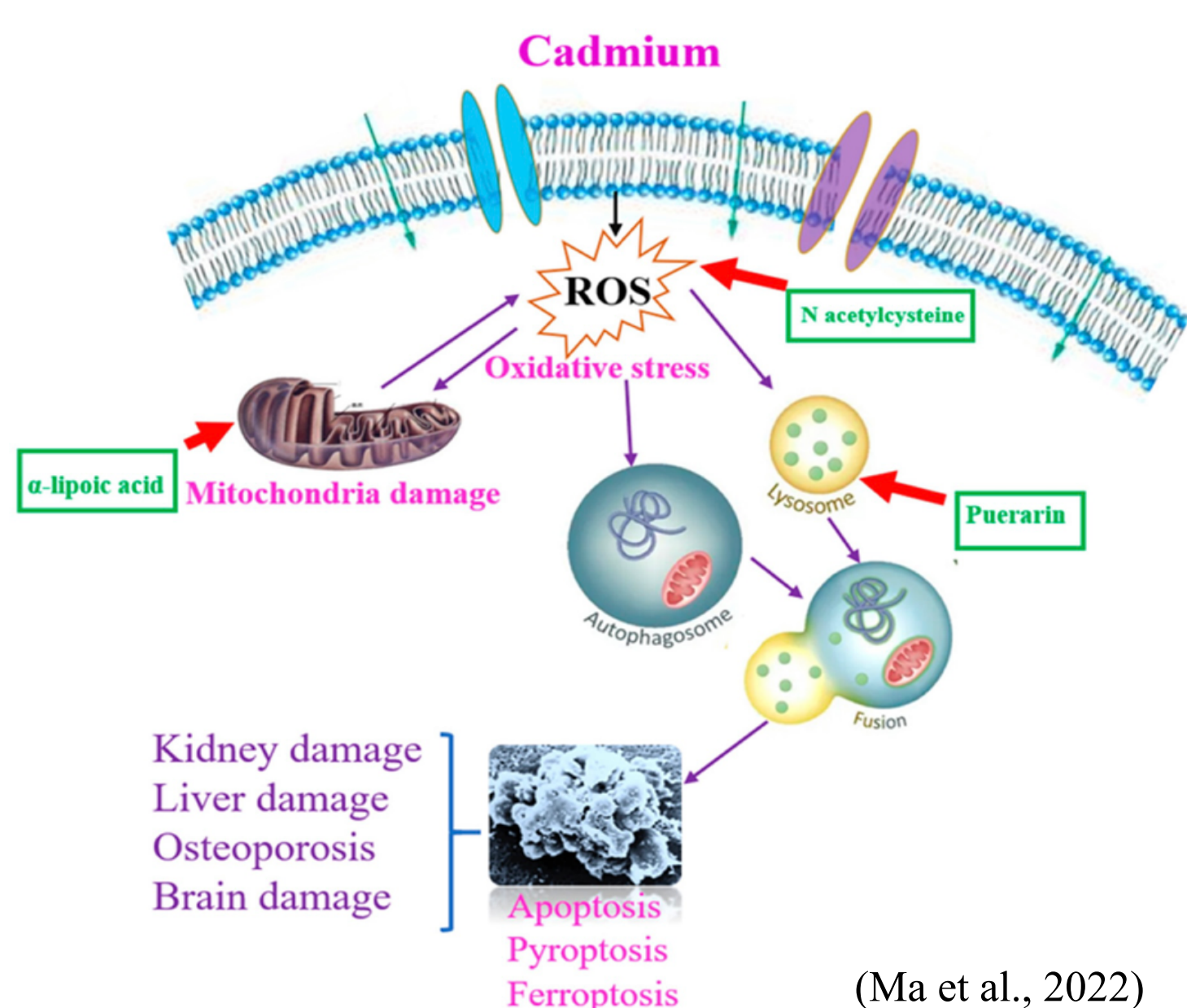


Introduction

- Cadmium is a neurotoxic chemical widely distributed within the environment, persevering for long periods.
- Exposure to cadmium can have toxic effects, altering the balance between the production of reactive oxygen species (ROS) and the ability of cells to detoxify and repair the damage (Wu et al., 2011).
- Planarians such as *Girardia dorocephala* are freshwater flatworms widely used in pharmacological and toxicological studies due to their biological and physiological properties, ability to regenerate tissues and sensitivity to various toxicants and drugs.



