Wisdom is power: Female budgerigars prefer males with stronger cognitive abilities

Supported by the National Natural Foundation of China, the Research Group of Avian Ecology of Institute of Zoology, Chinese Academy of Sciences led by Prof. Sun YueHua (孙悦华), found that "Problem-solving males becoming more attractive to female budgerigars", which was online published in *Science* on January 11, 2019, with the first author of Dr. Chen JiaNi and corresponding author of Prof. Sun YueHua. This is a story of male budgerigars gaining favor by learning feeding techniques.

In the process of sexual selection, females hope to find smart and able partners, so cognitive ability might be an important criterion for mate choice, and the evolution related to cognitive ability might be not only the result of natural selection, but also the result of sexual selection. As early as in 1871, Charles Robert Darwin (1809—1882), the founder of evolution, proposed such hypothesis in his famous book *The Descent of Man, and Selection in Relation to Sex*; however, it was difficult to obtain conclusive evidence from other animals to explain the problem.

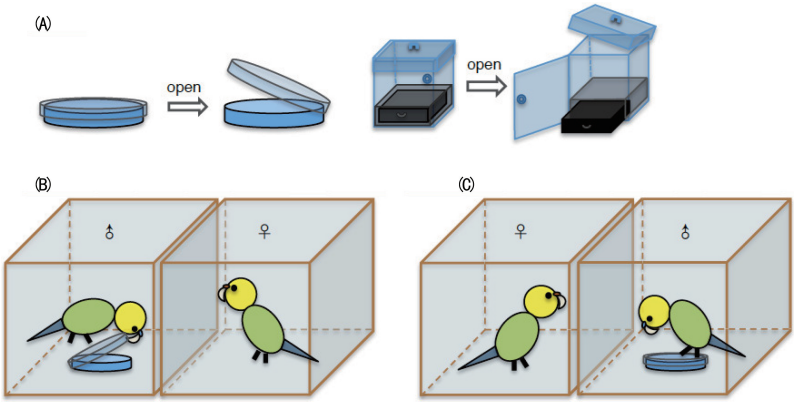

Figure (A) Problem-solving devices: the petri dish and the three-step box. (B) The female observing a trained male opening the petri dish. (C) A focal female observing an untrained male trying unsuccessfully to open the dish.

In order to explore this problem, Prof. Sun's team used the budgerigars in this study, with four-year of hard work in a poor lab, for the first time confirmed that the cognitive ability of birds can also be used as a criterion for sexual selection. It provides important enlightenment for people to better understand the evolution of cognition.

In the study, female budgerigars were given a chance to choose one of the two males she preferred. During a 4-day period, females spent more time with her preferred males. Next, the researchers helped the unfavoured males to learn two feeding techniques, opening the petri dishes and a small box with three steps (Picture A). After about one week of study, the unfavoured males returned to the females. The researchers asked the female to see how the returning males could easily open the boxes for food (Picture B), and how the males they had previously preferred was bewildered in front of the boxes (Picture C).

The budgerigars in the lab.

After several days of observation, the researchers gave the female a chance to select again. In the second time of choice, the females changed significantly, and they were willing to spend more time with former unfavoured males. Did the power of "wisdom" really help the males to regain the favor of the females? To verify this, the researchers also conducted two sets of comparative experiments. In the first group, the females were allowed to view the males that were not preferred feeding with opened boxes, while the preferred males were given only the empty boxes. As a result, the females did not change their original choice, or insisted on favoring the original ones. This suggests that food itself was not the reason for the change. In the second group, females were asked to select two females. The experiment was consistent with the initial procedure, with only two selected males being replaced with females. The results showed that the female did not change her preference for "best friend" after observing her feeding skills, referring that the selection was related to sex.

The study showed that direct observation of cognitive skills could affect animal mate selection, which supported the hypothesis started from Darwin that mate choice may affect the evolution of animal cognitive characteristics.