OBITUARY

Albert Weller, 1922-1996

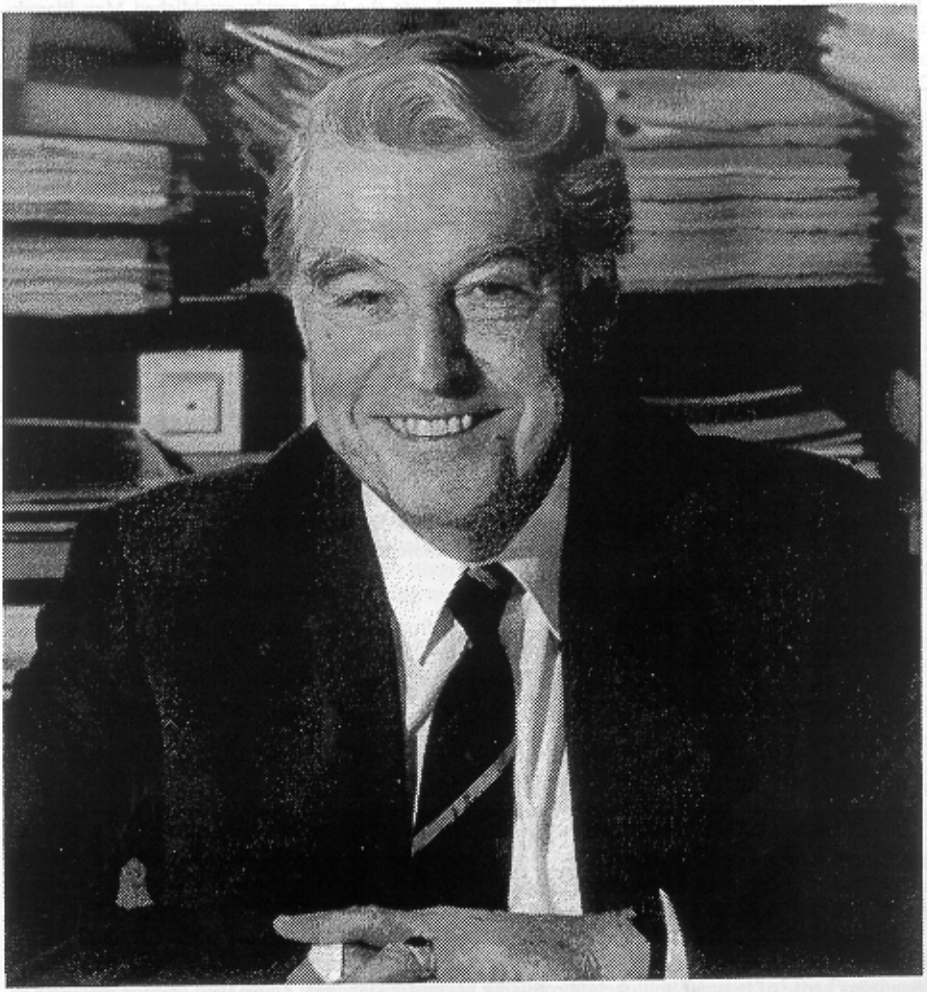
Albert Weller, emeritus Director of the Spectroscopy Department at the Max-Planck-Institut für Biophysikalische Chemie in Göttingen, died on September 27, 1996, at the age of 74. We have lost an eminent scientist, a pioneer in the field of excited state electron and proton transfer.

Weller was born on April 5, 1922, in Welzheim, Baden-Württemberg, Germany. He began to study chemistry in 1940 at the University of Leipzig and obtained his Ph.D. degree in 1950 under the guidance of the electrochemist *Gustav Kortüm*, with a thesis *"On the solvation of ions in water/ethanol mixtures"*. Later, his strong background in electrochemistry was an important factor in his pioneering studies of electron transfer and exciplex formation.
He started his postdoctoral studies with *Th. Förster*, at the Max-Planck-Institut für Physikalische Chemie in Göttingen. In the Institute he got to know *Brigitte von der Chevallerie*. They married in 1951, just before going to the USA, where Weller worked with *Robert Livingston* at the University of Minnesota in Minneapolis on spectroscopic investigations of chlorophyll and pheophytin *in vitro*. He returned to Germany in 1952 to join *Professor Förster*, at the Technical University of Stuttgart and continued his studies, already started in Göttingen, of protolytic reactions of aromatic hydroxy and amino compounds in the excited state. This was "chemistry on a higher level", as it became clear that properties of electronically excited molecules, such as acid-base characteristics, are substantially different from those in the ground state.

These experiments were the entry into the realm of fast reactions, employing molecular fluorescence. In the transient absorption spectrum of a solution of perylene and N,N-dimethylaniline in acetonitrile the radical anion of perylene was discovered (1961). This was the first direct experimental proof that the inner mechanism of fluorescence quenching in such systems involves electron transfer. After his Habilitation in 1957, the Bunsengesellschaft für Physikalische Chemie awarded him the prestigious *Bodenstein-Prize* in 1962.

