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STAGES EVOLUTION OF GROUND SQUIRREL OF NORTHERN EURASIA

A.K. Agadzhanyan

Summary

The analysis of a history of family Sciuridae allows to allocate some stages their evolution. First of them was Eocene — Early Oligocene, when went formation in depths of group rodent of modern family Sciuridae. There was a division Sciuridae on Sciurinae and Marmotinae in the end of Oligocene. Early and Middle Miocene was time of primary radiation ground squirrel to Northern America, where was separated the trunk marmot and branch prairie-dog in Late Miocene. The representatives of ground squirrel Marmotinae occur on the Eurasian continent in Pliocene. They are submitted by the well separated groups Tamiini, Citellini and Marmotini at this time. They review of the basic finds ground squirrel and marmot in territory of Russian plain, Siberia and Transbaikalia during Pliocene and Pleistocene is given in article.

GROUND SQUIRREL (RODENTIA, SCIURIDAE) FROM LATE PLEISTOCENE MIDDLE AND SOUTHERN TRANSURAL

N.V. Pogodina

Summary

The description of the fossils rests of the ground squirrel *Spermophilus superciliosus* from four sites Middle and Southern Transural is given. The stages of wearing of cheek teeth ground squirrel subgenus *Colobotis* are described. The comparison of a structure of cheek teeth of *S. superciliosus* and at the modern representatives ground squirrel subgenus *Colobotis*: *S. fulvus*, *S. major*, *S. erythrognys* was carried out.

HYBRIDIZATION BETWEEN PALETAILED (*SPERMOPHILUS PALLIDICAUDA* SATUNIN, 1903) AND ALASHANIC (*S. ALASCHANICUS* BÉCHER, 1888) GROUND SQUIRRELS IN MONGOLIA

V.P. Korablev, M.V. Tsvirka, G.N. Chelomina, E.A. Lyapunova

Summary

Cytogenetic analysis of 20 samples of *Spermophilus pallidicauda* from three localities in Mongolia revealed the presence of a first-generation F1 hybrid animal ($2n = 36$), of the paletailed *S. pallidicauda* ($2n = 34$) and alashanic *S. alaschanicus* ($2n = 38$) ground squirrels in the sympatric zone of their ranges. Analysis of nuclear DNA from ten ground squirrels (including first-generation hybrid) by RAPD-PCR revealed four hybrids in two sites. The sites of the hybrid animals identification were located more than 250 km apart. Hence, the sympatric zone between this species can encompass a large territory in Mongolia.

MOLECULAR GENETIC STUDY OF MATERNAL AND PATERNAL LINEAGES OF HYBRIDIZATION OF GROUND SQUIRRELS (*SPERMOPHILUS*: RODENTIA, SCIURIDAE)

O.A. Ermakov, S.V. Titov, V.L. Surin, N.A. Formozov

Summary

In four ground squirrel species from the Volga region — yellow (*Spermophilus fulvus*), russet (*S. major*), little (*S. pygmaeus*), and speckled (*S. suslicus*) — four hybridization variants (major/fulvus, major/pygmaeus, major/suslicus, and pygmaeus/suslicus) have been reliably described. It was shown that 36,7% (52 out of 137) of *S. major* individuals had «alien» mitotypes typical of *S. fulvus* and *S. pygmaeus*. Introgression at the Y chromosome was observed only in two cases: in one *S. major* individual (out of 51 phenotypically pure animals) caught in the major/fulvus sympatry zone, and in four (one litter) out of fourteen *S. fulvus* individuals caught in close vicinity of the sympatry zone of these two species. Two colonies of the «hybrid congestion» type were examined with 9 major/suslicus hybrids

analyzed in the first and 23 major/fulvus hybrids in the second colony. The prevalence of the *S. major* paternal lineages was observed in both colonies (77,8 and 82,6%, respectively). The data obtained suggest that compared to wide mtDNA introgression, introgression of Y chromosome in the Volga region ground squirrels is statistically significantly less frequent event.

