THE FUNCTIONAL ROLE OF DORSOMEDIAL NUCLEUS (DM) OF THE MIDBRAIN FOR GENERATING CALLS IN BENGALESE FINCH.

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Bengalese finch (*Lonchura striata*) produces distance calls whose acoustic structures are sexually different. Electrical stimulation to the regions of DM in male and female induces calls whose acoustic structures are similar to those of distance calls of male and female, respectively. Electrical stimulation at different frequency in female induces the certain kinds of calls with different acoustic patterns. These data suggest that DM is the nucleus which generates the different acoustic patterns of call in Bengalese finch.

EFFECTS OF GLUTAMATE TRANSPORTER INHIBITORS ON GLUTAMETE-INDUCED INWARD CURRENTS IN CRICKET GRYLLUS BIMACULATUS.

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We have previousely reported that glutamate-induced inward current is not carried by glutamate receptors but by Na^+ dependent glutamate transporters in voltage clamped cells of corpora allata in cricket Glryllus bimaculatus. In order to obtain more information about the basic properties of this current, we examined the effects of glutamate transporter inhibitors (kainate, dihydrokainate, cysteine, cysteate, cysteine sulfinate, PDC, DL-THA, and its racemic compound D- and L-THA, and DL-TBOA, a novel derivative of DL-threo- β -Benzyloxyaspartate) and analyzed a potenty of those inhibitors. The following results were obtained. (1) Kainate and dihydrokainate neither elicited a current nor blocked glutamate-induced inward current. (2)Cysteine alone elicited no inward current and blocked glutamate-induced inward current slightly. Both cysteate and cysteine sulfinate elicited inward current and potently blocked the glutamate-induced inward current. (3)DL-TBOA elicited no inward current and showed a most potent blocking action tested in this study. Based on these results, the glutamate transporter expressed in cricket corpora allata cell seems similar to that reported for EAAT1 than EAAT2, 3 and 4 which are cloned from mammalian brain.

MOLECULAR HISTOCHEMICAL AND PHARMACO-BEHAVIORAL STUDIES ON THE GLUTAMATE RECEPTOR IN THE BRAIN OF SALMONID FISHES.

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The localization of N-methyl-D-aspartate (NMDA)-type glutamate receptor (GluR) ε 2, ε 3, and ζ 1 subunit mRNAs in the chum salmon (*Oncorhynchus keta*) and lacustrine sockeye salmon (*O. nerka*) brains was investigated by *in situ* hybridization using specific probes which obtained by cloning the salmon each subunit partial cDNA. And, the effect of competitive NMDA antagonist (APV) and noncompetitive NMDA antagonist (MK-801) on the homing duration of lacustrine sockeye salmon in Lake Shikotsu was analyzed during their homing migration. GluR ε 2 subunit mRNA was expressed mainly in the forebrain. GluR ε 3 subunit mRNA was strongly observed in the cerebellum. GluR ζ 1 subunit mRNA was expressed widely in salmon brain. Injections of APV and MK-801 to lacustrine sockeye salmon resulted in significant lengthening of homing duration. These results suggest that the NMDA receptor channel is an important molecule during the homing migration of salmonid fishes.

MULTIPLE TYPES OF AMINO ACID TRANSPORTERS EXPRESSED IN CORPORA ALLATA CELLS IN CRICKET GRYLLUS BIMACULATUS.

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Effects of amino acid on membrane potential in cricket corpora allata cells were investigated. The following results were obtaind. (1) Acidic amino acid, glutamate and aspartate caused a most potent depolarization tested in this study. (2) Glutamine, serine, alanine, glycine, methionine, leucine, isoleucine and valine also caused membrane depolarizations. (3) Basic amino acid, such as lysine and arginine had little effect on membrane potential. (4) Depolarization induced by valin , methionine and alanine were eliminated by replacing the extrenal Na^+ with equimolar Li^+. (5) Algebraic summation of membrane depolarization between acidic amino acid (glutamate) and neutral amino acid(alanin, valin, and methionin) was observed indicating a possible existence of the electrogenic Na^+ -dependent amino acid transporters which carry the hydrophobic amino acid such as alanin, valin and methionin in cricket corpora allata cells.

VIP- AND NO-NERVE FIBRES IN THE NERVE PLEXUS OF THE ALIMENTARY TRACT OF *Xenopus laevis* TADPOLES.

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In order to investigate the development of the intrinsic nerves in the gut of anurans, we examined the distribution and density of vasoactive intestinal polypeptide (VIP) and nitric oxide (NO) nerve fibers in stages 52-59 *Xenopus* tadpoles. VIP- and NO-nerve fibers were identified immunohistochemically with anti-VIP and anti-NOS-I antibodies. The connective tissue layer of the subserous spaces contained both VIP- and NO-positive fibers along the alimentary canal. In the stomach, VIP-positive fibers were dense, irregularly arranged, thin varicose strands. Both nerve fibres in the small and large intestine showed checkered pattern. Nerve cell bodies were not identified. Histological features suggest that VIP- and NO-nerve fibers should function in controlling the motility of the alimentary canal.

AGING IN THE MOUSE OLFACTORY SYSTEM: Correlation of changes in the olfactory epithelium and olfactory behaviour.

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Although the functional organization of the olfactory system is reasonably well-documented, the majority of these studies have focused on a single time point during the ontogeny of the individual. The decline in vision and audition with age is well documented. However, there is little physiological evidence that olfactory acuity declines with age. We observed the amplitude of EOG (Electro Olfacto Gram) and the thickness of the olfactory epithelium. Both of them decreased dramatically with age in Senescence-Accelerated Mouse (SAM-P1). This strain of mouse exhibits accelerated senescence and age-related pathologies and is a reasonable model for research on aging. The median survival time for SAM-P1 is 55 weeks.

In the present study, we show that the acuity of the sense of smell declines with age. We propose that the olfactory acuity changes with age and the age-related decrease in olfactory sensitivity may be explained on the basis of olfactory receptor loss.