Brain loci involved in object discrimination learning in mudskipper

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Spatial learning requires precise object recognition in the environment. Hippocampus and perirhinal cortex are essential for the task in mammals. In fish, however, the brain loci involved are largely unknown. To explore the loci in fish, we used an amphibious fish mudskipper which prefers brackish water (BW) to fresh water (FW). Four different objects were arranged as visual cues outside a circular arena the floor of which was covered with a wet sponge. In each quadrant of the floor, a dish was placed. One of the dishes was filled with BW and the others with FW. A mudskipper was allowed to learn the location for 45 min in a session. Following four sessions, a test was carried out in the same arena with empty dishes. Nine out of fifteen mudskippers visited the quadrant where the BW-filled dish had been placed more frequently, suggesting that they can make the object recognition task. After the experiments, the expression of c-Fos in the brain was examined to see the region which is activated during the learning. c-Fos immunoreactive neurons were observed in the lateral part of the dorsal telencephalon, suggesting that the area is important for the object discrimination learning in fish.