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Obituary

Noun Shavit (1930–1997)

Noun Shavit passed away on June 19, 1997. Apparently invincible, Noun was finally overwhelmed by cancer, after a long, multiple phase struggle; he conducted himself with honor, courage and realism until the end, but with no concession on his mythical sense of humor.

Noun Shavit was born in Poland, raised in Argentina and emigrated to Israel as a young man. He graduated in Chemistry at the Hebrew University in Jerusalem, and pursued his studies in Bioenergetics at the Weizmann Institute of Science in Rehovot as the first PhD student of the late Prof. Mordechai Avron. He went on to postdoctoral studies with Profs. Paul Boyer (University of California at Los Angeles) and Anthony San Pietro (Charles F. Kettering Foundation).

Noun Shavit started his independent academic career at the Negev Research Institute in Beer-Sheva in 1968. He immediately became active in the pioneering effort to establish the university-level program in biology in Beer-Sheva, which became the nucleus of the future Ben Gurion University of the Negev (BGU). In addition to his research, Noun dedicated a significant part of his time and energy to the University and contributed greatly to its successful development. He served as Chairman of the Biology Department, Dean of the Faculty of Natural Sciences, and Director of the Doris and Bertie Black Center for Bioenergetics at BGU, as well as member of many academic steering committees. Noun was exemplary in his role as a fiery and fearless spokesman for academia against bureaucracy, and also as hard-working, creative Dean. But he never looked really comfortable in academic robes at degree ceremonies – he hated pomposity.

His dynamic role in the organizational life of BGU notwithstanding, Noun Shavit will be remembered first of all as a leading biochemist. His scientific contribution focused on energy transduction in photosynthesis. His initial studies were conducted with lettuce chloroplast thylakoids and photosynthetic bacterial chromatophores, in which the coupling between electron transport and phosphorylation was investigated using partial reactions and specific inhibitors, in the search for energized states or intermediates. He dedicated an important part of his work to the characterization of the activities of the chloroplast coupling factor and of their modulation by bound nucleotides, using isolated

vesicles, purified proteins and unicellular green algae. His approach involved a broad spectrum of ideas and methodologies, always at the frontiers of knowledge and technology. His laboratory thus evolved from the application of pure biochemistry to the use of genetic engineering as a central tool. As a result, studies of transmembrane pH and ion gradients, tightly bound nucleotides and diffusion gradients of ATP and ADP shared the same laboratory, and were often integrated with the results of protein chemical modification and site-directed mutagenesis. Noun was very much aware of the importance of scientific pluralism and integration of new ideas and experimental approaches in research. Such carefully metered versatility is considered today to be the magic blueprint for success in Molecular Biology. Noun with his natural prodigality passed this approach on to the students he supervised.

In the 1970s and 1980s, Noun Shavit and associates (Varda Shoshan, Claude Aflalo, Dudi Bar-Zvi and Zvia Conrad) investigated the effects of nucleotides on photophosphorylation and coupled electron transport. In these years Paul Boyer propounded the conformational coupling hypothesis and Noun's group contributed significantly to its critical examination. Noun found that the turnover of tightly bound ATP in photophosphorylation was much too slow for it to be a catalytic intermediate (Aflalo and Shavit 1982) and rather represented rebinding of a product diffusing slowly to the medium (Aflalo and Shavit 1984). Later, he and others established the relation between tight nucleotide binding and regulation of the chloroplast ATP synthase. The assessment of the number of nucleotide binding sites, their subunit location and function became the focus of Noun's interest. Using photoreactive nucleotide analogues, he studied the distribution of the label among the α and β subunits. He also observed that the labeling patterns were rather different whether membrane-bound CF_1 (Bar-Zvi et al. 1983) or isolated CF_1 (Bar-Zvi and Shavit 1984)was employed. In collaboration with M. Yoshida during the last decade, Noun extended his studies to the TF_1 of the thermophilic bacterium PS3 (Bar-Zvi et al. 1992) and used the unique properties of this enzyme to investigate its assembly from isolated subunits, the effect of bound nucleotides and the development of catalytic activity.

Noun Shavit realized early the extraordinary potential of molecular genetics for the understanding of general biological principles. Although many basic molecular studies of the ATP synthase can be done with well characterized standard organisms like *E. coli*, the particular properties of the photosynthetic ATP synthases, e.g. their specific regulatory devices, require work on plants. The object of choice was the green alga *Chlamydomonas reinhardtii*, a model organism for plant photosynthesis. Together with his associate Stefan Leu, and in continuing cooperation with one of us (H.S.), Noun established the molecular genetic techniques (Leu et al. 1992; Fiedler et al. 1997) for a comprehensive program of mutagenesis of CF_0CF_1 (Strotmann et al. 1998). His two last research applications (German Research Foundation with H. Strotmann, granted, ironically, on the day of his death, and to the Israeli Academy of Science) were highly praised by the respective panels. Unfortunately, he could only harvest the early fruits of this research (Hu et al. 1997).

On the personal level, one cannot refrain from recalling his exuberance, vitality and effervescent sense of humor, diluted with profound esteem and simplicity in his direct human relations ranging from dish washers to presidents. Students and close research associates were a special clan, who found in him a good listener and a source for helpful advice on matters personal or scientific. He received from them in return the same high standards he demanded of himself, as well as the same scientific alertness and joy of creation which characterized him until his last moments.

As an open scientist, Noun Shavit was ever able and willing to communicate his thoughts about and enthusiasm for photosynthetic phosphorylation. His enthusiasm was infectious and his facetious temperament made even the tensest meetings fun. The high point of many Gordon Conferences was the late evening session with Noun.

The following short anecdote is characteristic of Noun's countenance. 'It must have been in 1970 that I (H.B.) was on my way to the Bari Bioenergetics meeting in Pugnochiusso and landed early one morning in the almost deserted military airport at Foggia. There was no-one to meet me – and no-one at the airport even knew where Pugnochiusso was. Then, I heard a commotion. They were trying to arrest a rather wild looking bearded gentleman for taking photographs on military premises. He was laughing and bellowing at them in a strange kind of Spanish, from which I gathered that he was an Israeli Professor on his way to a meeting. That was how I met Noun Shavit!'

Noun was a loving, attentive family man and received in return the love of his wife Aliza, his two sons Nir and Eyal, their wives and children. He was supported bravely by them in his last difficult weeks. Noun loved children, of course above all his own grandchildren. His second son's twin children – whom

he was so anxious to welcome – were born a few days after his death.

We have lost a prominent scientist and the best comrade one could hope.
Adieu l'ami, shalom chaver...

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