

### **Neural basis underlying female mating preference in medaka fish**

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The medaka fish have a 24h reproductive cycle and exhibit mating behaviors every morning, which comprise several sequential steps including male courtship display and cooperative copulation. Here, we demonstrated that female mating preference in medaka is mediated by visual recognition of a mating partner. Female medaka could memorize a male that the female saw prior to mating. During mating, female medaka could recognize the male and tended to reject courtship display exhibited by a strange male. Furthermore some weak mutations in genes, which are responsible for sex-determination, caused abnormal female mating preference. The female mutant could not reject a strange male. Morphological and electrophysiological analyses revealed that the mutant had defect in neural development of a subset of neurons, which might be required for the regulation of sexual motivation. Finally we found that two males competed against each other for the nearest position to a female, irrespective of the reproduction period. Thus the males might compete so that the female could memorize them prior to mating, which could increase rate of male mating success. It is consistent with Charles Darwin's hypothesis that female mating preference could be a powerful selective force in the evolution of male secondary sexual characters.