

Morphogenesis: eternal truth or ephemeral beauty

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The construction and destruction of the sand mandala (A) in Tibetan Buddhism symbolizes both the beauty of form and the fleeting nature of its existence. D'Arcy Thompson, in the second edition of his seminal 1917 book "On Growth and Form", used the analogy of a milk splash (B) to illustrate such contrasting perfection and impermanence in biology. According to Thompson, morphology and morphogenesis, while transitory and complex, can be analyzed through mathematical understanding and technological innovations. Such insight has championed the field of developmental biology in the century since "On Growth and Form" was first published. Today, we now wield a sophisticated array of analytical tools and paradigms, enabling descriptive, visual and quantitative studies with a precision that Thompson and his peers would not have dreamed of.

Have we gotten closer to unraveling the universal logic of morphogenesis, like the metaphysical truth in Buddhism or mathematical beauty in Thompson's book? It is probably still too early

to tell. We are more certain, however, that to understand such logic, if a unifying rule set even exists, will require us to combine multiple tools and model systems, and more importantly to embrace a multi-faceted and organismal approach. In this special issue, we present a collection of such reviews and research articles to give *Developmental Dynamics* readers an updated view of animal morphogenesis. We hope to offer a platform for debate, to address the growing sentiment in modern morphogenetic synthesis that biological forms must be studied and dissected in the context of their higher-order function. The sand mandala, with its millions of colorful and carefully-arranged grains, conveys a religious truth that is beyond its genesis. But biology is not religion, and animal morphogenesis may merely be a manifestation of functional contingency, beholden only to the logic of chance and natural selection. Between us and our favorite model systems, there may be no eternal truth but ephemeral beauty. We should be prepared for either outcome.

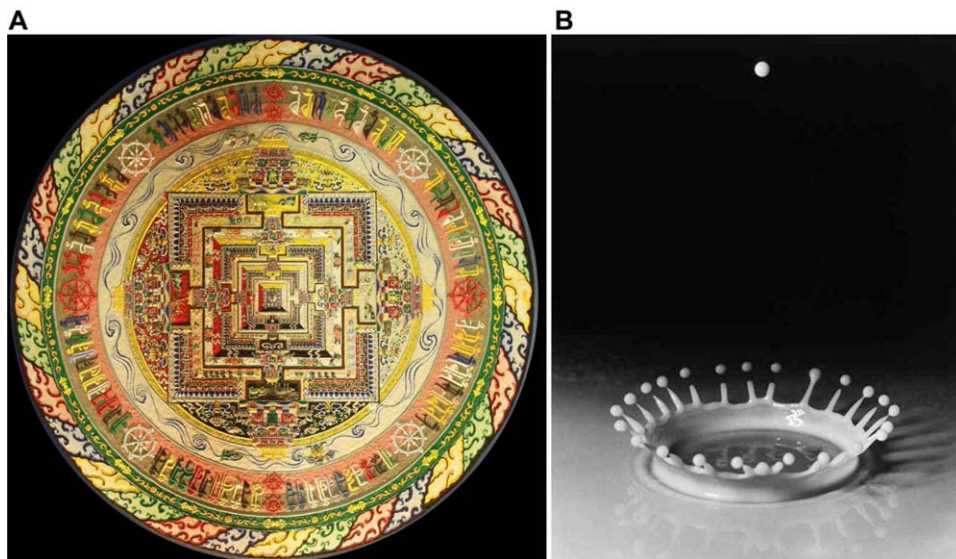


Fig. 1. A: Kalachakra sand mandala by Losang Samten, 2012; B: Milk drop by Harold Edgerton, 1936. Reproduced with permission

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