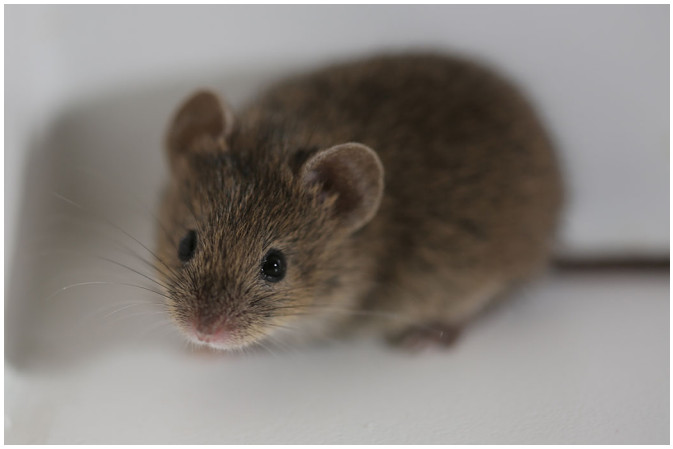
INSIDE JEB

Pygmy mice whistle for the audience



A pygmy mouse (*Baiomys taylori*). Photo credit: Bret Pasch.

It might just be squeaking to you and me, but to the ears of northern pygmy mice (*Baiomys taylori*), the shrill cries of their own can be a romantic serenade. Describing how the feisty little rodents rear up on their hindlegs to summon others, Bret Pasch from Northern Arizona University, USA, quotes from a research paper dating back to 1941, saying, 'The staccato-like song of pygmy mice is described as a "high-pitched, barely audible squeal" produced with the head "thrust forward and upward, stretching the throat"'. But there is an additional ultrasonic component of the rodent's ardent aria, stretching well beyond the limits of our hearing. Explaining that many small rodents use either their vocal chords to produce lower pitched calls or whistles to hit ear-splitting highs, Tobias Riede from Midwestern University, USA, and Pasch, teamed up to find out how the most diminutive rodent in North America produces its extraordinary vocal range.

'Pygmy mice are relatively rare', says Pasch, describing how the tiny animals live in the desert grasslands of Arizona and New Mexico, and recalling how he often encountered rattlesnakes when retrieving the mini rodents from traps. Once the mice were safe in the Northern Arizona University lab, it was simply a case of recording the obliging creatures' serenades. 'Mice routinely sing spontaneously or if they encounter the voices or odour of a potential mate', says Pasch. However, when the duo analysed the pygmy mouse's vocal range, they were surprised that the voices of the 10 g rodents were much deeper than they had expected, ranging from 16 to 40 kHz. 'Traditionally, our understanding is that vocal pitch is driven by the size of the vocal organ', says Riede, explaining that the voices of smaller animals are always squeakier than the voices of larger creatures. Yet, the highest tones in the pygmy mouse's range were only as high as those of lab rats, which are 40 times larger.

Then, the team played a trick on the squeaky pygmy mice, replacing the air in their cages with heliox – a mixture of oxygen and helium inhaled by deep-sea divers – which shifts the pitch of whistles without altering the pitch of calls produced by vibrating vocal chords, to distinguish the origins of different tones in the rodent's repertoire. And when the mice switched to breathing heliox, every tone in their vocal range became squeakier. The duo realised that instead of the voluble rodents using their vocal chords to make calls over the lower range of their repertoire, every syllable they articulated was a whistle. In addition, each syllable of the serenade became shorter, probably because the flow of the lighter gas through the animal's tiny voice box is different from that of air, making the puffs of gas they exhale to whistle less effective.

But how were the bijou animals able to produce such deep whistles when their frames are so tiny? Riede examined the structure of the tiny creature's voice box. Dissecting the minute vocal organs, which are the smallest that Riede has ever investigated, he discovered that pygmy mice have an unexpectedly large pouch that expands the size of the voice box, allowing the tiny creatures to produce the deeper tones (~16 kHz) by whistling, instead of using their short vocal chords like other rodents.

So, pygmy mice produce ultrasonic squeals by whistling, to evade the hearing of predators. Having discovered the secret of the maverick mammal's relatively deep voices, Pasch and Riede are eager to discover how the mouse's voice compares with those of other rodents to learn about the evolution of their communication.

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