Evolutionary developmental biology of bitterling fish

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PROPOSITIONS

Accompanying the PhD thesis

"Evolutionary developmental biology of bitterling fish"

1. The wing-like yolk sac extensions of the rosy bitterling are evolutionary novelties (Chapter 1).
2. Character-based staging series are the foundation of comparative developmental research (Chapter 2).
3. The brain is a water tube filled with cerebrospinal fluid (Chapter 3).
4. Because of developmental heterochrony, the phylogenetic stage does not exist, even between two closely related species such as the zebrafish and the rosy bitterling (Chapter 4).
5. The expression of molecular markers maps out the process of the brain regionalization.
6. *In vivo* time-lapse observation of the developing embryo and microCT scanning to construct 3D models of morphogenesis are the best methods to systematically study the embryonic development of a species.
7. Knowing what you are seeing is the first as well as the final step of the anatomical way of seeing.
8. The dynamic and complex process of embryonic development provides opportunities for evolving endless forms.
9. Cunningham's idea (1891), that the protoplasm during development is nourished and grows at the expense of the yolk, is simply stating the obvious.
10. The science of cosmology shows us that we are all stardust.
11. Human beings are born with the ability to create models.
12. Extending working hours in the lab at the expense of lunchtime can lead to unpredictable experimental mishandling and errors.

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