

Review of: "Role of Habenula in Social and Reproductive Behaviors in Fish: Comparison With Mammals"

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This review provides an overview of the evolutionally conserved circuit mechanisms of social behaviors, especially focusing on the habenular circuits. There are two major points for the authors to consider. First, it is important to describe the potential circuit mechanisms of social behaviors in habenular and hypothalamic pathways. As the authors described, both the habenula and hypothalamus are structurally and functionally well conserved between fish and mammals. While they separately overviewed the functions of the habenula and hypothalamus in social behaviors, the connections among those regions are missing. It will be helpful for the authors to provide a circuit overview for social behaviors, especially aggression circuit, due to the various functional manipulation works targeting the habenula and hypothalamus in zebrafish and mice, even with some speculations and acknowledgement of potential missing links. Second, it is worth to discuss the potential functional differences between the habenula and hypothalamus in social behaviors. While the hypothalamus is thought to simply drive behavioral outputs in social contexts, single unit recording (Falkner et al., 2014, 2016) showed the VMHvl activity encodes multidimensional information including sensory, motor, and motivation-related signals in male aggressive behaviors. Interestingly, the habenula also modulate the motivational component of aggressive behavior (Golden et al., 2016). What is the main role of the habenula in social behaviors? Why do the animals need this brain region in social contexts for survival?