. And, beginning in 1950, the explosion in organometallic chemistry has given us an incredible riches of structures and reactions—from ferrocene to olefin metathesis, metal-metal multiple bonds, to C-H activation, and remarkable olefin polymerization catalysts. All from a combination of inorganic and organic chemistry.

Organometallic chemistry from its beginning also depended on, and also built, another bridge. This is to theoretical chemistry. The first, rationalizing accounts of the electronic structure of ferrocene and the Dewar-Chat-Duncanson picture of metal-olefin bonding were followed by milestones such as the prediction of cyclobutadiene-iron tricarbonyl and Cotton's beautiful elaboration of the idea of a metal-metal quadruple bond. The work of Leslie Orgel played a very important role in those early days. There were fecund interactions all along—compounds leading to calculations, and calculations pushing experimentalists to make new molecules. Often the theory was done by the experimentalists themselves, for the best kind of theory (the one that keeps the fertile dance of experiment moving) is a portable one. As easy to use molecular orbital theory, the theory of choice of the times, most certainly was and is.

It is hard to imagine a contemporary course in organometallic chemistry which does not contain a hefty, albeit qualitative component of molecular orbital theory. Yves Jean (with François Volatron) earlier wrote a classic teaching text on the orbitals of organic molecules. Here he has applied his great pedagogical skills to the construction of a beautifully thought through exposition of bonding in organometallic chemistry. Our undergraduate and graduate students will enjoy this book. And they, the chemists of the future, will use the knowledge gained here to enlarge our experience with new organometallic molecules, subverting once again the arbitrary division of organic and inorganic chemistry. Molecules whose beauté and utility we still cannot imagine.

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