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The dholes *Cuon alpinus* live in large packs and are very vocal throughout a year and especially during the breeding and pup rising seasons. These animals produce high rates of high-frequency and biphonic calls, which are presented in both sexes and at all ages. The high-frequency squeaks and the biphonic yap-squeaks are species-specific and well distinctive from the similar high-frequency and biphonic whines of any dog-like canid sympatric to the dholes: domestic dogs *Canis domesticus*, the timber wolves *Canis lupus* and jackals *Canis aureus*. The high-frequency and biphonic calls are lacking in all fox-like canid species, so cannot be confused with such species as *Vulpes vulpes*, *Vulpes bengalensis* or *Vulpes ferrilata*. The squeaks and especially yap-squeaks of the dhole are extremely individualistic (97% correct assignment of calls to individual). This enables identifying different packs by calls of focal individuals, the method, already developed and applied for identifying packs of timber wolves. Dhole packs can be monitored by using arrays of modern inexpensive devices for automatic audio recording, such as AudioMoth, SongMeter, BAR, etc., allowing call collection at any weather and at wide range of temperature. The recorded calls are stored as audio files and can be analysed spectrographically at any time by using professional or free software. Data collection is possible season by season and year by year, for documenting the presence of packs at different places. In additional, monitoring of some focal individuals for scientific purposes is possible. Supported by RNF grant 19-14-0037.

S3-P11

Passive acoustic monitoring of male rutting vocal activity in five Russian populations of red deer and wapiti

Elena Volodina¹, Ilya Volodin², Ivan Rusin²

¹Moscow Zoo, Moscow, Russia, ²Lomonosov Moscow State University, Moscow, Russia

Passive acoustic monitoring is an actual tool for population monitoring at conservation and tourist areas. In polygynous red deer *Cervus elaphus*, a prolonged rutting vocal activity represents a prominent part of male reproductive behaviour. Rut duration as well as the overall vocal activity differ between populations and between years. This study investigates red deer stag roaring activity in ten recording points for the five populations distributed from the most western to most the eastern areas of Russia. Stag rutting calls were recorded in 2015-2018 for 5 min/hour, 24 h/day, for 52-60 days of rutting period, by using 10 automated recording devices, two recording sites per population, with simultaneous registration of temperature, once per hour. The devices recorded in total 111,824 rutting calls: 78,023 calls at Belgorod (Central-European red deer *C.e. hippelaphus*), 12,223 at Bryansk (*C.e. hippelaphus*), 17,955 at Kostroma (Siberian wapiti *C.e. sibiricus*), 926 at Ussuri (Far-East wapiti *C.e. xanthopygus*) and 2,697 at Khabarovsk (*C.e. xanthopygus*). The roaring activity in all recording sites and all populations peaked between hours 03:00 and 06:00, nearly lacked between 10:00 and 18:00, steadily increased from 20:00 to 03:00 to maximum and then rapidly decreased from 06:00 to 09:00 to minimum. Effects of time of day on roaring activity prevailed on the effects of temperature and were related to rut phase (start, active, fading). This study reveals that geographically distant populations of red deer and wapiti living under different climate condition may be surprisingly similar in the overall dynamics of roaring activity in the course of rutting period. At the same time, the absolute values of roaring activity could differ substantially between populations and recording sites

within populations. The impressive rutting roaring of red deer and wapiti can be considered as a seasonal key marker for a modern ecoacoustical approach. Supported by RFBS grant 19-04-00133.

S3-P12

Effects of maternal stress induced by predator odor on the anti-predator responses of adult offspring in Brandt's voles

Wanhong Wei^{1, 2}, Chen Gu^{1, 2}, Baofa Yin¹

¹College of Bioscience and Biotechnology; ²College of Animal Science and Technology, Yangzhou University, Yangzhou, 225009, P.R. China

Maternal stress has a diverse effect on the phenotype of offspring depending on the stage of development. In addition, maternal stress to predator odors influences the growth, behavior, and physiology of offspring. This study investigated the anti-predator responses of adult Brandt's voles (*Lasiopodomys brandtii*) after their mothers had been exposed to predator odors during gestation. We exposed pregnant Brandt's voles to cat urine, rabbit urine, or distilled water for 18 days (1 h/day). Once the offspring matured into adults, we measured the behavioral and hormonal responses, as well as *c-fos* mRNA expression, following acute exposure to cat urine, rabbit urine and distilled water. When exposed to cat urine odor, adult vole offspring of dams exposed to chronic cat odor showed the lowest frequencies and durations of alerting, foraging, and other behaviors, but the duration of hiding behaviors was highest. This group also exhibited the highest levels of adrenocorticotrophic hormone, corticosterone, and *c-fos* mRNA expression in the hypothalamus. When exposed to rabbit odor, adult vole offspring of dams exposed to chronic rabbit odor only exhibited a significant difference in hiding behavior. The hormonal responses and *c-fos* mRNA expression were exhibited in adult vole offspring of cat odor-exposed dams were highest. Our findings indicate that Brandt's vole offspring of dams exposed to cat urine odor had the strongest anti-predator behavioral and hormonal responses to cat urine odor, as well as the highest expressions of *c-fos* mRNA in the hypothalamus. When exposed to distilled water, adult vole offspring of dams exposed to chronic cat and rabbit odor only exhibited lower levels in hormonal responses. Thus, maternal stress to predator odor has a beneficial effect on the survival responses of vole offspring, because these vole offspring have stronger anti-predator behavioral and hormonal responses to avoid predators.

Symposium 4: Human-wildlife interactions: conflict and coexistence

S4-P1

Wind turbine underwater noise masks acoustic signals of marbled rockfish

Xuguang Zhang, Jia Chen, Hongyi Guo

Institute for Marine Biosystem and Neuroscience, Shanghai Ocean University, 201306, China