

The Relationship between *Odorrana hosii* Skin Histology and Habitat Water Quality in Different Locations of Sarawak

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ABSTRACT

Recent study has revealed that the poison gland in *Odorrana hosii* skin act as defensive mechanism and can help in wound healing management of a frog species. Since skin is the first organ that come into contact with the surrounding, the habitat of the species should be related to the properties of the frogs' skin. Thus, we investigated the *O. hosii* skin histology in relation to water quality parameters at different localities in Sarawak. The goal of study is to uncover a link between *O. hosii* habitat and its skin histology at four different locations: Ranchan Recreational Park (RRP), Matang Wildlife Centre (MWC), Borneo Highlands (BH), and Santubong National Park (SNP). The water quality criteria for each area were pH, turbidity, temperature, and dissolved oxygen (DO). The results showed that DO concentration of the habitat is the most essential element in affecting the health of the amphibian skin, as well as the forested areas (MWC, SNP, and BH) that protect the skin from direct sunlight. The DO of the habitat differed significantly for the mean number of mucous and seromucous glands at 0.01 ($\alpha = 0.05$) and 0.03 ($\alpha = 0.05$), respectively. The number of mucous glands and DO were found to have a strong positive correlation at 0.701. However, the number of seromucous glands showed a strong negative correlation with DO at -0.623. *O. hosii* skin from the four different localities was found to have cutaneous gland variations that reflect the environment in the number of glands. Mucous glands play an important role in indicating the localities' water quality, which reflects adaptation of *O. hosii* to its habitat. This highlights the importance of preserving natural habitats for this sensitive species.

Keynote: Bornean frog, histology, *Odorrana hosii*, skin, water quality

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INTRODUCTION

Anurans, such as *Odorrana hosii*, have integument instead of scales, enabling them to live in a wide range of terrestrial settings. However, their "bare" skin makes them prone to illness and injury. To defend themselves from harmful germs, anurans employ integument glands to respond to their environment (Seki *et al.*, 1995; Zainudin *et al.*, 2018) which are classified as mucosal or serous depending on their secretion type (Barrionuevo, 2017). Patterned or evenly positioned glandular glands are found on the dorsal skin, and the concentration of these glands may affect the rate of wound epithelialisation (Rasit *et al.*, 2018). *Odorrana hosii* has a green dorsum from snout to anus with brown sides and black crossbars (Inger *et al.*, 2005; Inger *et al.*, 2017). The International

Union for Conservation of Nature (IUCN) Red List of Threatened Species considers *O. hosii* to be of least concern (IUCN). Water-contaminated woodlands, rivers, and rocky streams are typical habitats for *O. hosii* (Inger *et al.*, 2005; Inger *et al.*, 2017). It prefers to rest on rocks, branches, or plants near water bodies for its foraging activities (Inger *et al.*, 2017; Zainudin *et al.*, 2017). A study by Shahabuddin *et al.* (2018) demonstrated that antimicrobial skin peptides (AMP) extracted from the skin of *O. hosii* are bacteriostatic and bactericidal. *O. hosii* peptides may be exploited to create new antibiotics. AMP is a source of possible antibiotics that kill microorganisms and prevent sepsis (Raghavan *et al.*, 2010; Shahabuddin *et al.*, 2018).

Water quality is critical for biological life, and the utility of its characteristics are often