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Looking back after 50 years

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In the first volume (1938) of *Documenta Ophthalmologica* I wrote an article "Processes of adaptation in the vertebrate retina in the light of recent photochemical and electrophysiological research". Professor Missotten has kindly asked me for a brief comment on how I felt re-reading that paper now, fifty years later.

My first experience was to recall the air of general excitement that stimulated so many physiologists in Europe and the United States to suddenly undertake experimentation on the long neglected primary visual processes. Retinology then got a push from which it never has recovered. The field has remained fertile, and has attracted numerous highly competent adepts.

My paper was divided into two sections: (i) photochemistry; (ii) electrophysiology. The major achievements presented in (i) concerned rhodopsin, the visual purple of the previous generations 1850–1907, headed by Kühne, König and Garten. Now its photochemical properties and constants became finally established by Lythgoe and Goodeve in London. Bleaching and regeneration of rhodopsin were the subjects of a large number of studies. Rhodopsin chemistry had received a directive hint by a paper in 1925 in which two Danes, Fridericia and Holm, showed that rats became nightblind when deprived of vitamin A in their food. The subsequent chemical approach of Wald had at the time (1938) led to the conclusion that a carotenoid retinene, so named by him, was the likely chromophore of rhodopsin and that the end result of bleaching rhodopsin was vitamin A. Six years later the matter was settled by Morton and Goodwin who proved retinene to be vitamin A aldehyde, now called retinal.

The renewal of retinal electrophysiology started with the papers by Adrian and Matthews in the late twenties on the mass discharge from the optic nerve of the Conger eel, with my own analysis of the vertebrate electroretinogram (1932) with the subsequent discovery that light also could inhibit the mass discharge in the optic nerve (1934 with Therman) and with Hartline's studies of the activity in single fibres of the optic nerve of *Limulus'* ommatidial eye. An immediate sequence, though too early for my article, was Hartline's isolation of single fibres in the frog eye and our comparisons

of the relation between the ERG and the amount of rhodopsin in the course of bleaching and regeneration.

These early papers soon became well known and also initiated well known lines of development. Though the original work was reviewed in my article, my main purpose, as shown by its title, was to relate the new findings to the adaptation of the retina to light and darkness. This end was served in section (i) by a detailed account of the work on the bleaching and regeneration of rhodopsin, and in section (ii) by describing components in the adaptation to light and darkness which could easily be demonstrated as modifications in the electrical response of the retina not determined by the amount of retinal rhodopsin available. At the time the prevailing view was that the sensitivity to light in dark adaptation simply and measurably reflected the prevailing concentration of rhodopsin. It seems today that the method used in determining sensitivity to light decides the outcome. Interestingly Rushton in 1977 remarked that: "We still do not know why the bleaching of the rods or cones raises so enormously the visual threshold of those receptors".

Finally, let me say that I am aware of having missed something that to us of that period was so fundamental, the feeling of being engaged in producing novelty. However, ancient facts discovered, like ancient great misses, undergo the same fate: rapid oblivion, being wiped out as self-evident in consequence of better techniques and advanced insight.

References

To be found in the original article except:
Rushton WAH. Some memories of visual research in the past 50 years. In: The Pursuit of Nature. Cambridge University Press, 1977: 85–104.

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