Michael Lappert (1928–2014)

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The passing of Michael F. Lappert at the age of 85 on March 28th, 2014 has deprived organometallic chemistry of one of its greatest protagonists. In a research career spanning over six decades, he characterized a vast array of organometallic compounds from all parts of the periodic table. Many were of an unknown type, featuring rare oxidation states, coordination numbers, or bonding. Several were progenitors of new compound classes and were a major influence on subsequent developments.

Michael (Mike) Lappert was born in Brno, Czechoslovakia in 1928. In 1939, he came to the UK as a refugee on one of the last Kindertransports, along with his brother Martin (most of his immediate family did not survive the Holocaust). He was educated at Cannock House School, and later at Wilson's Grammar School. Subsequently, he enrolled at the Northern Polytechnic, and graduated with first-class honors as an external student at the University of London in 1949. He remained there for his PhD (awarded in 1951) working with Professor W. Gerrard on the interaction of alcohols or ethers with boron halides. He became a faculty member at Northern Polytechnic, and in 1959 moved to the University of Manchester Institute of Science and Technology. In 1964, he was recruited as a reader at the University of Sussex by Professor Colin Eaborn. He was appointed professor in 1969, research professor in 1994, and research professor emeritus in 1997.

His work yielded over eight hundred journal articles and three books. He advised over one hundred PhD students, and a similar number of postdoctoral fellows. He received many honors, including election to the Royal Society (1979), and honorary doctorates from the Ludwig-Maximilians-Universität München (1980) and the Universidad de Murcia (2013).

His early reputation rested on his contributions to boron chemistry. Besides the alkoxides, he also discovered $[BCl_4]^-$, BN cyclobutadiene analogues, triborylamines, the BCl_3-catalyzed ortho-Claisen rearrangement, and studied for the first time the restricted B–N rotation in aminoboranes (with P. A. Barfield and J. Lee). Work on B–N compounds led to a lifelong interest in amides, including those of carbon, specifically the carbenoid electron-rich olefins, which allowed access to numerous transition-metal carbenes. He also obtained carbene complexes from the Vilsmeier reagent, and was the first to demonstrate that a carbene complex was an initiator in olefin metathesis.

By the late 1960s, his interests had extended to the synthesis of new types of compounds from all blocks of the periodic table. The key to his synthetic accomplishments was the use of new ligands, many of which were sterically crowding, had no β-hydrogen atoms, and often included $SiMe_3$ or *t*Bu substituents that conferred lipophilicity. In particular, the use of CH_2SiMe_3, $CH(SiMe_3)_2$, and $C(SiMe_3)_3$ ligands to stabilize transition-metal alkyl compounds, described in a 1969 patent, was a major advance. At the time, stable homoleptic (a term he introduced) transition-metal alkyl compounds were unknown. He showed that the $CH(SiMe_3)_2$ ligand could stabilize low-coordinate transition-metal and the lanthanide alkyl compounds $[Ln\{CH(SiMe_3)_2\}_3]$. In the main group, he showed that it stabilized germanium, tin, and lead carbene analogues (1973). In the solid state, it was shown that these species are weakly dimerized, but had pyramidalized coordination at the carbon-homologue element, for example, the heavier Group 14 element analogue of ethylene R_2SnSnR_2 (1976). This structure, and the recognition that its bonding differed fundamentally from that in alkenes, was an important turning point in modern main-group chemistry and in our understanding of bonding. He also synthesized the first persistent or stable paramagnetic heavier main-group species MR_2 (M = P or As) and MR_3 (M = Ge or Sn) using the same ligand. These studies were paralleled by the use of the related $N(SiMe_3)_2$ ligand to synthesize the corresponding main-group amido derivatives. Other lipophilic ligands, such as $\{\eta^5\text{-}1,3\text{-}(Me_3Si)_2C_5H_3\}^-$ and the β-diketiminate $[\{N(SiMe_3)CPh\}_2CH]^-$ were also widely used. In addition, the first d- and f-block species with bridging alkyl groups, such as $\{Cu(\mu\text{-}CH_2SiMe_3)\}_4$ or $\{LnCp_2(\mu\text{-}Me)\}_2$ were synthesized. He also pioneered the use of bulky aryloxo and thiolato ligands to synthesize stable low-coordinate main-group species.

To those who worked with him, his supportive and low-key advising style, combined with his vast chemical knowledge, meant that he had the happy knack of producing a huge volume of interesting results while maintaining a relaxed lab atmosphere. Besides science, he had a deep interest in literature, opera, and the theater, and he could talk knowledgeably about many subjects besides. He was a kind and generous man of great hospitality, one aspect of which was the lavish parties at his home that were hosted originally by his aunt Louise Gross-Lappert and later by his wife Lorna. Visitors were always welcome and treated royally at their home. He was a true gentleman and a great scientist.

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DOI: 10.1002/anie.201404980