Press Release

LEIBNIZ-INSTITUT FÜR ZOO- UND WILDTIERFORSCHUNG (IZW) . PF 601103 . 10252 BERLIN

Bats: A good immune system ensures success in reproduction

Anyone who is healthy has more enthusiasm for reproduction. The same is true even for bats. Male bats with a good immune system are more successful in being selected by females during mate choice and reproduction than their ailing counterparts, as recently highlighted by researchers of the Leibniz Institute for Zoo and Wildlife Research (IZW) in the online scientific journal PLoS ONE.

In male deer and peacocks we know: the more spikes in the antlers and the more eyes on the peacock's tail, the greater the success with females. The "good genes" hypothesis assumes that the attractiveness of males is associated with good genes passed on to offspring.

Now, for one specific version of the good genes hypothesis IZW-scientists found strong support. An IZW-team led by Christian Voigt and Simone Sommer demonstrated for lesser bulldog bats (*Noctilio albiventris*) that males with a high variability within the immune genes of the “major histocompatibility complex” (MHC), a gene region crucial for the immune defense against pathogens and parasites, reproduce better and hand on their good genes directly to the offspring. The likely reason for the higher reproductive success: Males with good MHC genes have to invest less energy into the defense against pathogens, particularly parasites.

Tropical bats have been recently identified as a major reservoir for many dangerous pathogens, such as SARS, Ebola or Nipa viruses. Yet, quite often tropical bats seem to remain unaffected by these viruses,

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even though humans and non-bat wildlife species may develop severe symptoms. The IZW researchers therefore asked whether there is anything special about the immune gene constitution of tropical bats, and whether bats have specific evolutionary adaptations to protect themselves against seemingly dangerous pathogens or parasites.

Genes that code for the immune defense are highly variable and therefore individuals can substantially vary in the effectiveness of their immune defense as this depends on which genes they carry. Using the example of the Lesser Bulldog Bat, the researchers showed that the expression of immune genes influenced the degree of parasitic infestation by ticks and bat flies. Males that suffered severely under parasites possessed unfavorable immune genes. They were also less often reproductively successful and therefore did not pass on their "bad genes" to the next generation.

Reproductively active and successful males were parasitized less often and also carried less often the "bad" immune genes. This clearly helped their progeny. "We were amazed to see that the next generation already carried more of the good immune genes than the previous one" says Julia Schad, the first author of the paper. The unfavorable immune genes were less common in the offspring than in the previous generation, helping the offspring to fight off parasites such as ticks and bat flies. The results show that bats may adapt quickly in that already the successor generations substantially benefits from the increased effectiveness of the immunogenetic defense against prevailing parasites and pathogens.

Immune genes also affect the odor profile of animals. Female bulldog bats might use olfactory cues to select males as mates which carry the beneficial immune gene constitution , speculates Simone Sommer. In an on-going project, the team investigates whether the odor profile of male bats is related to the variability of their immune genes.

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The article is free to read on the ***PLoS ONE*** website:

http://dx.plos.org/10.1371/journal.pone.0037101

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Background information:

The Leibniz Institute for Zoo and Wildlife Research (IZW) investigates the vitality and adaptability of wildlife populations in mammalian and avian species of outstanding ecological interest that face anthropogenic challenges. It studies the adaptive value of traits in the life cycle of wildlife, wildlife diseases and clarifies the biological basis and development of methods for the protection of threatened species. Such knowledge is a precondition for a scientifically based approach to conservation and for the development of concepts for the ecologically sustainable use of natural resources.

www.izw-berlin.de

The IZW is a member of the the Gottfried Wilhelm Leibniz Scientific Community, known as the Leibniz Association, the umbrella organisation for 87 institutions conducting research or providing scientific infrastructure. Some 7,100 scientists and scholars work in the humanities and social sciences, economics, spatial and life sciences as well as in mathematics, the natural and engineering sciences and in environmental research. Altogether, ca. 16,000 people are employed at Leibniz Institutes, which have an annual budget of 1,3 billion euro. Characteristic of the Leibniz Association is the enormous diversity of themes addressed by the institutes as well as its decentralised organisational structure: by far the majority of institutes are scientifically and organisationally independent. They conduct strategic, themebased research and constantly strive for academic excellence and social relevance. In this way, the Leibniz Association makes direct reference to its eponym, Gottfried Wilhelm Leibniz, who was the epitome of a great universal scholar. It is in this spirit that the nonuniversity research institutes and the service facilities adopt an interdisciplinary approach. They provide scientific services and the relevant infrastructure and cooperate with universities, institutions belonging to other science organisations and commercial enterprise.

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