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Homann P H & Schmid G H. Photosynthetic reactions of chloroplasts with unusual structures. *Plant Physiol.* 42:1619-32, 1967.
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A comparative study was undertaken on structurally different chloroplasts with the aim to correlate capacities in partial photosynthetic reactions with features of thylakoid organization. Reactions associated with photosystem I were found to occur in chloroplasts containing only unstacked thylakoids. Photosystem II activity, on the other hand, appeared to require the existence of membrane appressions. [The *SCI*® indicates that this paper has been cited in over 120 publications since 1967.]

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" 'We usually ask the same questions, but change the answers,' my friend and former colleague Michael Greenberg would tell students of our cell physiology course who inquired about the tests we would give. This seemingly absurd statement popped up in my mind as it wandered from its present preoccupation to that of 17 years ago when Georg Schmid and I investigated the relationships between photosynthetic activities and chloroplast structure.

"Georg and I had met as doctoral candidates at the Technische Hochschule Karlsruhe in the Federal Republic of Germany. As we worked on mechanisms of alkaloid biosynthesis, and entertained each other with uninhibited renditions of schmaltzy German ballads, we did not foresee that various coincidences would bring us together again as postdoctoral students of the eminent scholar of photosynthesis, Hans Gaffron. I joined his group at Florida State University in 1962 and soon became infected by its long-standing interest in the mechanism of oxygen evolution by the photosynthetic system II, especially as it related to the function of manganese. Georg arrived in 1964. It was natural that my curiosity was aroused when in the course of his studies on tobacco mutants he noted a correlation of distinct structural characteristics of chloroplasts with exceptionally high, or negligibly low, photosynthetic capacities. It did not take me long to trace the impairment of the photosynthetic activity in one type of mutant chloroplast to an inoperative photosystem II. This set the stage for an exciting collaborative effort to compare the photosynthetic characteristics of the chloroplasts from all of Georg's mutants. Everything went well except for the dangers lurking outside the laboratory: one night, for example, a Tallahassee native was incredulous when told that the legs sticking out from under his car were attached to someone who had nothing more sinister on his mind than to retrieve a hapless escaped beetle for his spectacular insect collection.

"What we accomplished we owed to the opportunities found in Gaffron's laboratory. Yet he magnanimously declined coauthorship of the article we eventually prepared on the mutant work. Our investigation of the structural identities of the two photosystems turned out to be very timely, especially in view of the coinciding discovery of a function-related dimorphism of the plastids in C_4-plants.[1]

"Answering the question of where on grana-forming photosynthetic 'lamellae' the active chlorophyll might be located, Elliot Weier had suggested that it all resides in the grana.[2] We showed that nonstacking thylakoids of green plants could harbor a fully active photosystem I. Had we not been so biased in favor of the significance of membrane appressions, and more observant when analyzing our chlorophyll data, we perhaps might have come a little closer to what would be today's reply[3] to the question addressed by Weier. Thus, our work was a very early stage in the process of refining the answer to a seemingly simple question. For scientists, such 'changing of an answer' is a natural consequence of increasing knowledge, but others may adamantly resist it—sometimes to our peril, as Gaffron has so persuasively warned."[4]

1. **Laetsch W M.** The C_4 syndrome: a structural analysis. *Annu. Rev. Plant Physiol.* 25:27-52, 1974. (Cited 180 times.)
2. **Weier T E, Stocking C R & Shumway L K.** The photosynthetic apparatus in chloroplasts of higher plants. *Brookhaven Symp. Biol.* (19):353-74, 1967.
3. **Anderson J M.** The molecular organization of chloroplast thylakoids. (Sybesma C, ed.) *Proceedings of the Sixth International Congress on Photosynthesis.* The Hague, the Netherlands: W. Junk. In press.
4. **Gaffron H.** Resistance to knowledge. *Annu. Rev. Plant Physiol.* 20:1-40, 1969.

