PH 1

ACTION OF MELANIN-CONCENTRATING HORMONE (MCH) ON FISH MELANOPHORES.

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Synthetic salmon MCH was shown to aggregate the pigment granules within melanophores of some fishes (Wilkes et al., 1984). In the present study, we have pharmacologically and physiologically examined the effect of MCH on the nerve-melanophore system in six kinds of teleost species. In the melanophores of all fishes used, MCH showed the potent melanosome-aggregating action, but had no dispersing effect. The effect was dose-dependent, and the threshold concentration was about 10^{-10} M. Alpha- and beta-adrenergic antagonists did not affect MCH action on adrenergically-innervated melanophores. Muscarinic cholinolytics also did not inhibit the action of the hormone on cholinergically-innervated cells of siluroids. Ca ions were not indispensable for the pigment-aggregating action. Furthermore, MCH aggregated melanosomes in the cells which were insensitive to melatonin. The conclusion was that the effects of MCH are direct on the target cells through its specific receptors.

PH 2

ACTION OF MELANIN-CONCENTRATING HORMONE (MCH) ON NON-MELANOPHORAL CHROMATOPHORES IN TELEOSTS.

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The effects of synthetic salmon melanin-concentrating hormone (MCH) on the chromatophores other than the melanophores were examined. In the erythrophores on the split-fin preparations of the platyfish Xiphophorus maculatus and the swordtail X. helleri, and further in the xanthophores and amelanotic melanophores on the scale of the medaka Oryzias latipes, the pigment aggregation was potently induced by MCH (10^{-7} M) even in the absence of Ca ions. The results obtained by the pharmacological analyses using the blocking agents such as phentolamine or propranolol suggest that the action of the peptide is probably mediated through its specific receptors on the target cells. In contrast, the leucophores of the medaka responded by the pigment dispersion only when Ca ions were present. This response is similar to that induced by alpha-MSH. On the other hand, the motile iridophores of the blue damselfish, Chrysiptera cyanea, which play a major role in coloration and its rapid changes, were not affected by the hormone.

PH 3

CONTROL OF GRANULAR MOVEMENTS OF THE AMELANOTIC MELANOPHORES IN THE LIGHT-COLORED VARIETIES OF THE MEDAKA (ORYZIAS LATIPES).

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It is known that so-called "colorless" or "amelanotic" melanophores are present in the skin of the orange-red and white varieties of the medaka, Oryzias latipes, which lack the fully pigmented melanophores. It is considered that these melanophores possess only inactive tyrosinase precursors and are deficient in tyrosine, and therefore have only a small amount of melanin (Hishida et al., 1961). In this study, we have investigated the control mechanisms of motile responses of them. The granules in these cells aggregated in response to K ions, catecholamines, MCH and melatonin. Beta adrenergic agonists, adenosine, atropine and alpha-MSH aroused the granular dispersion in the cells. These pharmacological analyses indicate that these cells are controlled both neurally through alpha adrenoceptors and adenosine receptors, and hormonally through beta adrenoceptors and receptors for hormones from the pineal and the pituitary. The conclusion was, therefore, that the controlling mechanisms of these cells are just the same as those of the normal melanophores.

PH 4

AUTORADIOGRAPHIC DEMONSTRATION OF ADRENERGIC INNERVATION TO FISH ERYTHROPHORE.

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The pattern of innervation to erythrophores and melanophores in reddish scales of the swordtail, Xiphophorus helleri ('neon' and 'tuxedo' strains), was determined using ^{3}H-norepinephrine (^{3}H-NE) by light microscopic autoradiography. When isolated scales of 'neon' fish were incubated with ^{3}H-NE, autoradiograms revealed that dense plexuses of varicose fibers labeled with ^{3}H-NE enclosed the dendrites and cell bodies of melanophores, but no exact plexus that corresponds to erythrophores could be observed. In 'tuxedo' scales, in which only erythrophores exist, a fairly dense varicose plexus was seen to enclose each erythrophore. These labeled fibers were never observed in scales incubated in the presence of excess cold NE or in denervated ones. Potassium ions induced a marked decrease in the labeling of varicose fibers in addition to the aggregation of pigment granules within both chromatophores. These findings suggest that the observed labeled fibers are adrenergic nerves which control the pigment-aggregation response of chromatophores and further that erythrophores and melanophores of the present fish receive the same adrenergic innervation.