POPULATION FEATURES OF INTERSPECIAL HYBRIDIZATION OF GROUND SQUIRRELS (*SPERMOPHILUS*: RODENTIA, SCIURIDAE)

S.V. Titov, O.A. Ermakov, A.A. Shmyrov, A.A. Kuzmin, V.L. Surin, N.A. Formozov

Summary

On the example of hybridization of ground squirrels significance of colonies spatial structure, reproductive strategy, assortative mating and prolificacy of hybrids for interspecial relations is shown. Depending on population situation these factors may either isolate species or promote hybridization.

CHARACTERISTIC FEATURES OF FORMING OF MIXED COLONIES OF RUSSET (*SPERMOPHILUS MAJOR* PALL.) AND SPECKLED (*S. SUSLICUS* GBLD.) GROUND SQUIRRELS

A.A. Kuzmin, S.V. Titov

Summary

On the example of mixed colonies of Russet and Speckled Ground Squirrels three ways of forming of mixed colonies are described. Way of development choice depends on initial conditions of population of indigenous sympatric specie (quantity, sex ratio) and on the scale of introduction of other sympatric specie.

REPRODUCTIVE RELATIONS OF RUSSET (*SPERMOPHILUS MAJOR* PALL.) AND YELLOW (*S. FULVUS* LICHT.) GROUND SQUIRRELS IN HYBRID COLONY

A.A. Shmyrov

Summary

Reproductive relations of Russet and Yellow Ground Squirrels in hybrid colony are described. It is shown that introgressive hybridization is observed in this colony. Characteristic features of interspecies relations are promiscuity sexual relations, multiple mating and multiple paternity.

MANY-YEAR FLUCTUATIONS OF PYGMY SUSLIK *SPERMOPHILUS PYGMAEUS* PALL. NUMBER BETWEEN VOLGA AND URAL RIVERS IN XX CENTURY

N.M. Okulova, F.G. Bidashko, A.K. Grazhdanov

Summary

The probable causes of many-year pygmy suslik number fluctuations in Western Kazakhstan are discerned. The dependence of suslik number fluctuations from cosmic, global, regional factors, changing local climates is revealed. These factors influence on success of fattening and overwintering. It is showed that in sand desert landscapes in conditions of drying up and heating of climate the suslik number decreases gradually. This leads to almost complete disappearance of susliks from sand desert. In loamy semi-desert the growth of suslik number observed till eighties years of XX century, when it was replaced by number decrease. It so can be explained by trends of external factors, influencing on surviving and reproduction of susliks.

INTERPOPULATIONAL RELATIONS IN LONGTAILED SIBERIAN GROUND SQUIRREL IN THE SOUTH-WESTERN TUVA

D.B. Verzhutsky

Summary

Eight populations of longtailed Siberian ground squirrel have been made known in the South-Western Tuva. The borders of edge habitations of separate populations sometimes are in the distance of 1—2 km one from another; theoretically it must not be obstacle for the animals interchange. When specially studied, no single case of animal migration was noted between three neighbouring populations. That is the evidence of high isolation degree of the assigned groupings.

THE ECOLOGICAL REASONS OF CHANGE OF NUMBER AND DISTRIBUTION OF SPOTTED SOUSLIK SPERMOPHILVS SUSLICUS (GILDENSTADT, 1770)

V.A. Lobkov

Summary

Features of changes of number of Spotted Sousliks are described depending on weather conditions and under influence of population mechanisms. Long preservation stable spatial-etological structures conduct to reduction in a gain and depression of a population. The external influences breaking spatial structure of settlements result in occurrence of generations females, having numerous broods. The increase in fruitfulness females provides restoration of number after its depressions. The retrospective analysis of conditions of a life and changes of number of sousliks in XIX and XX centuries is given. It is shown as weather anomalies or economic activities causes dynamics of number and distribution of Spotted Sousliks during historical development of this species.