In the same year, Weller became Professor of Physical Chemistry at the Free University in Amsterdam. Apart from his high scientific standing, his religious background fitted very well into the prevailing attitude at the Free University, which was founded on calvinistic protestant principles. After a short period in which he lectured in German, his lectures were given in Dutch, which language he rapidly learned to speak fluently.

In Amsterdam, the scientific interest started to shift from proton transfer towards electron transfer reactions in the excited state. The first example (found already in Stuttgart) of a fluorescing intermediate in such reactions, a hetero-excimer or exciplex $^1(A^- D^+)$, was reported in 1963 for the system perylene/N,N-dimethylaniline in nonpolar solvents.
The students working under his guidance, including the present author, very soon started to appreciate his friendly personality and charm. They realised that he always was several steps ahead and progress



was rapid, no doubt due to his inspiring influence. Within a short time a fundamental understanding was achieved of the underlying principles of exciplex formation, in the singlet as well as in the triplet state. Practically all aspects known today of the molecular nature and excited state behaviour of hetero-excimers were unraveled, from an experimental and also from a theoretical point of view. The experiments were carried out with, from the present standpoint, rather simple equipment: mainly a rapidly scanning spectrofluorimeter, consisting of a prism monochromator, a photomultiplier and an oscilloscope.

One of the results of these studies was a semiempirical formula for the exciplex energy in hexane, in terms of the electrochemical oxidation/reduction potentials of the reaction partners A and D. With the aid of this formula, now generally called the *Weller-equation*, the occurrence or non-occurrence of exciplex formation can easily be predicted.

In the year 1965 Weller went back to Germany to become the Director of the Max-Planck-Institut für

Spektroskopie in Göttingen, which in 1971 merged into the then newly established Max-Planck-Institut für Biophysikalische Chemie. There, detailed studies were undertaken of the primary processes connected with electron transfer reactions in the excited state. The molecular aspects of exciplex formation and of the dissociation of exciplexes into radical ions were investigated by using nano- and picosecond laser flash-photolysis.

During these studies the now famous *Rehm-Weller curve* was published (1969), which showed that the rate constant of excited state charge separation in a polar solvent such as acetonitrile does not start to decrease for systems with strongly negative values for the reaction free enthalpy ΔG, as predicted by the Marcus theory. On the other hand, it had been found that the predictions of this theory could be confirmed in chemiluminescent charge recombination processes producing triplet and singlet excited states from positive and negative radical ions. This evident discrepancy, a violation of the principle of microscopic reversibility, always bothered Weller and this problem remains unresolved.

In the following years, the study of the magnetic field dependence of electron transfer reactions became one of the highlights of his research. The influence of magnetic fields on geminate recombination of radical ion pairs in polar solvents was first established in 1976. These studies brought new insights into the influence of the intermolecular distance between the D and A reactants on the electron transfer mechanism. It now became possible experimentally to distinguish between exciplexes (tight ion pairs) and solvent-separated radical ion pairs, an important step forward in mechanistic studies, as these species possess similar absorption spectra.The extension of this research to molecules in which the electron donor and acceptor moieties are linked by alkane chains in addition provided direct access to polymer dynamics.

Weller has received invitations as Visiting Professor from a large number of Universities in Europe and the USA. He has been awarded honorary doctorates by the Universities of Leuven (1983) and Bayreuth (1987). He also was a member of the Academy of Sciences in Göttingen, the Finnish Academy of Sciences and the Leopoldina in Halle.
He has made important contributions to the scientific community, serving on the editorial boards of Chemical Physics Letters, Chemical Reviews, the Zeitschrift für Physikalische Chemie and the Berichte der Bunsengesellschaft für Physikalische Chemie.

The pioneering work of Weller on electron and proton transfer in the excited state has had a profound impact on many areas of photochemistry and photophysics, including photosynthesis. He has been author of a large number of influential papers. A *Weller Festschrift* was published in the Journal of Physical Chemistry in 1991 on the occasion of his retirement.

His many friends from all over the world greatly admired his sharp intellect, charming personality, disarming sense of humour and uncompromising scientific standard. Those who had the privilege to work with him were fascinated by his intuitive knowledge of the behaviour of molecules interacting in the excited state.

During the latter part of his life Weller's health was under constant attack. Nevertheless, he bravely mastered these difficulties and undauntedly continued his scientific work. After his retirement he regularly came to the Institute and took actively part in the seminars and other scientific activities, until the last days. His death therefore came unexpected.
The scientific community has become very much poorer by his death, but his inspiring influence will remain.

Klaas Zachariasse
Göttingen

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