

Editorial

It gives us great pleasure to celebrate Manfred Eigen's 70th birthday with this Special Issue of *Biophysical Chemistry* entitled "Evolutionary Biotechnology - from theory to experiment".

Manfred Eigen has been a member of the Advisory Editorial Board of *Biophysical Chemistry* since its inception in October 1973. During that time, he has published several papers in *Biophysical Chemistry*, the titles of which reflect his evolving research activity which includes, amongst others, work on diffusion controlled reaction rates in repressor-operator association and membrane bound enzymes in 1974 (Vol. 2; p.255) and on selection and self-organization of self-reproducing macromolecules in 1979 (Vol. 10; p.153). More recently his lecture at the IUPAB Congress in Budapest on "On the origin of biological information" (Vol. 50; p.1) was reported and most recently, in 1996 in a return to his earlier interest, his seminal and highly topical paper on "Prionics" was published (Vol. 63; p.A1-A18) in the Journal and is being reviewed in *Nature*.

Although born in Bochum, on 9th May 1927, Manfred Eigen has spent most of his life in Göttingen where he studied Physics and Chemistry at the university. His graduate work was with Arnold Eucken and post-doctoral work with Karl Friedrich Bonhoeffer at the Max Planck Institute in Göttingen. In 1958, at only 31 years of age, Manfred Eigen was elected a member of the Max Planck Gesellschaft; in 1962 he was made director of the Kinetics Department and an Institute director in 1964.

At the age of 29, Eigen was awarded the first of his many scientific prizes, including, most notably, the Nobel Prize for Chemistry in 1967. He has received almost all of the relevant international scientific medals and prizes and 12 honorary degrees.

By the time he was recognized in 1967 for his work on fast reaction kinetics, his scientific interest was

focused almost exclusively on problems concerning evolution. In 1971 he published a pioneering paper dealing with two new concepts: the "self-organization of matter" and the "evolution of biological macromolecules"; these have since become classical concepts in the field of evolution. In 1992 he was the recipient of the prestigious Paul Ehrlich Prize for the theory presented in that paper and for its far-reaching consequences.

Manfred Eigen has always captivated the attention of his contemporaries by his ability to generate scientific insights from the latest findings in physics and molecular biology; however, unlike those whose propositions border on the fanciful, his ideas never digress from sound scientific knowledge.

Initially his thoughts on molecular evolution, and thus the development of life on earth, centred around self-replicating molecules that existed about 3.8 billion years ago. From the very beginning these molecules must have possessed such diverse structures that they were subject to the process of natural selection.

More recently his interest has focused on the technological utilization of ideas concerning evolution. By employing the so-called evolution machines that utilize the principles of biological evolution, new compounds can become optimally adapted for particular functions. In the late sixties, Rudolf Rigler, at present a professor at the Karolinska Institutet in Stockholm, worked for several years as a postdoctoral fellow with Manfred Eigen. During this time preliminary ideas for developing a new analytical method - fluorescence correlation spectrometry (FCS) - for detecting single molecules were conceived. This technology was subsequently perfected by Rudolf Rigler, and FCS is currently employed for studying molecular evolution. Manfred Eigen has named this new research field "evolutionary biotechnology" which is the title of this volume. In 1993, together with

Karsten Hen he initiated the foundation of the biotechnology company EVOTEC BioSystems GmbH in Hamburg. This firm is investigating technological applications of evolutionary biotechnology. This includes pharmacoscreening, molecular diagnostics (e.g. of viruses) as well as the evolutionary optimization of agents.

A great many scientists have benefited from Manfred Eigen's foresight in the establishment by him of the Max Planck Institute for Biophysical Chemistry at Nikolausberg in Göttingen in 1971. The possibility of interacting across many disciplines, carrying out research at a level almost incomparable elsewhere, not least because of its idyllic location and unparalleled support, has provided a stepping stone for younger workers, and a haven for a great many senior

researchers.

On a personal level, the Principal Editor of this Journal is greatly indebted for the opportunity to spend five years as a post-doctoral fellow at the Max Planck Institute between 1976 and 1980, and for the impact this time had in establishing firmly a subsequent career in science. Also, the co-editor, G. Schwarz, looks back on the early time during the 1950's and 1960's when he joined Manfred Eigen's group for thirteen years in the original Institute at the Bunsenstrasse, where the fast reaction work was done. He gratefully remembers the benefit of a truly exciting scientific atmosphere which stimulated all kinds of successful work linking up sophisticated theory with significant experiments.

As a true physicist, Manfred Eigen prefers chalk and blackboard with which to formulate and discuss his ideas and theories. Whether it is on evolution or diffusion, he never fails to amaze his listeners with the natural ingenuity by which he manages to visualize even unthinkable large numbers.

