Female great tits avoid the best singers

Songbirds sing to attract a partner and fend off competitors, say textbooks on the function of birdsong. But it is not as simple as that in reality, shows a large-scale field study. It is actually the males who are attracted to the territories of the best singers.

TEXT NIENKE BEINTEMA

In a large-scale field study in which dozens of great tits were fitted with digital radio tags, Wageningen behavioural ecologists made some remarkable discoveries. Females stayed away from the territories of the males that sang the most elaborately. Rather, it was other males who were attracted to these territories. The authors published their results in *Behavioral Ecology* in May 2020.

'There has already been a lot of research into the function of birdsong, some of it done by us,' says Marc Naguib, professor of Behavioural Ecology at Wageningen University. 'Most of these studies involved birds in captivity, or were field experiments documenting birds' immediate responses to birdsong. However, if you want to understand the relation between birdsong and bird movements and social interactions, you need to look at whole populations in the wild. And you'll need to track the birds at times when there is no singing as well.'

The project is a collaboration between Naguib's group, specialized in birdsong and bird movements, and Professor Kees van Oers of the Netherlands Institute of Ecology (NIOO-KNAW), who studies the ecology and genetics of great tits. PhD student Nina Bircher and her colleagues placed sound recorders next to 38 nesting boxes in the woods near Wageningen, and captured 70 great tits that visited those nesting boxes. These birds were fitted with tiny lightweight backpacks containing radio transmitters that give off a signal every 5 seconds. A network of receivers sent these signals to a computer, so that the researchers could follow all the birds for weeks and compare the spatial information with recordings of birdsong.