- Planaria regeneration is a complex biological process that involves the activation of stem cells, called neoblasts, to regenerate lost tissues and organs.
- Research has suggested that ROS play a critical role in this process. However, if an overproduction occurs, oxidative stress can inhibit regeneration (Wu et al., 2012).

- Increasing CdCl₂ concentration exposure to 20μM will inhibit cephalic regeneration, however, introduction of antioxidants like NAC and MitoQ will mitigate the overproduction of ROS, thereby allowing the flatworms to resume their normal head-to-tail polarity of tissue homeostasis.

Results

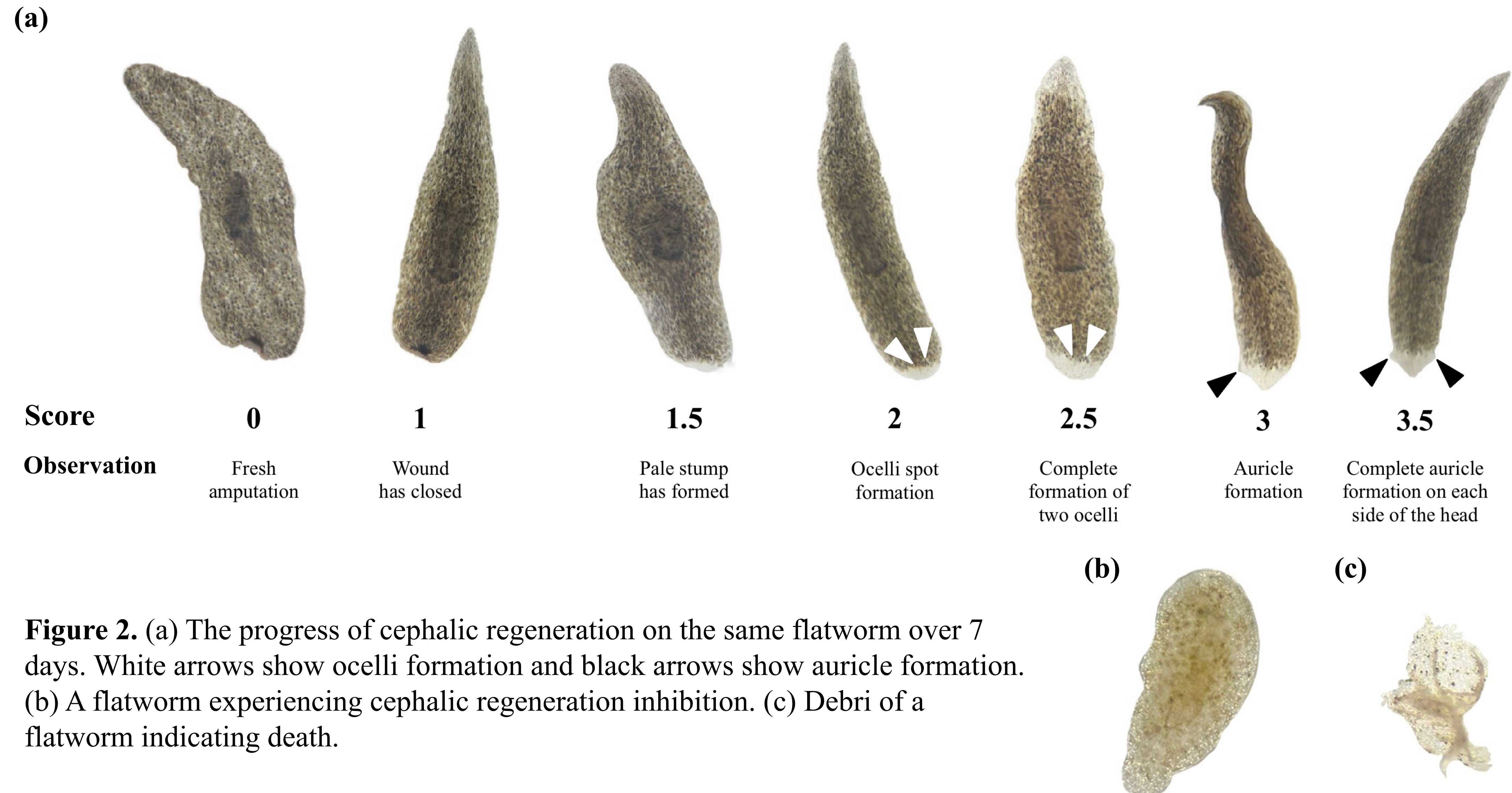


Figure 2. (a) The progress of cephalic regeneration on the same flatworm over 7 days. White arrows show ocelli formation and black arrows show auricle formation. (b) A flatworm experiencing cephalic regeneration inhibition. (c) Debris of a flatworm indicating death.

Methods

