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- 家電製品・コンピュータおよび医療関連ソフトウェアの開発・販売
Eight behavioral tests were performed in young adult (45 weeks old) WT and CRMP4-KO mice: open field test, novel object recognition test, social interaction test, tube test, food exploratory test, elevated plus maze, autonomic response to thermal approach and hot plate test. In those tests, we found some sex differences in CRMP4-KO mice, compared to WT mice. For example, social interaction test (10 min), the total duration of active interactions was significantly shorter in CRMP4-KO males than WT males, but no significant difference was found between CRMP4-KO females and WT females. We next compared gene expressions including S-hydroxytryptamine (GHT) receptors, alpha-amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid (AMPA) receptor subunits GluR1 and GluR2 and dopamine D1-D2 receptors (D1 and D2) in hippocampus between WT and CRMP4-KO mice of both sexes. We found some significant changes in expressions of GluR1, GluR2, and D1R mRNAs in CRMP4-KO mice compared to those of WT mice. In addition, sex differences were detected in two of them. The expression of GluR2 mRNA was significantly higher in hippocampus of CRMP4-KO males than that in WT males, though the difference was not found between CRMP4-KO and WT females. On the other hand, the expression of D1R mRNA was significantly higher in CRMP4-KO females than that in WT females, although the difference was not found between CRMP4-KO and WT males. These studies showed effects of CRMP4 deficiency on some of behaviors and gene expressions in sex-dependent manner. It means that sex differences appeared in some behaviors and gene expressions when CRMP4 was deleted. In our previous studies, we found that CRMP4 contributes to the regulation of dendritic elongation and inhibitory excitatory balance in male prenatals mice (Tasuta et al., 2015, 2016).

The present study provides new questions why these sex-dependent effects come out in CRMP4-KO mice and how CRMP4 naturally contributes to making these sex-differences insomniation.

**Behavioral (Mammalia)**

Follower and hide neonate ungrasps: Whether anti-predatory strategy in first days of life influences mother-offspring acoustic communication?

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Neonate ungrasps have two main strategies for avoiding predators: hiding in grass and reunion with a mother only after nursing or following the mother in the herd soon after birth. In both cases, mothers and young use individualized contact calls for mutual recognition. However, the differences in anti-predatory strategies can affect individuality of contact calls and their acoustic structure. We collected data from three species with different anti-predatory strategies in neonates: the ‘follower’ saiga antelope Saiga tatarica, the ‘hider’ red deer Cervus elaphus and the ‘follower’ saiga antelope Saiga tatarica. We expected more individualistic calls in the ‘follower’ species, because in the ‘hider’ species, mothers may additionally rely on spatial landmarks for recognition their young. Calls of 39 mothers and 22 neonate saigas were collected on their natural breeding grounds in Northern Kazakhstan in May 2014. Calls were collected in the absence of other small animals using automated recording systems SongMeter SM2 placed near the neonates; call sequences of distinctive animals were selected from 235 hours of the automated recordings.

Calls of red deer were collected at the experimental farm of University of Castilla-La Mancha (Albacete, Spain) in June 2011-2012. We analysed a sample of 1040 individually identified contact calls, recorded from 28 mothers and 31 neonate red deer. Calls of gorailed gazelle were collected at the Ecocenter ‘Djetiolan’, (Buckhara, Uzbekistan) in May-June 2006-2010. We analysed a sample of 453 individually identified contact calls, recorded from 7 mothers and 21 neonate gorailed gazelles. Mothers and neonates of all three species produced two types of contact calls: oral (emitted with an opened mouth and nasal (emitted through the nose with a closed mouth). The individual identity was well expressed in all three species and exceeded two-three times the random value in both nasal or oral calls. However, inter-species differences were observed. In saiga discriminant analysis based on 10 acoustic variables accurately classified individual identity in 97.9% oral calls of 21 mothers, 95.0% nasal calls of 16 mothers and 93.4% oral calls of 22 neonates. Variables mostly contributing to vocal individuality (the fundamental frequency, the 2nd and 3rd formants) were the same in both mother and young and in both the nasal and oral calls. In red deer, discriminant analysis based on 11 acoustic variables, accurately classified individual identity in 77.0% oral and 68.6% nasal calls of 17 neonates and 71.7% oral and 61.1% oral and 64.2% nasal calls of 17 neonates. Variables mostly containing to vocal individuality were a few variables of the fundamental frequency and the duration. In gorailed gazelle, discriminant analysis based on 6 acoustic variables, accurately classified individual identity in 77.0% oral and 67.4% nasal calls of 12 neonates. Variables mostly containing to vocal individuality were a few variables of the fundamental frequency, 3rd and 4th formants.

**Behavioral (Mammalia)**

Female male choice in Campbell's hamster (Phodopus campbelli Thomas, 1905): Whether the sexual traits, stress, testosterone, aggression, and immunecompetence are indeed real predictors?

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Androgen-dependent male sexual traits as well as immunecompetence are theoretically assumed to be key indicators of a male's quality for the male-chosing female. The goal of this study was to estimate a relative role of sexually dimorphic traits, stress and sex hormone levels, immune competence and behavior of males in female choice of potential sexual partner. Campbell's hamster (Phodopus campbelli Thomas, 1905) is a sexually dimorphic species. Male of this species possesses fat dependent antibrain gland producing sexual behavior in territorial marking and involving in sex and individual recognition. In the choice variant sexually motivated (SM) females (transitional state of vixen proestrous to estrus) were able to interact with two tetra- cered male siblings that differed in expression of sexual traits. Males were unrelated to the female and able to contact and copulate with her. In both males, we measured body mass, size of midventral gland, mono-aminc acid distance and external testicular diameter. We also estimated levels of blood testosterone and cortisol. T-tick (T-tick) and B-cell immune responses to antigens, as well as aggressive and sexual dominance through additional encounter experiments with another SM female (sinlce female siblings could freely compete for the female). We found that: SM females choose a partner among two male-sibs and use the strategies of vigilance with the preferred male compared to the non-preferred one. There is no paternal investment associated neither with the first visit of the chosen male, nor with the higher expression of sex-related morphological traits, higher levels of