The use of locomotor behaviour in zebrafish to detect effects of neuroactive substances

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Banisteriopsis caapi and Psychotria viridis are plant species used since ancient times by south American indigenous people to prepare a concoction, Ayahuasca, consumed in shamanic ceremonials due to their psychedelic properties. Recently, in Brazil several religious groups have based their ceremonials on the consumption of this beverage, calling the attention of the scientific community to the possible toxicological risks but also to the potential therapeutic applications of Ayahuasca. Locomotor behavior has been increasingly used in zebrafish (Danio rerio) as an endpoint of neuronal disruption, able to detect effects of neuro-active compounds such as Ayahuasca at relatively lower concentrations when compared to the conventional toxicity parameters used. In collaboration with Brazilian partners, behavioral methodologies using the video tracking system Zebrabox have been developed to unravel the effects and modes of action of Ayahuasca. In a first phase an hypoactive (decreased locomotor activity) effect was observed in zebrafish larvae in accordance to the serotonergic action of the active compounds of the mixture (Andrade et al., 2018). Further refinements in the methodologies are being tested to assess anxiety-like behaviors such as thigmotaxis and erratic swimming.

Behavioral methodologies are also being used by the authors in the assessment of effects of environmental pollutants due to their high sensitivity and ecological relevance given that disturbances on the swimming capacity and social behavior of organisms can be directly linked to the impairment of important physiological functions such as predator-prey interaction, feeding and reproduction. Behavioral disturbances have already been described for several types of pesticides and pharmaceuticals (Sanches et al., 2018; Santos et al., 2018) providing data for a better characterization of the modes of actions of these compounds and ultimately contributing to a more accurate assessment of environmental risk.

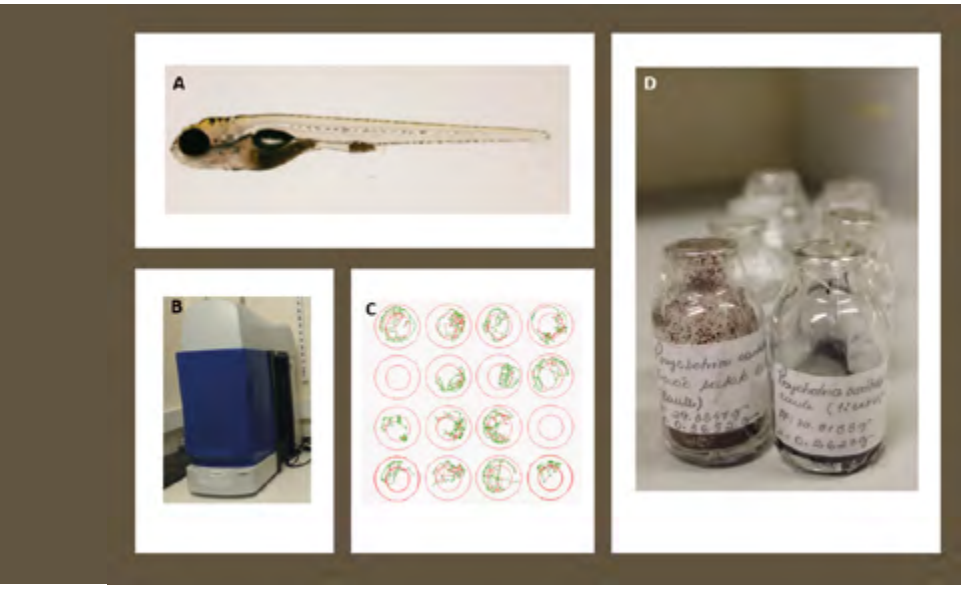

FIGURE 1
A – zebrafish (Danio rerio) larvae;
B – Video tracking equipment Zebrabox;
C – Schematic output of the behavioral analysis of zebrafish larvae;
D – Extracts of plants of the genus Psychotria used in the preparation of the psychoactive beverage Ayahuasca.