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MODE OF THE PIGMENT MIGRATION OF FISH MELANOPHORES.

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In the melanophores of gobies, *Chaenogobius urotaenia* and *Chaenogobius* sp.2, aggregation of pigment mass, which started at the distal end of the processes, occurred by the application of KCl or nor-epinephrine. Small groups of pigment granules, however, were left behind at the extremity of the processes. After the aggregation of the pigment mass was completed, one to fifteen pigment granules still moved centripetally in succession to join the central pigment mass. When KCl was replaced by Ringer's solution or when nor-epinephrine was replaced by atropine, the central pigment mass dispersed. But, the granules remaining at the extremity of the processes continued to move centripetally until their movement was overwhelmed by the dispersing activity of the central pigment mass. It is likely that melanophores possess two intra-cell activities; the one which excludes the pigments from their location toward the center and the other one which permits the pigments to distribute. The former activity propagates in a periphery-central direction and the latter in the opposite direction. A balance of the two activities determines a given state of the pigment distribution such as full dispersion, a variety of half-dispersion or full aggregation.

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EFFECTS OF COLD ON MELANOPHORE DISPERSION IN ISOLATED TAIL FIN FROM AMPHIBIAN TADPOLE

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The isolated tail from northern amphibian tadpole (*Rana c.* and *Hynobius r.*) showed light skin color in physiological salt solution at room temperature. When the isolated tail was exposed to cold, the tail skin became dark. This microscopic observation revealed that exposure to cold caused reversible dispersion of melanin granules. There was no darkening, however in the tail of *Xenopus* tadpole (southern amphibia) at low temperature. The dispersion effect of MSH on melanophores in *Xenopus* was blocked at low temperature. MSH required calcium ions for the melanophore dispersion, but the effect of cold was not depend on calcium ions. β -Adrenergic agents dispersed the melanophores of amphibian tadpole, but β -antagonist had no inhibitory effect on tail fin darkening at low temperature. From these experiments, it is thought that the melanophore dispersion at low temperature is not mediated by a hormonal or adrenergic reaction. It is known that the isolated tail of *Xenopus* and other amphibian tadpoles become dark in darkness. However, this darkening reaction strictly required calcium ions. Therefore, the cold effect is not the same as the darkening effect on the melanophore dispersion. The cold effect on skin darkening in northern amphibian tadpoles may be advantageous for quick growth in cold water at early spring due to heat-absorption by melanin.

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MECHANISM OF LIGHT REFLECTION FROM FISH SKIN POSSESSING THE MOTILE IRIDOPHORES.

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The light reflection from the motile iridophores of the blue damselfish, *Chrysiptera cyanea*, is due to the "non-ideal" multilayered thin-film interference phenomenon (Kasukawa et al., 1985). Using the Spectro-Multichannel Photo-Detector (MCPD-100, Union Giken), the spectral characteristics were quantitatively analysed. The wave peak reflected from the fish displaying normal cobalt-blue color was 465 nm. Then, the cytoplasmic layer between platelets was calculated to be 165 nm thick. When they changed their hue to dark (380 nm), the thickness decreased to 132 nm. When their body showed greenish tone (530 nm), the thickness increased to 186 nm. As the skin color changes from the cobalt-blue to dark, or to green, the increasing rate of the piles is -19 or +14%, respectively. These shifts were continuous and reversible. Though the incident angle was varied, the spectral peak did not shift. Actually, the fish is visible as assuming the same hue, when looked at from everywhere. This may be due to the fact that the piles disposed radially from the nucleus, and that all piles may be able to elongate or shorten simultaneously. Such motile iridophores were found to exist in some other damselfish species than *C. cyanea*.

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ADENOSINE RECEPTORS ALSO MEDIATE PIGMENT DISPERSION IN NON-MELANOPHORAL CHROMATOPHORES OF FISHES.

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The presence of adenosine receptors on the membrane of guppy and catfish melanophores (Miyashita et al., 1984) and of damselfish motile iridophores (Kasukawa et al., 1986) was already reported. In the present study, we have found that erythrophores of the platyfish (*Xiphophorus maculatus*), and xanthophores, amelanotic melanophores and leucophores of the medaka (*Oryzias latipes*) respond to adenosine by pigment dispersion. The drug did not aggregate chromatosomes. The action of adenosine was inhibited by methylxanthines, which suggests that these cells possess the adenosine receptors. Further, it was shown that even the pigment-dispersing effect of cAMP, an established intracellular second messenger, is primarily mediated by the receptors in a similar fashion to the action of adenosine. We can safely conclude, therefore, that adenosine receptors are generally present on the membrane of all the known types of teleost chromatophores. In the cells other than leucophores, adenosine released from the sympathetic fibers as a co-transmitter may function to reverse the effect of norepinephrine rapidly. The significance of the lack of such quick reversing mechanism in the leucophores remains uncertain.