

Animals of large body sizes show lower heat losses and tend to settle regions of cold climates. In turn, animals living in warm areas tend to be smaller because this trait allows for better heat exchange. This rule, formulated by Carl Bergman in 1874 apply to many warm-blooded animal lineages, including humans. Thirty years later, Joe Allen extended Bergman's rule, noticing that heat exchange depends also on the size of appendages, which should decrease as the temperature decreases. It turns out that Allen's rule is widely recorded in many evolutionary lineages. In birds, the beak size increases with increasing temperature and decreases with decreasing temperature. That is why toucans live in rainforests, while grouses and ptarmigans settle mainly regions of cold climates. Of course, there are many exceptions in these dependencies, but the fact is that several dozen percents of the variance in morphological traits correspond to the climate variability.

Therefore, the question is whether the climate indirectly shapes the ecology of animals by influencing the size of the body and appendages (e.g. beaks)? The body size determines a position of organism in the ecosystem. Moose, which reside at far north, are also the heaviest deer and have a huge food demands. The species of long-tailed monkeys, which according to Allen's rule, occur mainly in warmest regions of the world, show also excellent skills in arboreal locomotion. Therefore, the climate might affect various aspects of life and the evolution of warm-blooded animals, which issue has not been tested to date.

This study is a comparative analysis of a global woodpecker community. 221 extant woodpecker species settle almost all wooded habitats of the world. Woodpeckers have also a huge impact on biodiversity because excavate tree cavities, spread fungi and kill larvae of wood-dwelling insects. However, only the largest woodpeckers can break very thick layer of bark of tree trunks and excavate deep hollows in wood. Small woodpeckers, in turn, feed on insects that occur on the bark surface or drill within a thin layer of bark surrounding tree branches. Woodpeckers with a long, slender beak are perfectly adapted to probing in the crevices already existing in trees, epiphytes and largely rotten wood. The long- and slender-billed woodpeckers only rarely excavate holes in wood. This project will answer the question whether Bergman's rule and Allen's rule are related to variation in the abilities of excavating and probing, as well as linkage with trunks and branches among woodpecker species. I suppose that the decreasing body size along with increasing temperature cause that the deep excavating and foraging on trunks disappear in species ecology, while probing and foraging on branches increase in importance. This would mean that due to thermoregulation constraints, woodpeckers play a different role in ecosystems of varying climates. This issue is very important in the context of climate change because global warming can decrease body size and increase the size of appendages in many animal species and this, in turn, may cause gradual changes in an organism's ecology.