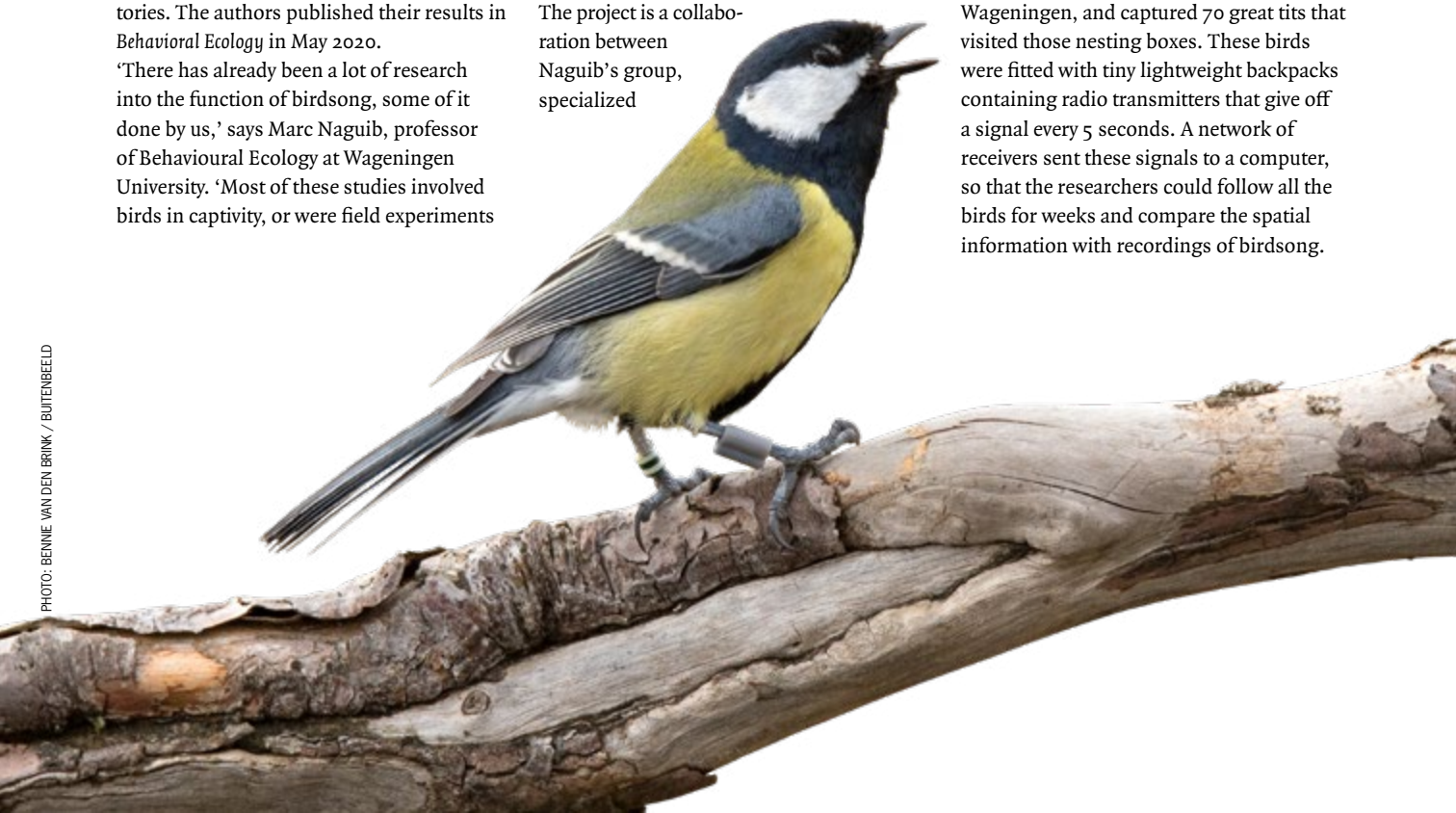

PHOTO: BENNIE VAN DEN BRINK / BUITENBEELD

MORE THAN 20 YEARS OF RESEARCH ON BIRDSONG

Research on birdsong goes back decades and it has attracted researchers from many disciplines, ranging from linguists and neurobiologists to behavioural and evolutionary ecologists. Professor Marc Naguib and his colleagues have been doing research on birdsong and bird movements for more than 20 years. Professor Kees van Oers from NIOO-KNAW has been studying great tit ecology and genetics for a similar length of time. The two institutes joined forces a few years ago. 'This cooperation and the use of novel technologies are now providing very different insights,' says Naguib. 'Into the role of song and social relations in bird communities, for instance.'

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This great tit has been fitted with a radio tag (visible near its tail).

'All in all, we collected about 35 million data points from the radio tags, which revealed around 30,000 excursions by great tits into their neighbours' territories,' says Naguib. 'An amazing number, when you think about it. This has never been done on this scale before.'

Although the males mainly sing between 5 and 7 am, Bircher found that the effects of the singing in that peak period continued throughout the day. 'All day long, males appeared to have a preference for the territories of the best singers,' notes Naguib. That is, for the territories of the males with the largest repertoires, who started earliest and sang for longest. 'Females, on the other hand, actually appeared to avoid those territories. Why? We don't know yet. But it does show that the function of birdsong is not as simple as we have always assumed.'

EXTRA-PAIR MATING

Naguib can imagine a few possible explanations for this. 'Perhaps the visiting males want to see how strong and healthy their neighbour is,' he says. 'Or check out the quality of the territory, the breeding stage of the female, or how alert the male is.' Earlier studies have suggested that excursions by male songbirds into neighbouring territories are sexually motivated – even when the males have already found a mate. This phenomenon is known as extra-pair mating. Over half of the offspring in a songbird's nest may be fathered by a neighbour. In the current Wageningen study, extra-pair chicks made up 18 percent of the chicks sampled, and 40 per cent of broods contained at least one extra-pair chick.

'Interestingly, we didn't find any correlation between extra-pair paternity and male or female excursions into others' territories,' says Naguib. 'Females made most trips into neighbouring territories after they'd already laid their eggs.' Combined with the birdsong data, this suggests that males do not sing in order to attract females to their territories, and that females do not seek out male neighbours with the aim of mating.

> 'The radio tags gave us 35 million data points'

COMPLEX SOCIAL NETWORKS

All in all, these findings challenge common beliefs about the function of birdsong, concludes the Wageningen professor. 'It's very exciting. When suggesting that birdsong attracts females, we always presumed that females actively choose their mates, but we had no information on what they do during the day, as they live so quietly, hidden away in the woods.'

Further studies are on Naguib's wish list, but to conduct them some new technological aids will have to be developed, such as backpack microphones combined with radio tags, to discover when and how much birds sing on and off their own territories. 'We also want to log how close birds get to each other,' says Naguib. 'The social networks within bird populations are fascinating and complex. There's so much we still don't know – let alone understand.' ■

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