

Tropical crow species is highly skilled tool user

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A captive Hawaiian crow (‘Alalā) using a stick tool to extract food from a wooden log. The ‘Alalā is an iconic Hawaiian bird species of great cultural significance. Credit: © Ken Bohn/San Diego Zoo Global

An international team of scientists and conservation experts has discovered that the critically-endangered Hawaiian crow, or 'Alalā, is a highly proficient tool user, according to a paper published today in the leading scientific journal *Nature*.

For decades, another species – the famed New Caledonian crow – had baffled researchers with its remarkable tool-using skills. These birds, which only live on the remote South Pacific island of New Caledonia, use tools to winkle insects and other prey from deadwood and vegetation, exhibiting an astonishing degree of dexterity. The big question was why they, but apparently no other members of the crow family ('corvids'), had evolved such technological prowess. But without other tool-using crow species for comparison, the New Caledonian crow remained a puzzling oddity.

There are over 40 species of crows and ravens in the world, and many of them – especially those living in remote tropical locations – remain poorly studied. "This raises the intriguing possibility that there are some undiscovered tool users out there," explains the study's lead scientist, Dr Christian Rutz, from the University of St Andrews, UK.

"We had previously noticed that New Caledonian crows have unusually straight bills, and wondered whether this may be an adaptation for holding tools, similar to humans' opposable thumb," Rutz elaborates. By searching for this tell-tale sign amongst some of the lesser-known corvid species, he quickly homed in on a particularly promising candidate for further investigation – the 'Alalā.



A captive Hawaiian crow (‘Alalā) using a stick tool to extract food from a wooden log. ‘Alalā have relatively straight bills and highly mobile eyes – morphological features that may aid their handling of bill-held tools. Credit: © Ken Bohn/San Diego Zoo Global

Following a population crash in the late 20th century, the 'Alalā is now sadly extinct in the wild. In a last-ditch effort to preserve the species, the remaining wild birds were brought into captivity, to launch a breeding programme. "Later this year, in collaboration with our partners, we will be releasing captive-reared 'Alalā on Hawai'i Island, to re-establish a wild population," says Bryce Masuda, co-leader of the study and Conservation Program Manager of San Diego Zoo Global's Hawai'i

Endangered Bird Conservation Program.

Masuda was excited when the St Andrews scientists got in touch with his team: "We had occasionally seen birds using stick tools at our two breeding facilities, but hadn't thought much of it." The St Andrews and San Diego teams quickly agreed to conduct a collaborative project, to examine the tool-using skills of 'Alalā under controlled conditions.

"We tested 104 of the 109 'Alalā alive at the time, and found that the vast majority of them spontaneously used tools," says Masuda. Current evidence strongly suggests that tool use is part of the species' natural behavioural repertoire, rather than being a quirk that arose in captivity, according to Rutz: "Using tools comes naturally to 'Alalā. These birds had no specific training prior to our study, yet most of them were incredibly skilled at handling stick tools, and even swiftly extracted bait from demanding tasks. In many regards, the 'Alalā is very similar to the New Caledonian crow, which my team has been studying for over 10 years."

Experts have applauded the 'tour de force' of controlled experiments. "Most studies in our field investigate just a handful of subjects, so it is truly mindboggling to see an entire species tested," comments Professor Thomas Bugnyar, a corvid expert at the University of Vienna, Austria, who was not involved in the study.

Dr Sabine Tebbich, an expert on animal tool use, also based at the University of Vienna, is similarly impressed by the scope of the study: "It was important that the authors took on the extra challenge of investigating how the behaviour develops in juvenile 'Alalā. Their results show that the species has predispositions that allow chicks to 'discover' the behaviour independently, without ever observing tool-proficient adults." Interestingly, study co-author Dr Richard James, Director of the Centre for Networks and Collective Behaviour at the University of Bath,

UK, could demonstrate through extensive computer simulations that it is unlikely that a single bird once had a smart idea, which subsequently spread across the captive population through social learning.

The discovery of a second tool-using crow species finally provides leverage for addressing long-standing questions about the evolution of animal tool behaviour. "As crow species go, the 'Alalā and the New Caledonian crow are only very distantly related. With their last common ancestor living around 11 million years ago, it seems safe to assume that their tool-using skills arose independently," explains Rutz. "It is striking that both species evolved on remote tropical islands in the Pacific Ocean that lack woodpeckers and ferocious bird predators – perfect conditions, apparently, for smart crows to become accomplished tool users!"

According to Douglas Myers, President and Chief Executive Officer of San Diego Zoo Global, the study marks an important milestone for the long-running 'Alalā recovery programme: "This is a wonderful example of how scientific research can contribute to conservation efforts. The discovery that 'Alalā naturally use tools is of great significance, especially at this critical stage of our recovery efforts, as it provides completely unexpected insights into the species' ecological needs. After more than 20 years of hard work, we are finally ready to release birds. I am confident we will manage to bring this iconic Hawaiian bird species back from the brink of extinction."

In 1964, world-renowned primatologist, Dr Jane Goodall DBE, founder of the Jane Goodall Institute and UN Messenger of Peace, provided the first detailed report of tool use in wild chimpanzees. Her landmark paper, published in the journal *Nature*, categorically refuted the long-held idea that only humans are gifted tool users. Two years later, along with Hugo van Lawick, she described in *Nature* the first recorded observation of the use of rock tools by Egyptian vultures to open ostrich eggs.

Goodall is excited about the 'Alalā study: "I love learning about the discovery of tool use behaviours in other species of animals. This latest finding is especially wonderful. With two tool-using corvids, the well known Galapagos finches, and one vulture in the list of tool using birds, we can now make comparisons with avian and primate tool using. Each of these discoveries shows how much there is still to learn about animal behaviour, and it makes me re-think about the evolution of tool use in our own earliest ancestors."

But Goodall cautions: "Let this discovery serve to emphasise the importance to conserving these and other animal [species](#) so that we can continue to learn ever more about the range of their behaviour before they vanish for ever in the 6th great wave of extinction. We owe it to future generations."

More information: Christian Rutz et al. Discovery of species-wide tool use in the Hawaiian crow, *Nature* (2016). [DOI: 10.1038/nature19103](#)

Provided by University of St Andrews

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