Diversity and evolution of opsin-based pigments in non-visual function

Mitsumasa Koyanagi, Akihisa Terakita
Department of Biology and Geoscience, Graduate School of Science, Osaka University, Japan.

Many animals sense light signals for vision and non-visual photoreceptions. Light is captured by an opsin-based photopigment in a photoreceptor cell and leads to cellular light response. More than 2000 opsin genes were identified in varied animals so far, and most animals possess multiple opsin genes. However, the significance of the multiplicity of non-visual pigments has been unknown, in contrast to the case of cone visual pigments, which is revealed to have diversified in spectral sensitivity for color vision. Previously, we found that the parapinopsin is a UV-sensitive photopigment and underlies the UV reception for the pineal "color discrimination" in lamprey. Recently, we discovered that teleosts possess two parapinopsins, parapinopsin-1 and parapinopsin-2 in their genomes. RT-PCR analyses revealed that both parapinopsins are distributed to the pineal organs but not other tissues. Therefore we investigated and compared their spectroscopic characteristics by expressing them in cultured cells as well as localization in the pineal organ by using specific antibodies. Obtained results allowed us to discuss the linkage between the diversification of parapinopsin and the evolution of pineal color discrimination in teleosts.