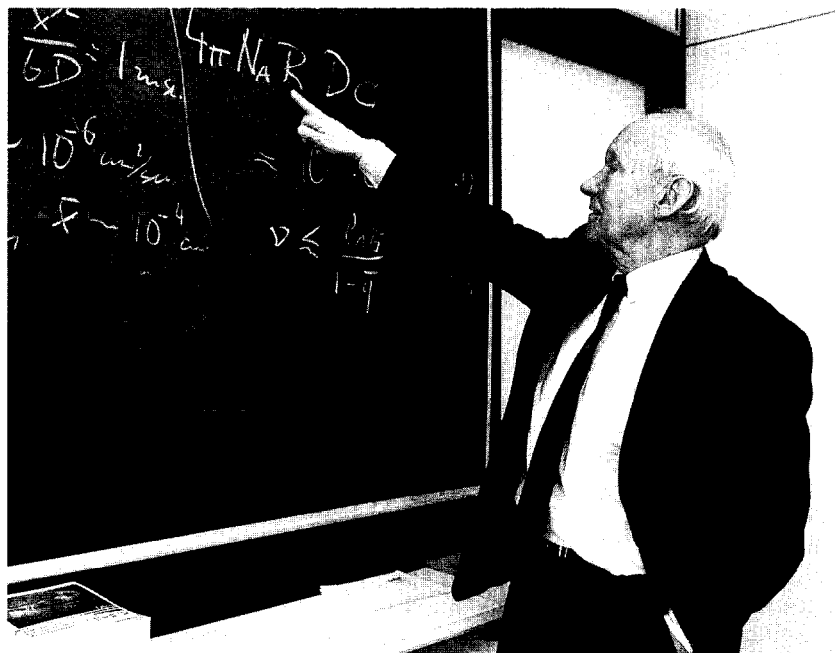


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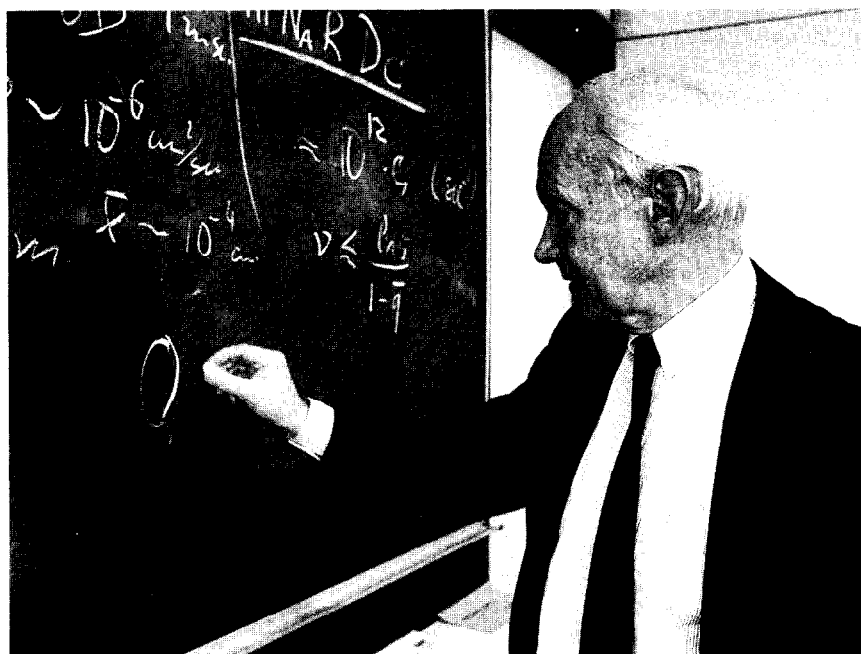


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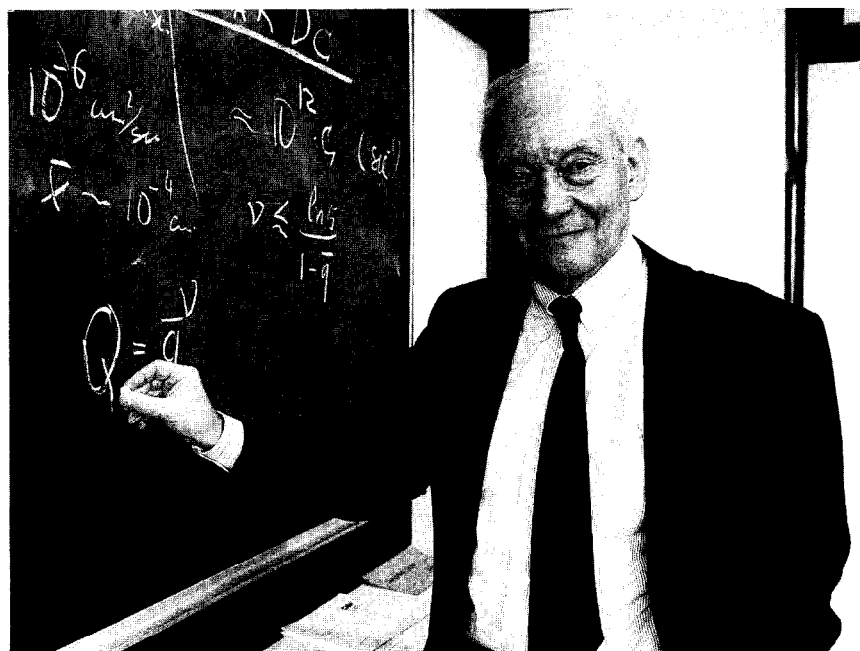


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The collection of papers in this Special Issue are from current and past colleagues. We are indebted to Peter Schuster, Rudolf Rigler, Detlev Riesner and others for their expert help in reviewing the manuscripts, and to Margitta and Robert Clegg for editing the English of the papers. In addition, we wish to thank Ruthild Winkler-Oswatitsch and Andre Koltermann for their suggestions and organizational skills in compiling the volume and helping authors with their manuscripts. Ruthild Winkler-Oswatitsch, in particular, has been especially helpful in providing

photographs and information about Manfred Eigen.

Finally, we wish Manfred Eigen a very happy birthday and look forward to many more highly productive years of scientific contributions made through publications and interactions in a manner which is characteristic of the man.

A. Watts
G. Schwarz