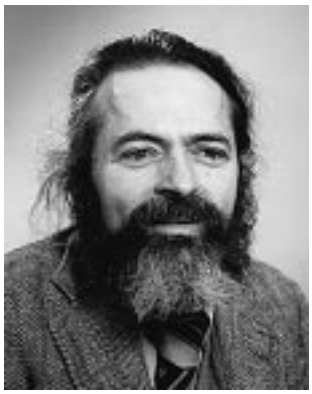
Memorial Tribute to
Dr. Michael Conrad



(1941–2000)

We lost a dear friend and colleague on December 28, 2000, when Professor Michael Conrad passed away after a battle with lymphoma. Michael was truly a giant in the field of evolutionary computation, a pioneer who endeavored to push the limits of our knowledge of biological information processing in all its forms. His contributions to evolutionary computation include the first known simulation of a hierarchical and potentially open-ended ecosystem [1], [2], one of the earliest efforts to formalize an evolutionary model of brain behavior [3], the first modern effort to use an evolutionary algorithm to optimize a neural network [4], as well as many innovative and provocative ideas concerning information-theoretic descriptions of evolution [5] and the evolution of evolvability in coevolutionary systems [6]–[10]. The careful reader will note that the references listed here predate 1986—a clear indication of Michael's prescience.

Michael's greatest contribution to our field, however, was not any of these technical achievements, but rather his engaging personality and enthusiasm, which he evidenced so clearly. It was impossible to spend time with Michael and not enjoin his joy for science and, more particularly, for work in biological information processing.

Even while fighting his illness, Michael was incredibly active. Michael was currently working on models of DNA-based quantum computing as part of a National Science Foundation Grant [11]. In the past five years, Michael supervised two M.S. theses and two Ph.D. dissertations and was supervising six Ph.D. students at the time of his death. In addition, he was on the committees of seven Ph.D. and ten M.S. students. His courses in adaptability and modeling at Wayne State University, Detroit, MI, were attended by large numbers of students, with his most recent class having over 80 registered students. His classes were uniformly well received; as one student wrote in evaluation: "Dr. Conrad doesn't just dispense facts, but gives an insight into the creative process. We don't often get insights like these in other classes."

Michael's Ph.D. students are located in academic institutions all over the world and continue to work in research areas that he pioneered. Those of us who had the privilege of working under Michael's supervision look back on those times as golden. He was an exceptional advisor and mentor who cared deeply about each of his students and gave tirelessly of his time to help them succeed. He was willing to sift through piles of data into the wee hours of the morning to find that one interesting result or work that would help a student prepare a paper for publication. Perhaps our fondest memories are of the time we spent in one-on-one discussions with Michael. His high-quality writing and daring to tackle difficult challenges were an inspiration. His ability to make connections across diverse fields of science, philosophy, art, and literature was astounding.

Michael participated in conferences and symposia, whether or not they were big or small events, and honored us most recently by presenting the keynote lecture at the May 2000 IEEE Symposium on Combinations of Evolutionary Computation and Neural Networks in San Antonio, TX. He was an Associate Editor of the IEEE TRANSACTIONS ON EVOLUTIONARY COMPUTATION since 1997 and the long-standing Managing Editor of the journal *BioSystems*. In his lengthy career, he contributed hundreds of papers to the literature on the modeling and simulation of biological systems. Many remain as fundamental citations.

In 1999, the Evolutionary Programming Society recognized Michael with a Lifetime Achievement Award at the Congress on Evolutionary Computation held in Washington, DC. The award is given for consistent contribution to the field of evolutionary computation over a period of 30 years. His acceptance speech will undoubtedly stay with everyone who was in the audience that night for a very long time. He started slow and soft, but by the time he finished, he was fully engaged and so were we, as he enthralled us with his visions of things to come in evolutionary computation. He focused particularly on the possibility of devel-

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oping hardware associated with evolutionary machines, an area of activity that is just blossoming now with many innovations.

It is hard to finish this short reprise, for it cannot do Michael justice. Perhaps a fitting remark is found in one of Michael's earliest papers, "Evolution experiments with an artificial ecosystem," coauthored with his advisor, Prof. H. Pattee, in 1970 [2]. This paper concerned the potential for evolving a truly open-ended hierarchical ecosystem. The results evidenced many emergent properties, but what remained was to demonstrate an evolutionary model that would create new hierarchical levels of organization. With characteristic modesty that is so often missing from our current culture, Michael concluded only that the results indicated the feasibility and usefulness of a synthetic approach as a source for new ideas about fundamental problems in biology. The final sentence read "As one might expect, true acts of creation at all levels remain difficult to imitate." Michael Conrad was one of those true acts of creation: one of a kind, impossible to imitate.

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