Captive rooks master tool use

Subverting some popular thoughts on tool use and physical intelligence, a group of captive rooks has shown a remarkable capacity to modify and use various tools. Rooks (*Corvus frugilegus*) are not known to use tools in the wild, although they are closely related to New Caledonian crows (*Corvus moneduloides*), which are habitual tool users.

Habitual tool use was once thought to be exclusive to humans, then later identified in other primates and some bird species: chimpanzees, orangutans, New Caledonian crows and woodpecker finches. The use of tools is thought to have evolved in crows as a result of cognitive specialization, ecological pressure or morphology. But the new data on rooks suggests that tool use in this group of birds may have developed from an advanced physical intelligence rather than as an adaptive specialization.

Christopher Bird (University of Cambridge, UK) and Nathan Emery (Queen Mary University of London, UK) reported the rooks' spontaneous tool use (*Proc. Natl. Acad. Sci. USA* published online 28 May 2009; doi:10.1073/pnas.0901008106). They designed a testing apparatus in which a food reward was placed on an inaccessible platform inside a clear box. The rooks could retrieve the reward only if they knocked the platform down by dropping an appropriately sized and weighted object through a clear tube mounted on top of the box.

Andrew Howe

Rooks were first presented with this apparatus along with a stone positioned so that it could be nudged into the tube. After successfully completing five 'nudging' trials, the birds were given five more trials in which they had to retrieve a stone from near the base of the tube before dropping into the tube. Each bird was removed from the aviary after succeeding at this 'transfer' task five times to allow another bird to attempt the task. One bird needed no 'nudging' trials; after watching another rook complete the transfer task four times, she spontaneously picked up the stone and dropped it down the tube.

The first four rooks to complete five transfer trials were subjected to further testing, which showed that they could select tools (stones, sticks or wire hooks) of the appropriate size and shape and orient them so that they could fit in the tube. Furthermore, they were able to use one tool in order to reach a second tool that they needed to retrieve the reward. They also modified tools when necessary to make them functional.

Monica Harrington

IS SILVER THE NEXT ANTICLOTTING DRUG?

Various treatments are available for the millions of people worldwide who are likely to get dangerous blood clots. Though effective, these drugs have serious risks, such as uncontrollable internal bleeding. As a result, scientists are currently researching therapies that can precisely control the activity of blood cells called platelets and keep platelets in an inactive state. When hyperactive, platelets can stick together and contribute to the formation of potentially dangerous blood clots.

In a recent study, Debabrata Dash of Banaras Hindu University (Varanasi, India) and colleagues reported that silver nanoparticles reduce the ability of the platelets to aggregate together in mouse blood (*ACS Nano* published online 4 May 2009; doi:10.1021/nn900277t). This means that silver nanoparticles, each of which is about 1/50,000th the diameter of a human hair, might help prevent blood clot formation in humans.

Dash and his team used 50 male mice from two different strains to test the nanoparticles. The researchers slowly injected either a buffer solution or nanosilver into the tail vein of each mouse. After 10 minutes, the researchers punctured the carotid arteries of the mice and collected blood. They then added a nucleotide called adenosine disphosphate to the blood samples to stimulate platelet activity and measured platelet aggregation. The silver nanoparticles significantly prevented platelets from sticking together in a concentration-dependent manner.

Dash and his team are currently studying whether the nanosilver, which has antibacterial properties, can also block the formation of fibrin, another key component of blood clots. Additionally, the researchers plan to test if other nanomaterials can block platelet activity (they have already shown that gold does not inhibit platelet aggregation). Unlike the platelet inhibitors currently available, researchers can build nanoparticles in specific shapes, sizes and architectures based on desired biological properties. For example, nanoparticles can be designed to easily pass through cell membranes, a common challenge in drug development.

But before nanosilver could be used in humans, researchers would have to ensure it is safe. To test whether the silver injections inhibited normal blood coagulation, Dash and his team anesthetized the mice post-injection and cut 3 mm off from the tail of each mouse. The nanosilver injections did not significantly increase bleeding time. Following the experiment, the mice survived normally, and *in vitro*, the nanosilver did not destroy the platelets. Despite these promising results, Dash emphasized the need for further cytotoxicity studies. **Kirsten Dorans**