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Cohen-Bazire G, Sistrom W R & Stanier R Y. Kinetic studies of pigment synthesis by non-sulfur purple bacteria. *J. Cell. Comp. Physiol.* **49**:25-68, 1957.
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This paper describes methods for the quantitative measurement of chlorophyll and carotenoids in two strains of nonsulfur purple bacteria, *Rhodopseudomonas spheroides* and *Rhodospirillum rubrum*, and the application of these methods to the study of the kinetics of photosynthetic pigment synthesis under controlled conditions. [The SCI® indicates that this paper has been cited in over 675 publications since 1957.]

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In his monograph on the Athiorhodaceae,[1] C.B. van Niel had summarized the information concerning the color changes observed in cultures of members of this bacterial group. He wrote, "The most striking effects are no doubt exerted by light and oxygen.... No careful quantitative studies have yet been made on the pigments of Athiorhodaceae." The work published in 1957 by W.R. Sistrom, R.Y. Stanier, and me tried to remedy this situation.

The experiments were performed during a postdoctoral year spent in Berkeley in 1953-1954 in Stanier's laboratory. I had met Stanier in 1952 at the Pasteur Institute in Paris. I was then working in Monod's group on β-galactosidase biosynthesis. We had just published a paper[2] where we defined the "differential rate of enzyme synthesis."

Shortly before his Paris visit, Stanier, with his Berkeley colleagues H.K. Schachman and A.B. Pardee, had discovered that the photosynthetic pigments of *R. rubrum* were carried by large (200S) particles named "chromatophores."[3] Cultures grown aerobically, devoid of pigments, did not contain such particles. The problem was laid out and Stanier hoped that through my experience with β-galactosidase, I would be able to tackle the regulation of pigment and chromatophore synthesis in purple bacteria.

On arrival in Berkeley in September 1953, I chose a strain of *Rhodopseudomonas spheroides*, from the collection of purple bacteria of van Niel, and started growing it photosynthetically and aerobically. The first semiquantitative experiments gave the clue: the bacteria reacted to an increase or a decrease in light intensity by immediately adjusting the rate of photosynthetic pigment synthesis to that corresponding to the light intensity at which they were exposed during growth. For cells that had a higher initial pigment content than that required by the new level of light, adjustment was achieved by a temporary arrest of pigment synthesis and dilution through growth. For cells with a lower pigment content than that required, adjustment was achieved by a temporary rapid pigment synthesis to the proper level. Thereafter, the differential rates of pigment synthesis were identical for the two cultures. Aeration of a photosynthetically growing culture provoked an immediate arrest of bacteriochlorophyll (Bchl) synthesis and a strong inhibition of carotenoid synthesis. These experiments were repeated with accurate measurements of the Bchl and carotenoid cell contents.

It was evident that an increase in light intensity or the introduction of air elicited the same response, a transitory one for light, a long-lasting effect for oxygenation. We proposed that in the pathway of Bchl synthesis, a step was sensitive to the redox state of a carrier in the electron transport system that was common to both photosynthetic and oxidative metabolisms. One possible candidate was the key enzyme δ-aminolevulinate (ALA)-synthase. The activity of this enzyme has recently been shown to be regulated by the dithiol-disulfide interchange mediated by the thioredoxin system.[4] The mysterious redox control may end up to be a thiol-redox control.

1. **van Niel C B.** The culture, general physiology, morphology, and classification of the non-sulfur purple and brown bacteria. *Bacteriol. Rev.* 8:1-118, 1944. (Cited 190 times since 1955.)
2. **Monod J, Pappenheimer A M, Jr. & Cohen-Bazire G.** La cinétique de la biosynthèse de la β-galactosidase chez *E. coli* considérée comme fonction de la croissance. *Biochim. Biophys. Acta* 9:648-60, 1952. (Cited 185 times since 1955.)
3. **Pardee A B, Schachman H K & Stanier R Y.** The chromatophores of *Rhodospirillum rubrum*. *Nature* **169**:282-4, 1952. (Cited 40 times since 1955.)
4. **Clément-Métral J D & Holmgren A.** Purification and some properties of thioredoxin from a photosynthetic bacterium: *Rhodopseudomonas spheroides* Y. (Gadal P, ed.) *Thioredoxins, structure and functions*. Paris: Editions du Centre National de la Recherche Scientifique, 1983. p. 59-68.