Listen to the call: Scientists recreate the song of a 150-year-old insect that could help rediscover its species

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The katydid Prophalangopsis obscura has been lost since it was first collected, with new evidence suggesting cold areas of Northern India and Tibet may be the species' habitat. Credit: Charlie Woodrow, licensed under CC BY 4.0

A museum specimen has been heard for the first time in 150 years after scientists digitally recreated its song.

The body shape and song of Prophalangopsis obscura could help give researchers clues about where the insect might still be living after being lost for over a century.

An insect last seen in 1869 has sung again.

The grasshopper-like insect, called a katydid, is known from a single specimen held in the museum's collection. First described in 1869, Prophalangopsis obscura has never officially been seen since, although there are reports of a pair being captured in 2005.

But by recreating this species' long-lost call, researchers are hoping that it could be used to find the insect in the wild, if it still survives.

Ed Baker, a Bioacoustics Researcher at the museum, is a co-author on a new paper which recreated P. obscura's call. He says, "While we're only dealing with one specimen, it's one of just a handful of species which survives from a group of grasshopper and cricket relatives that likely dominated during the Jurassic."

"Comparing this species to modern relatives is interesting because it has large wings, which suggest it is capable of long flight, and sings a low-pitched song which travel over long distances. Along with its habit of living out in the open, these features should make it an ideal target for bats as it is easier to detect."

"Its survival since the Jurassic suggests that it currently lives in an environment without bats that feed on free-flying insects."

This can give some clues as to what regions researchers should be looking in on the hunt for this long-forgotten species. The findings of the study were published in *PLOS ONE*.

How do crickets, grasshoppers and their relatives make noise?

Katydids are a group of insects that form part of the Orthoptera, which contains all crickets, locusts and grasshoppers. These animals produce songs using stridulation, rubbing body parts such as the wings and legs together to make sound.

The Museum's specimen of P. obscura is the only confirmed member of the species in existence. Image . Credit: The Trustees of the Natural History Museum, London

Generally, males use these noises to attract females during the summer as part of the breeding season, though females of some species stridulate

in certain circumstances.

The last time the sound of P. obscura was clearly identified in the wild was over a century ago. The only known specimen of the insect was presented to the museum by British army officer Sir John Bennet Hearsay, and the species was later described scientifically by Francis Walker in 1869.

Despite repeated attempts, the species has never been seen again. This is due in part to its labeling, as is the specimen was labeled as having come from "Hindustan," which the researchers believe is generally synonymous with the area of India under colonial rule by Britain.

That was until 2005, when two female insects which appeared similar to the male P. obscura were collected from Tibet. It cannot be known for certain if these insects are part of the same species, or a closely related one, because of the differences in sex between the specimens.

If they were to be found living together, it could help confirm the identity of the Tibetan katydids.

To try and find out more about where the species could still be living, researchers created 3D images of each wing and determined their resonant frequency. With this information, the team could then recreate what the insect's song could have sounded like.

"Insect sounds can be linked to its evolutionary history," Ed says. "You can examine why species have certain song frequencies, which may be to avoid overlapping with each other, and how the structure of the songs reflects their environment and development."

In the case of P. obscura, its low-pitched song may be explained by its environment. Bats tend to avoid cold areas through migration and

hibernation, which would allow the katydid to fly freely without the risk of being eaten.

The cold climate of northern India and Tibet may therefore be suitable locations for this insect to live, potentially helping scientists to rediscover the species.

Listening in to the past

The recreated song allows P. obscura to join a host of insects whose songs have been recorded by the museum and form part of a sound archive. Ed helped to make many of these recordings more widely available while exploring the collections.

"While looking in cupboards at the museum, I found CDs and reel to reel cassettes containing insect recordings from hundreds of species," explains Ed. "We worked to make these recordings available by digitizing them, as previously it was time consuming and complex work to make use of them."

"Now they're being digitized we've got people researching them, which has led on to the acoustic monitoring pilot we're hoping to do as part of the Urban Nature Project. We're hoping to use recorders to listen to the insects present in the museum's gardens with minimal disturbance."

As well as monitoring biodiversity and informing conservation, studying insect acoustics can also help to find out how the past could have sounded.

"We'd like to recreate more sounds from rare or extinct species," Ed says. "This would allow us to build up a picture of the acoustic communities these species live in, and in the case of P. obscura, it could give us a better idea of what the Jurassic could have sounded like."

"Going back to species that are evolutionarily older also allows us to get closer to where sound evolved as a communication mechanism, which helps explain why these insects have evolved the way they did."

"We're a long way from really knowing, but we're starting to chip away at it."

More information: Charlie Woodrow et al, Reviving the sound of a 150-year-old insect: The bioacoustics of Prophalangopsis obscura (Ensifera: Hagloidea), *PLOS ONE* (2022). DOI: 10.1371/journal.pone.0270498

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