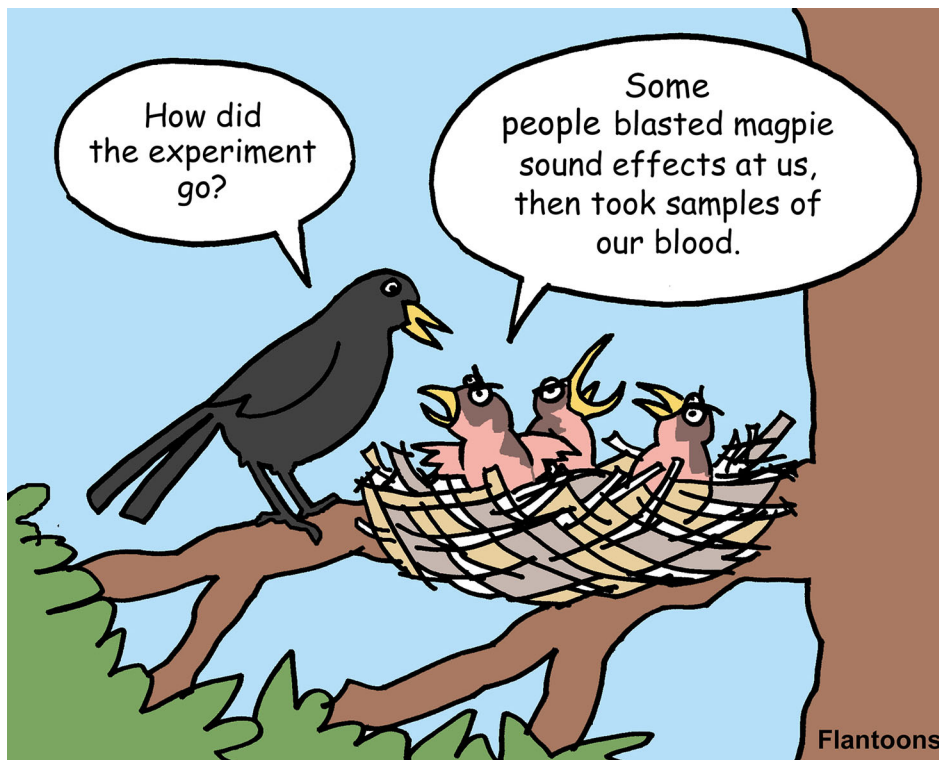


INSIDE JEB

Harassed nestlings boost immune system when danger is at hand



At the first sign of danger, your pulse begins to race, your mouth dries and you may even feel sick as you prepare to switch off all non-essential bodily functions in the fight to survive. In many cases, one of the first systems to go down in a bid to redirect energy is the immune system. However, Gianluca Roncalli, from the University of Granada, Spain, and an international team of collaborators wondered if there might be occasions when it may be beneficial to scale up some components of the immune system. Explaining that wounded older nestlings may be able to flee and survive an attack, Roncalli and his colleagues began investing how a series of alarm calls warning nestlings of an impending assault may affect their immune systems to find out whether they are suppressed or boosted when under attack.

The team played the slightly alarming calls of predatory species (including sparrow hawks and magpies), the

increasingly disturbing calls of petrified blackbird parents or the extremely alarming calls of harassed nestlings that thought they were under attack, to clutches of 10- to 11-day-old nestlings. After an hour, the team collected minute blood samples from the tiny animals before embarking on an extensive analysis to identify how 11 different components of the nestlings' immune systems responded to the escalating threats.

Even though the calls of the sparrow hawks and magpies could have alarmed the nestlings, the team found no evidence that the chicks boosted their immune system in response. However, as the chicks felt increasingly harassed in response to the distressed parents' cries and the shrieks of the terrified nestlings, they ramped up production of (1) a protein called ovotransferrin, which mops up free iron in the blood that could nourish bacterial infections; (2) antibodies, which participate in disposing of infections; and

(3) eosinophils, a type of white blood cell that consumes infectious bacteria. However, other components of the immune response did not vary as the chicks felt increasingly troubled, and the chicks that were already fighting parasitic infections were unable to boost production of a type of white blood cell known as lymphocytes. 'This study highlights a previously unknown link between predation risk and immunity', says the team, and they point out that it is important to investigate the impact of stress on many different components of the system, as responses can vary depending on the threat.

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Roncalli, G., Colombo, E., Soler, M., Tieleman, B. I., Versteegh, M. A., Ruiz-Raya, F., Gómez Samblas, M. and Ibáñez-Álamo, J. D. (2018). Nest predation risk modifies nestlings' immune function depending on the level of threat. *J. Exp. Biol.* **221**, doi:10.1242/jeb.170662.

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