

## Itzhak Ohad (1930–2016)

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Published online: 7 February 2017  
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Professor Itzhak Ohad, or Itzik, as we all knew him, passed away on November 20, 2016. He was one of the most influential biochemists in Israel, and was widely known to all those interested in *photosynthesis research* around the world.

Itzik was born in 1930 in Buzău, Romania to Moshe and Frima Abramovici. He and his family went through great hardships during World War II, including being expelled from high school as happened to young Jews in Romania at that time. At the age of 17, Itzik became a counselor for orphaned children, on their way from Romania, through Holland; finally, in 1948, he brought them to the newly established state of Israel. Arriving with only a suitcase and a violin, he joined other friends from his youth movement

to establish Kibbutz Shoresh (a communal agricultural settlement) on the outskirts of Jerusalem.

In 1953 Itzik studied on his own to obtain the grades he needed to be accepted at the Hebrew University of Jerusalem (HUJI). He studied Biology at the HUJI, and then did a Ph. D. (1959–1963) with Prof. Shlomo Hestrin in Biochemistry, at the HUJI. During his Ph.D., he started using the new (at that time) technology of Electron Microscopy (EM) at the Weizmann Institute (with Prof. David Danon). Realizing the potential of EM, Itzik went to the Rockefeller Institute (now University) to work with Prof. George Palade who would later receive the Nobel Prize (in 1974) for his discoveries on cellular structural components. Returning to the Department of Biological Chemistry of the Hebrew University in 1966 as an independent researcher, Itzik was instrumental in setting up the University's first EM lab, and indeed, he was one of the pioneers of the method in Israel and one of the early chairpersons of the Israel Society for Microscopy.

Over the next 50 years, he mostly focused on the study of photosynthetic organisms and the molecular basis for the control and operation of photosynthetic systems. Chloroplast biogenesis, photoinhibition and the repair cycle of photosystem II were core issues and his contributions in these fields are enormous and widely recognized. Itzik, with his intense but heartfelt manner, formed a myriad of friendships and collaborations within the photosynthetic community, and his lab was always an important hub for researchers, young and senior. Given his status in the scientific community, it is not surprising that he was always invited to scientific meetings as a key contributor, and on the occasions when Itzik did not participate in a photosynthesis meeting it became a bit less exciting and the discussions were not as vibrant. He spent several productive sabbaticals in the US, Norway, Japan, Germany and Sweden.

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Invited and edited by Govindjee, a great admirer and a friend of Itzhak Ohad; he serves as the editor of the *History & Biography* section of *Photosynthesis Research*.

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**Fig. 1** Prof. Itzhak Ohad in his lab, in 2014, performing an experiment measuring the effect of high light (photoinhibition) on photosynthetic organisms

Figure 1 shows Itzhak Ohad doing experiments in the laboratory.

Itzik was the first recipient of the Hestrin Prize (1964) of the Israel Biochemical Society; he received The Max-Planck Scientific Award in cooperation with K. Kloppstech, (Hannover) in 1993, and then received the Monod medal in 1998. He served as the Director of the Minerva Avron Even-Ari Center for Photosynthesis (1995–1998) and was awarded an Honorary Doctorate at Stockholm University (1998).

One of the most important roles that Itzik played was as a teacher and a mentor. More than 25 of his students and post-docs became independent researchers, in Israel and abroad. Itzik's manner of mentoring students provided them with full academic freedom, motivating them to start new projects and introduce new methods. This is also evident in the broad range of research fields that are covered by those students that developed independent careers. As a teacher he was exciting, and to some, breathtaking. Itzik officially retired in 1999; however, he remained fully active, publishing 38 papers after retirement. One of his great goals, to find organisms that are resistant to photoinhibition (one of the subjects that Itzik worked on for many years) was achieved in the last years of his research. Itzik, with Nir Keren and Aaron Kaplan (of the HUJI) discovered a cyanobacterium and a green alga in the sand crusts of the Negev desert that, through very different mechanisms survive the intense desert sunlight. In his honor, the newly discovered alga and cyanobacterium were named *Chlorella ohadii* and *Leptolyngbya ohadii*, surely one of the greatest honors any lover of the natural world could want.

We provide below, under “References”, a selected list of fifteen of his research papers. Figure 2 shows Itzik (Itzhak



**Fig. 2** Prof. Itzhak Ohad in his office in the Department of Biological Chemistry, Faculty of Science of the Hebrew University in Jerusalem

Ohad) in his office at the Hebrew University. He is pointing to the position on the map on the computer screen that shows the place where he found the two novel high light resistant organisms—the alga *Chlorella ohadii* and the cyanobacterium *Leptolyngbya ohadii* in Israel's Negev desert.

Itzik is survived by his wife Esther, whom he met when they were young students at the HUJI, and his two sons Nir and Danny, and four grandchildren, some of whom continue his love of scientific research. Itzik also had an artistic side, loving music and drawing beautiful sketches. At his funeral, which took place in the Judean hills that he loved so much, and attended by so many of his colleagues and students, his son Nir told how at the very end, he was still discussing the design of new experiments with him. He will be very much missed by the scientific community and friends in Israel and abroad.

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