REGULATING FACTORS OF THE WATER ABSORPTION IN JAPANESE TREE-FROGS WERE CHANGED BY BODY FLUID OSMOLARITY.

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Japanese tree-frogs have two types of water absorption system: the ordinary system that functions always during terrestrial, and the enhanced one that absorbs water much faster but functions only in dehydrated circumstance. The enhanced system is activated by noradrenaline or vasotocin, both of which activate Na^+, K^+-ATPase via adenylyl cyclase and protein kinase A. We have previously reported that under prolonged dehydration, water absorption was mainly controlled by vasotocin, while it was regulated by noradrenaline for the beginning of dehydration period.
Since osmolarity of the body fluid is raised proportionally as the dehydration period proceeds, we artificially raised the osmolarity to make the body fluid virtually in dehydrated condition, and examined regulating factors of the water absorption. When the osmolarity of the body fluid was raised to 130%, water absorption was controlled by noradrenaline. When it was raised to 150%, the water absorption was controlled by vasotocin. Finally, it was raised to 200%, the lethal level to the animal, water absorption was controlled by both of the factors, noradrenaline and vasotocin.

ELECTRICAL ACTIVITIES OF THE MEDULLARY NUCLEI WHICH CONTROL DRINKING BEHAVIOR IN EEL

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To seek neurons projecting to drinking-associated muscles, Evans blue (EB) was injected into the sternohyoid (SM), branchial, opercular, pharyngeal, upper esophageal sphincter or esophageal body muscles. The SM controls ingestion and the remaining muscles control swallowing. All neurons stained by EB were located only in the caudal medulla (MO) of eel. Neurons projecting to the SM was identified as the reticular cells (RCs) and neurons projecting to the remaining muscles as the glossopharyngeal-vagal motor complex (GVC). Since RCs project directly to the SM and their morphology is similar to somatomotor neurons in other fish, they may compose an ingestion center. The GVC may be a swallowing center, since the GVC neurons project directly to the branchial, opercular, pharyngeal and esophageal muscles and their morphology is similar to visceromotor neurons in other fish. Both ingestion and swallowing centers were positioned extremely close in the caudal MO, suggesting existence of close interaction between ingestion and swallowing centers. In the RC and GVC of the brain isolated from the skull, extracellular recordings were performed, and effects of various regulators were examined.

EFFECT OF PROLACTIN ON EPITHELIAL TRANSPORT ACROSS SKIN OF TREE FROG (*Hyla arborea japonica*)

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Adult amphibian skin transports Na^+ actively from the epidermal to the dermal side. The transport is measured as short-circuit current (SCC) across the skin. Basolateral application of prolactin (PRL: 10 micro g/ml) increases the transport. The increase in the transport could be caused by an increase in the single channel current (i) and/or open channel density (M) of the epithelial sodium channel (ENaC). Whether i and/or M is increased by PRL was analyzed by current-fluctuation analysis using the channel blocker, CDPC on skin of tree frog. The characteristics of skin obtained before PRL were: SCC, 34.9±5.4 micro A/cm^2; i, 0.43±0.06 pA; M, 2.3±0.7 channels/mm^2 (n=11). The ratio after:before PRL was 2.4±0.3 for SCC, 0.5±0.1 for i, and 6.8±1.7 for M. PRL significantly increased SCC ($p<0.01$) and M ($p<0.05$), and deceased i ($p<0.01$). An increase in SCC by PRL is due to an increase in M , but not i. PRL tends to inhibit K^+ channel which locates on basolateral side of the skin

Correlation of the habitats and the kidney structures in anuran amphibians

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Amphibians inhabit areas ranging from completely aqueous to terrestrial environments. The diverse factors including osmoregulation make their adaptation possible. Urinary concentrating ability of the kidney might be an important factor. In the present study, 15 species of anuran amphibians inhabited diverse environments were used. We examined some morphological factors of the kidneys that play a major role in the process of urine formation. According to the observation by light- and electron microscopy, there is an interspecies difference in the nephron constituting cells, and the structure of the nephron is related to their habitat. In the aquatic species, a large volume of plasma is filtrated in a large glomerulus and the ultrafiltrates are reabsorbed in a large long proximal tubule of the nephron. Control of tubular transport may be undeveloped in a small short distal tubule of the nephron. On the contrary, a long distal tubule was developed well in the terrestrial species. Thus, it is supposed that development of the distal tubule of the nephron is one of the important factors for the terrestrial adaptation.

GLUCAGON-LIKE PEPTIDE ISOLATED FROM THE EEL INTESTINE: EFFECTS ON THE ATRIAL BEATING

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A new glucagon-like peptide was isolated from the intestine of the eel. Since its structure is similar to that of oxyntomodulins (OXMs) reported in various vertebrates, we named this peptide eel oxyntomodulin (eOXM). The eOXM enhanced the contractile force and the beating rate of the eel atrium in a dose-dependent manner. These effects of eOXM were not inhibited by betaxolol, indicating that the actions of eOXM were independent of those of adrenaline. Eel oxyntomodulin enhanced the intracellular Ca^{2+} concentration of the myocardium. The contractility of the eel atrium was greatly reduced after omitting Ca^{2+} from the bathing medium or after treatment with verapamil, a Ca^{2+} channel blocker. After inhibiting Ca^{2+} entry under these conditions, the inotropic effect of eOXM was markedly reduced, but the chronotropic effect was not altered significantly. These results indicate that the inotropic effect of eOXM is via a stimulation of Ca^{2+} influx but that the chronotropic effect may be independent of extracellular Ca^{2+}.

L-TYPE CA CHANNEL AND CA-PERMEABLE NONSELECTIVE CATION CHANNEL IDENTIFIED IN MYOCYTES ISOLATED FROM CRICKET LATERAL OVIDUCT.

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Whole-cell patch clamp technique was applied to myocytes isolated from lateral oviduct of the cricket *Gryllus bimaculatus*. Upon application of ramp pulses, two types of inward currents were elicited; one is activated at negative membrane potential (–60 to –200 mv) and the other is activated at relatively positive membrane potential (around –50 mV). The former current was carried by both monovalent (Na, Cs, and K)and divalent (Ca and Ba) cations and was inhibited by extracellular Gd suggesting that the channel responsible for this current is a nonselective cation channel (NSCC). The latter current was also carried by both monovalent and divalent cations but was identified as L-type Ca channel currents. The present results suggest a coexistence of L-type Ca channel and Ca-permeable NSCC in myocytes isolated from cricket lateral oviduct.