SOME ECOLOGICAL ISSUES ON CURRENT CONDITIONS OF MINOR ASIAN GROUND SQUIRREL (*SPERMOPHILUS XANTHOPRYMNVS* BENNETT, 1835) IN ARMENIA

L.V. Sahakyan

Summary

In the given article contemporary condition of the Minor Asian ground squirrel population and its dissemination in Armenia are described. There is given data on type, general and area of natural habitat, and altitude of dissemination limits. In our point of view the most exact descriptions of the rodents are selected. Some peculiarities about ecology, data on daily and annual activity, feeding ratio and reproduction, medium and longstanding quantity in the different parts of the natural habitat are presented as well. Tendencies in change due to the possible impact of the anthropogenic factor of the previous limits of dissemination are introduced.

SEASONAL CORTICOSTERONE DYNAMICS IN NATURAL POPULATION OF THE SPECKLED GROUND SQUIRREL (*SPERMOPHILUS SUSLICUS*)

V.A. Kuznetsov, A.V. Tchabovsky, M.P. Moshkin

Summary

New methods of noninvasive estimation of the animal's endocrine status based on analysis of hormone contents in feces were used to study the seasonal dynamics of stress in connection with social (density of population) characteristics of speckled ground squirrel. The study was implemented at natural population inhabited southern part of Moscow region in 2002—2003. The level of stress was the highest at the beginning of active season (on heat) and decreased in the course of time; it depends on density of animal's population. The results are discussed in connection with the peculiar properties of the speckled ground squirrel and close species ecology.

**PATTERNS OF COLONY FORMATION WHILE OCCUPYING NEW PATCHES
IN LONG-TEETH GROUND SQUIRREL (*SPERMOPHILUS FULVUS* LICHT., 1823)**

S.A. Shilova, A. V. Tchabovsky, V.S. Popov

Summary

Study of colony formation while borrowing new patches allows us to reveal the mechanisms of population dynamics. On the study site for 3 years we were observing the process of new group forming, consisted of animals, playing the different sociodemographic roles. That group was formed by settled vagrant youngs, which began their breeding the next year after settling. Sociality level of new formed group was no different from one of other resident groups being under our observation for a long time. We suggest that forming of such group indicates the attraction of the dispersing animals to each other that was unexpected for such solitary species, as long-teeth ground squirrel was.

**DOES BREEDING OF YEARLING FEMALES OF LONG-TEETH GROUND SQUIRREL
(*SPERMOPHILUS FULVUS* LICHT., 1823) REDUCE THEIR REPRODUCTIVE SUCCESS IN?**

V.S. Popov, N.A. Stukolova, A. V. Tchabovsky

Summary

Female's age of first reproduction constrained with other species traits, such as social structure or body weight. In some particular cases early breeding can decrease female's reproductive success. In long-teeth ground squirrel yearling litters doesn't differ from adult litters in number of daughters, survived till maturing. But males, survived from adult litters, outnumber those from yearling litters. This difference caused by skewed male-biased sex ratio in adult litters, instead of yearling's. So, breeding as yearlings doesn't reduce the reproductive success of females long-teeth ground squirrel.

**DAM EMERGENCE TIMING AFFECTS FATTENING AND SOCIAL ACTIVITY IN
JUVENILES OF LONG-TEETH GROUND SQUIRREL (*SPERMOPHILUS FULVUS* LICHT.)**

N.A. Stukolova, A.V. Tchabovsky, V.S. Popov

Summary

We studied dynamics of social activity and physical condition of juveniles in long-teeth ground squirrel during their first activity season. Active season their mothers were shorter as a result of later emergence of the later emerged juveniles from hibernation. Social activity of «late» juveniles decreased more rapidly than that of «early» emerged youngs and the former played less than the latter. Late juveniles had lower body mass at emergence, but at 45—50 day after emergence they achieved weight similar to that of early juveniles, i.e., they gained more weight in a similar time than early-emerged youngs. Thus, late juveniles had to pay an opportunity cost of lower social experience to ensure sufficient body weight gain at immergence. Hence, females that had emerged earlier had more chances to produce offspring of higher quality in terms of social experience, than did females that had emerged late.

