NUS National University of Singapore | Department of Biological Sciences Faculty of Science

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SEMINAR

Tues, 13 Jan 2026 | 2 pm | S3-05-02 Conference Room 1

Hosted by Associate Prof Christoph Winkler

Breathing Beyond Water: Development of the Labyrinth Organ in Paradise Fish

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Paradise fish (*Macropodus opercularis*) inhabits waters of east Asia with low oxygen levels. As an adaptation to this environment this species evolved specialized labyrinth organ (LO) that enables the aerial breathing and thus better access to the oxygen. This results not only in better survival, but it might be also the reason for more complex social and reproductive behavior such as bubble nest building. However, the developmental origins of this unique organ remain unknown to date. By implementation of deep anatomical analysis and high-throughput sequencing, we show that LO seems to be derived from the epibranchial domain of the first gill bearing arch during early metamorphosis. We also show, based on cross-species single-cell RNA sequencing analysis, that LO shares molecular programs with gills but also exhibits distinct transcriptional profiles reminiscent to other tissues with air-breathing properties across species. These findings show LO as a striking example of organ-level development via anatomic repurposing. Hence, paradise fish can be used as a powerful model for studying organ evolution.