CYCLIC NUCLEOTIDE METABOLISM AND NON-RHODOPSIN PHOTORECEPTION

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The problem of evolutionary origin of cell receptors includes several aspects: accessibility at different stages of evolution of the molecules which could serve as potential sensors; competition between chemically different sensor molecules to fit the propper physiological and ecological niche; the evolutionary roots of transduction mechanism and its interaction with a sensor. The latter one in the context of photoreceptor studies can be formulated as a question: how specific and unique could be a functional relationship between different chemical types of photoreceptor and some definite transduction mechanisms?

The combination of rhodopsin (retinal chromophore) photoreceptor with a metabolism of cyclic nucleotide, 3 ,5 guanosine monophosphate is known to be a principal element of the signal amplification mechanism in visual cells of vertebrates. It will be demonstrated in the communication, that the capability to interact with cyclic nucleotide metabolism is not a privilege of rhodopsin photoreception. Excitation by light of photoreceptor pigments participating in photocontrol of plant and microbial metabolism leads to a change of the activity of enzymes catalyzing synthesis and degradation of cyclic nucleotides. The functioning of cryptochrome, the flavin containing photoreceptor, in fungi is connected with the control of phosphodiesterase activity. The fall of 3 ,5 adenosine monophosphte concentration in a cell is followed by the changes in gene expression and, possibly, in ion transport through the cell membrane. In higher plant cells phytochrome, the receptor with a bilin chromophore, can

interact with both adenylate cyclase and phosphodiesterase.

These facts allow to speculate about the "layering" of different types of photosensitive molecules over the biochemical transduction mechanism which has developed with no direct relationship with evolution of the photosensors.