**REPRODUCTIVE COSTS IN FEMALES OF SPECKLED SOUSLIK
(*SPERMOPHILUS SUSLICUS* GBLD., 1770)**

A.F. Babitsky, A.V. Tchabovsky, L.E. Savinetskaya

Summary

The assumption that reproduction is costly is crucial for life history theory. At the same time prevalence — or even existence — of costs of reproduction in real populations has been widely disputed. We sought for evidence of costs of reproduction in female speckled ground squirrels (*Spermophilus suslicus*). We also tested the hypothesis that costs of reproduction, if existent, might affect the reproductive decisions. To address these questions we analyzed data on the reproductive rate,

body mass dynamics, and survival of females in a population of the speckled ground squirrel in Moscow region, Russia. From 2001 to 2005 we live-trapped and individually marked 187 adult females at a 1-ha study grid.

Reproductive rate increased with age (oldest females being most likely to reproduce) and differed significantly between years, but didn't correlate with population density. On the other hand, body mass dynamics and survival did not differ between years, but were strongly influenced by reproductive status of females. Specifically, reproductive females were heavier at emergence than non-reproductive ones, but gained weight slower and weighed less at the time of entry into hibernation. Consequently, reproductive females suffered marginally higher over-winter mortality.

Our data suggest that in speckled ground squirrels reproduction incurs costs in terms of lower fattening success and increased subsequent mortality. Females' reproductive decisions appear to be influenced by age and mass at emergence rather than population density. Thus individual differences between the females might be more important determinants of reproduction than density-dependent regulation. These results are partly consistent with previous studies of different ground squirrels.

THE DIVERSITY OF CALLS PRODUCED BY LIVE-TRAPPED SPECKLED GROUND SQUIRRELS *SPERMOPHILUS SVSLICUS* (RODENTIA, SCIURIDAE)

V.A. Matrosova, L.A. Volodin, E.V. Volodina

Summary

The description of vocal repertoire of adult speckled ground squirrels (*Spermophilus suslicus*), made on the base of calls recorded from live-trapped animals, is given. The calls were subdivided into seven call types, belonging to the two structural classes: tonal (whistle and chatter) and wideband (grunt, short rhythmic grunt, chirr, snarl, pant).

MATHEMATICAL MODEL OF THERMAL CONDITIONS IN LITTLE SOUSLIK (*SPERMOPHILUS PYGMAEUS* PALLAS, 1778) BURROWS

K.I. Belovezhets

Summary

Method of mammalian burrow thermal conditions calculation using thermal conductivity equation is discussed. Boundary conditions are mean month surface temperature and temperature of thermoneutral soil layer. Results of calculation for little souslik population from Volga region are presented. Temperature at the beginning and finish of hibernation and main parameters of thermal condition during year are modeled.

SOME ASPECTS OF BIODIVERSITY CONSERVATION OF GENUS *SPERMOPHILUS* AND CLOSELY-RELATED SPECIES

O.N. Shekarova

Summary

Genus *Spermophilus* consists of 38 species in Eurasia and North America. This group is often considered with African genus *Xerus* and North American *Cynomys* as a group named «ground squirrels». All of them inhabit open landscapes, they are rodents with daily activity, use complex borrows etc. Ground squirrels has very important biocenological and environment forming role. However they are known as pests, carriers of different diseases and hunting objects. For decades and even through the ages people have trapped. Killed and tried to eliminate them. Now many ground squirrels have become rare and should be protected. Three species of g. *Cynomys* and 10 species of g. *Spermophilus* are entered in the IUCN Red List of Threatened Species. In Russia 5 species of g. *Spermophilus* are in the state and/or regional Red Data Books. We should to revise our views on these unique groups and to help them.