

Avron M. Photophosphorylation by Swiss Chard chloroplasts.

Biochim. Biophys. Acta **40**: 257-72, 1960.

The article describes a detailed study for optimizing the conditions for preparation of chloroplasts from leaves of higher plants and of the reaction conditions for measuring photophosphorylation. Under the conditions specified, the world record rate.(which still holds) of light-induced ATP formation, approaching 2500 μ moles X mg chl⁻¹ X hr⁻¹, was attained. A simple assay system for following the incorporation of radioactive inorganic phosphate into ATP is described and is used to evaluate several mechanistic aspects of the process. [The SCⁱ® indicates that this paper was cited 449 times in the period 1961-1976.]

Mordhay Avron
Department of Biochemistry
Weizmann Institute of Science
Rehovot, Israel

December 11, 1977

"This paper reports on my first effort as an independent scientist to evaluate for my own conviction the optimal capacity of chloroplasts, isolated from leaves of higher plants, to catalyse the then new and exciting process of photophosphorylation. I had just been appointed as an assistant professor at the Weizmann Institute of Science, after spending a post-doctoral period with Prof A.T. Jagendorf at the Johns Hopkins University. During the latter period we succeeded in confirming and extending the report of

Prof D.I. Arnon that chloroplasts do indeed possess a new process by which light energy is used as the driving force for ATP formation. We also showed that the process was essentially irreversible with no significant ATP breakdown under any conditions. Commencing my work in Israel, I decided initially to devote some time to optimizing the methodologies used in such studies. Part of the impetus for this study came from the fact that the favorite material used in all studies of photophosphorylation until then was spinach leaves, which were unavailable in Israel. After checking several sources, I decided to do the study on Swiss Chard leaves.

"Several improvements in the preparative technique were developed, in particular the realization of the importance of maintaining reduced conditions during isolation. A simple radioactive assay method was devised, based on techniques previously used in other systems.

"The role of many parameters, such as light intensity, nucleotide and phosphate affinity and specificity were separate studies. All of these were summarized in a recommended 'standard assay conditions' under which consistent very high and stable rates of photophosphorylation were observed.

"This paper is not a classic in the common sense of the word. Its popularity, as indicated by its frequent citation, reflects, I believe, mostly its usefulness to many workers in the field in evaluating and defining in clear and concise terms the techniques, capacity, limitations, and problems in the then new and still highly important process of photophosphorylation."