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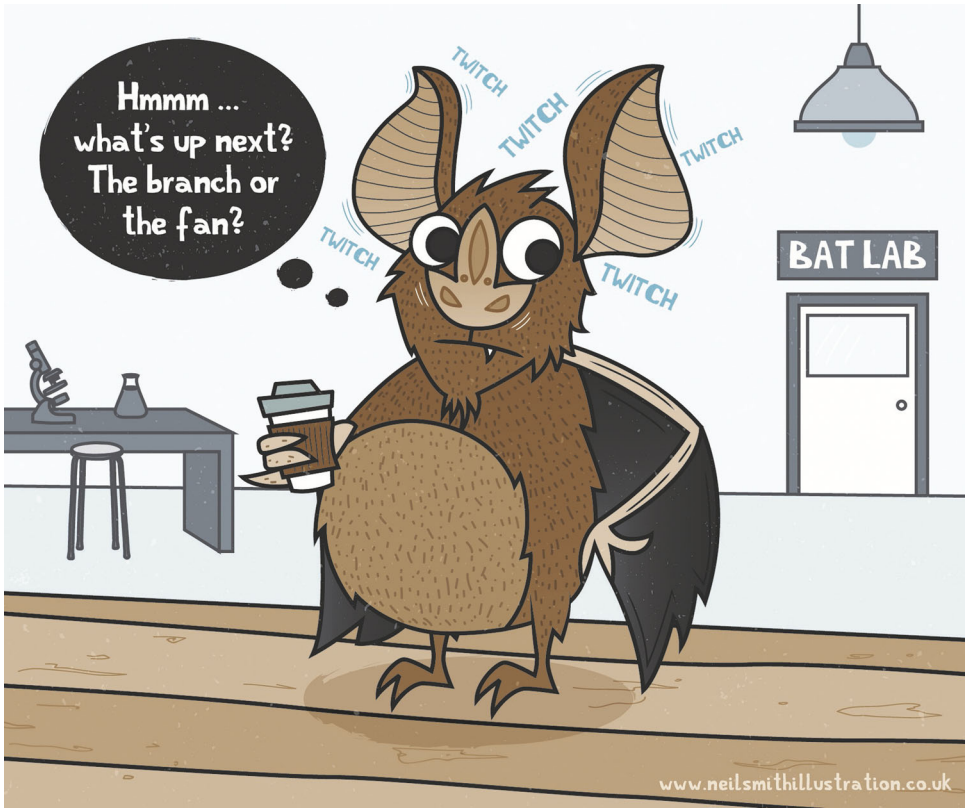
INSIDE JEB

Great roundleaf bats coordinate noseleaf and ear gyrations



Listening for the returning sound of your own echoing voice is always entertaining, but the echoes produced by cruising bats are more than a simple amusement. Guiding the nocturnal creatures past obstacles, the tiny mammals' high-pitched calls also allow them to pinpoint tasty insect morsels. Some species – such as leaf-nosed bats – even fine-tune their high-intensity sound guidance beams with ridges and flaps of flesh arranged around their nostrils, known as noseleaves. Rolf Müller, from Virginia Tech, USA, explains that nose-leaf bats pucker and wriggle the fleshy structures to accurately direct their echolocation clicks, in addition to cocking their ears to intercept the returning echoes. But he and colleagues at Virginia Tech and Shandong University–Virginia Tech International Laboratory, China, wondered whether the minute mammals precisely coordinate their twitching noses and swivelling ears to make the most of their sonar.

After painting tiny white dots on the nose leaves and ears of four great roundleaf bats (*Hipposideros pratti*), Müller and colleagues (Shuxin Zhang, Yanming Liu, Joanne Tang and Luoxia Ying) filmed the bats' ear and nose movements as they reacted to a leafy branch and spinning fan – to simulate vegetation and a flying insect, respectively. Analysing the ear and nose manoeuvres, the team saw the bats close their noseleaves as they produce echolocation clicks. In addition, the tiny animals swivelled or bent their ears when listening for returning echoes. And when the team compared the bats' ear and noseleaf motions, it was clear that the movements were well synchronised, with the bats folding the top portion of the ear down as they closed their fleshy noseleaf structures when clicking.

'The biosonar system of hipposiderid bats includes coordinated emission and reception dynamics', says Müller. However, the team points out that their high-speed movies do not prove that the bats actively use the echolocation information that they pick up when coordinating their ear and noseleaf movements. 'The next step… could be to look at possible functional advantages that the coordination of noseleaf and pinna [ear] motions could provide', says Müller, adding that Zhang is already working on a robot that mimics the bats at Virginia Tech to test the question.

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