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GLASS-EEL OLFACTION: SENSITIVITY TO AMINOACIDS

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The ascent of the European eel (Anguilla anguilla) is characterized by an euryhaline behaviour as it leaves the sea and goes up the river. During this transition from salty to fresh water the eels change from a grouping to an individual life style: simultaneously, they start to feed. Aim of this study was to investigate the role of the olfactory system in this behaviour. In detail, we studied both morphology, by means of SEM observations, and electrophysiology of the olfactory mucosa. Experiments were performed both on unpigmented glass eel (GE, i.e. specimens that just reached the fresh water) and on pigmented elvers (EL, i.e. specimens in the early period of their individual behaviour). Morphological tests showed that two types of chemoreceptors different in size and shape are present in the olfactory mucosa at both GE and EL developmental stages. Stimulation with seven different aminoacid solutions allowed recording of underwater electro-olfactograms (EOG) whose amplitude increased exponentially with logarithmic increase in stimulus concentration. The mean shapes of the dose-response curves in GE and EL stages were quite similar: in other words, responsiveness to aminoacids was inespective of the developmental stage. The presence of a wide range of sensitivity to aminoacid still at the euryhaline shift leads to suppose a role for olfaction during the upstream migration.

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CRITICAL LEVELS OF PREOPTIC cAMP CONCENTRATION ARE RELATED TO THE EVOLUTION OF THE SLEEP CYCLE IN THE RAT

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In the preoptic region (PO) of the rat cAMP concentration changes in relationship with wake-sleep processes (E. Perez et al., Exp. Brain Res. 47: 114-118, 1982). This study was carried out in order to investigate the consistency of experimentally induced changes both in sleep and nucleotide biosynthesis. 56 male Sprague-Dawley rats were divided in two experimental groups: HS, hypoxic stimulation (n = 19, air O_2 tension lowered by washing with N_2) as a control; SM, sleep monitoring (n = 37, EEG recording). Animals were i.p. injected with 23 mg/kg of dl-propanolol (PRO: n=9, HS; n=19, SM) or with saline (SAL: n=10, HS; n=18, SM) and sacrificed in liquid N_2 after 1 min in HS or after at least 30 sec of synchronized sleep in SM. cAMP and protein content were determined in samples from PO. The results (pmol cAMP/mg protein, mean±SEM) show that cAMP concentration in HS is minimal with PRO (15.02±1.26) and maximal with SAL (35.05±3.69). In SM with SAL, cAMP concentration was found to be in the middle of this range (23.71±2.11), whereas in SM with PRO it was close to the minimum value (17.23±1.63). The latter condition is characterized by the total suppression of desynchronized sleep. These findings would suggest that critical levels of cAMP concentration in PO are related to the evolution of the sleep cycle.

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ROLE OF DIFFERENT BRAIN STRUCTURES IN THE RECOVERY OF FUNCTION AFTER HEMICEREBELLECTOMY (HCb) IN RATS

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In a previous study we demonstrated marked differences in the extent of recovery and in the side of extensor hypotonia following a right HCb performed in rats at different developmental stages. It has been suggested that this different functional recovery might be due to the differences in the degree of anatomical remodelling demonstrated in this experimental model. To test this hypothesis, we selectively lesioned some of the circuits displaying post-lesional reorganization, (frontal cortex, anterior thalamus, red nucleus, cerebellar cortex and deep nuclei to the left side), in rats which had neonatally or in adulthood received a right HCb. Cortical, thalamic and rubral lesions did not modify postural and motor asymmetries in both operated groups. Lesion of left hemicerebellum provoked a left extensor hypotonia in rats in which both HCbies had been performed in adulthood, and a right extensor hypotonia in the animals which had received neonatally a right HCb and in the adulthood a left HCb. In conclusion, our data suggest that the remodelled cerebellar efferents do not play a key role in the improved recovery observed in neonatally operated rats and indicate that the time of lesioning is crucial in determining a relocation of function in the spared hemicerebellum.

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ASYMMETRIES IN EYE AND HEAD REFLEX MOVEMENTS

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In cats the velocity of upward eye response is higher than the downward one, when the vertical ampullo-ocular reflex is evoked oscillating the animals at 90° side down (VVOR 90°-yawed pitch). This asymmetric response disappears in upright position (VVOR 0°-pitch) because of the coactivation of the otoliths. Therefore, in natural condition the asymmetry of the VVOR is fully masked. Thus, a question arises on the functional meaning of the latent vertical ampullar asymmetry. Aim of the present study was to extend this analysis to laterally eyed animals and to check the presence of asymmetry in the vestibulo-collic reflex (VCR). The EOG and EMG of extensor and flexor neck muscles were recorded in cats and rabbits. Asymmetric responses in VVOR 90°-yawed pitch and symmetric ones in VVOR 0°-pitch were seen in rabbits as in cats. No asymmetries occurred in HVOR and VVOR-roll. On the other hand, the EMG activity of the extensor neck muscles was clearly asymmetric in both cats and rabbits in response to pitch at 90° side down as well as at 0° with upward prepon derance during dynamic phase. We conclude: 1) VOR and VCR asymmetries occur only in the sagittal plane in both frontally and laterally eyed animals; 2) only the asymmetries of VCR are not suppressed by the macular input. This different otolithic effect seems reasonable since VCR, differently from VOR, acts against the gravity during upward head movements in upright position.

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