

Movement detectors projecting to the fish tectum

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Visually guided behavior in lower vertebrates is based on the detection of “key stimuli” by means of specialized neurons in the visual system. The detection begins at the retinal level, the output units of which, i.e. the retinal ganglion cells, send highly processed information to the primary visual centers of the brain, settled in the midbrain formation tectum opticum (TO). Axons of different “detectors” terminate at different tectal levels, forming three retino-recipient layers. In the superficial layer of TO, axons of direction-selective units (DSUs) are terminated. In the second, medial tectal layer projections of oriented selective units (OSUs), spot detectors and color-opponent units are terminated. Retinal output units, characterized by sustained responses to dark or light stimuli, project to the third, the deepest TO layer. DSUs projecting to the tectum were shown to comprise six physiological types according to their selectivity to sign of stimulus contrast (ON and OFF units) and their preferred directions: three directions separated by a 120°. Unlike DSUs the OSUs of fish retino-tectal system were shown to divide into two types – only by their preferred orientation (vertical or horizontal). Both DSUs and OSUs are characterized by small responsive receptive fields (4–5°) and the finest spatial resolution.