Holarctic Marmots as a factor of Biodiversity.
**Rumiantsev V.Yu., Nikol'skii A.A. & Brandler O.V. eds.,
Abstracts of the 3d Conference on Marmots (Cheboksary, Russia,
25-30 August 1997), Moscow ABF 1997, 216p.**

SOCIAL DYNAMICS OF YELLOW-BELLIED MARMOTS: STRATEGIES FOR EVOLUTIONARY SUCCESS

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This paper explores whether social behavior of *Marmota flaviventris* is best understood as a strategy for regulating population density or as a strategy for maximizing reproductive success. Population regulation is envisioned as a density-dependent feedback loop in which increased population density results in decreased natality and increased dispersal and mortality. A decrease in population density results in decreased dispersal and mortality and increased natality.

There is little evidence for density-dependent demographic effects. Positive correlations are opposite to those predicted and suggest that when environmental conditions are favorable, both survival and reproduction are enhanced (Table 1). Neither amicable nor agonistic behavior are related to population density. Thus, social behavior does not appear to be directed to population regulation.

Female yellow-bellied marmots are organized into matrilines. The five major characteristics of matrilines are: (1) matrilines consist of mother:daughter or sister:sister associations, (2) matrilines undergo fission, (3) not all litters produce recruits, (4) not all females reproduce each year, and (5) most matrilines become extinct. These matrilineal characteristics suggest that social behavior involves an interplay of cooperation and competition.

Cooperation involves defense of resources against conspecifics, suppression of reproduction by a numerically dominant matriline of females of an adjacent matriline, and the detection of predators. Cooperation is limited. Adult males are territorial and polygynous and yearling males must emigrate.

The size of female groups is limited; higher population numbers are associated with more matrilines rather than an increase in the size of matrilines. Competition occurs within matrilines and is expressed as reproductive suppression of subordinate females and agonistic behavior directed to distantly-related or unrelated individuals.

The formation of matrilines can be thought of as a mechanism for increasing direct fitness. Resource sharing occurs among closely-related individuals. Members of a matriline engage in far more amicable than agonistic interactions. Also, social behavior among yellow-bellied marmots related by 0.5 is predominantly amicable whereas that of other degrees of relatedness is primarily agonistic. Only females of high relatedness live in the same matriline.

The following evidence indicates that female *M. flaviventris* attempt to maximize direct fitness: (1) matri lines are small, (2) matrilines divide when average relatedness decreases, (3) matrilines are mother:daughter associations, (4) cooperative behaviors are directed to close kin (5) reproductive suppression that enables a female to rear her offspring rather than helping to rear the offspring of others.

Table 1. Correlations among demographic traits of *M. flaviventris*.

Mean litter size vs mean number of residents	0.70
% juvenile survival vs % total survival	0.72
% total survival vs % maternity	0.72
% total survival vs mean litter size	-0,52