Using a scalpel, worms will be amputated halfway between the anterior apex and anterior end of the pharynx (Chan & Marchant, 2011). The tails will be placed in the wells of a 6 well plate containing IOS water. The progression of head regeneration will be monitored everyday over a two-week period. A scoring sheet with various criteria on regeneration ability will be used to track changes of each fragment following a photo.

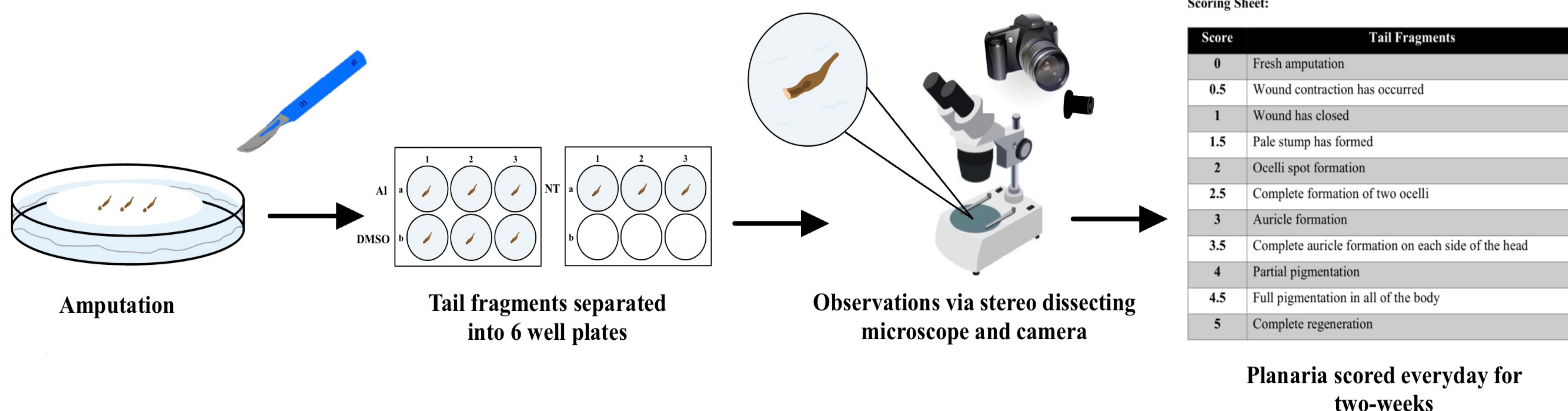


Figure 1. Trunk fragment assay used to amputate each flatworm.

Discussion

- The results indicate that larger pigmented flatworms had a complete regeneration within two-weeks compared to the smaller flatworms.
- This assay will be used in future work, exposing planarians to varying concentrations of cadmium chloride and antioxidants such as NAC, GSH, alpha-tocopherol, MitoQ, and Sulforaphane.
- Antioxidants can neutralize the accumulation of ROS and stabilize oxidative stress by donating electrons to reduce cellular damage and promote proliferation and differentiation of cells involved at certain targets.
- The study of planarian regeneration holds great promise for developing regenerative medicine approaches for humans.

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