

Why do woodpeckers resist head impact injury?

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Head injury is a common concern around the world, but researchers suggest that woodpeckers may have an answer for minimizing such devastating injuries. As reported in the Oct. 26 issue of the online journal *PLoS ONE*, an analysis of woodpecker anatomy and behavior revealed some features that could potentially be put to use in designing more effective helmets.

Woodpeckers are able to peck at a tree trunk at a high speed (6-7 meters per second), resulting in intense deceleration forces upon impact, without sustaining any [brain injury](#). To investigate the source of this protection, the researchers, led by Yubo Fan of Beihang University in Beijing and Ming Zhang of Hong Kong Polytechnic University, recorded the behavior using two synchronous high-speed [video cameras](#), and also took scans of the birds' heads to reveal details about the micro-structural parameters such as the bone volume, thickness, and density etc.

They then constructed 3D models that allowed for further testing and measurement of the forces involved. The results showed that specific details of the cranial bones and beak, such as the relative "spongy"-ness of the bone at different places in the skull and the unequal lengths of the upper and lower parts of the beak, were crucial for preventing impact injury.

The researchers conclude that the shock absorption system is not based on a single factor, but is a result of the combined effect of a number of different morphological features. This combination may be useful in

guiding design for new protective gear.

More information: Wang L, Cheung JT-M, Pu F, Li D, Zhang M, et al. (2011) Why Do Woodpeckers Resist Head Impact Injury: A Biomechanical Investigation. PLoS ONE 6(10):e26490. [doi:10.1371/journal.pone.0026490](https://doi.org/10.1371/journal.pone.0026490)

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