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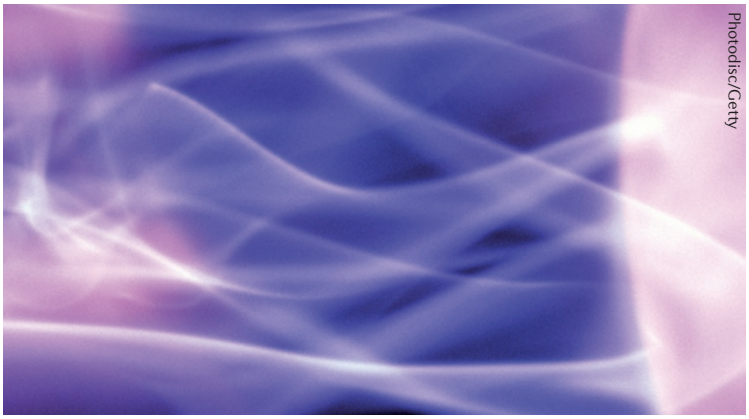
DEVELOPMENT

A new phase for scaling



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During embryonic development, structures must be scaled to maintain correct proportions while changes in overall size are altered. A recent study has provided conceptual insight into how such scaling is achieved.

A good example of scaling during development is vertebrate segment formation: if experimental manipulations are made to reduce overall embryo size, the number of segments formed remains constant, but their size is reduced. This segmentation programme is known to involve oscillations in signalling pathways such as Notch, WNT and FGF in segment precursor cells termed presomitic mesoderm (PSM) cells. Any role for these oscillations in scaling was previously unknown.

Lauschke, Tsiairis *et al.* developed a novel *ex vivo* system to study properties of signalling oscillations. Using two-dimensional culturing of fragments from the posterior part of the mouse embryo, the authors were able to recapitulate oscillatory mesoderm patterning and to segment scaling in a monolayer of PSM cells.

The authors applied real-time imaging of a Notch signalling reporter to quantify the distribution of phases of oscillating Notch signalling across monolayer PSM cells — this is known as the phase gradient. They found that scaling was achieved by fixing the amplitude of the phase gradient: that is, the difference in the phase between the most posterior and most anterior monolayer positions was constant. Thus, the slope of the phase gradient was able to predict segment size. This is distinct from previously proposed mechanisms of scaling that rely on measuring total field size.

The authors were able to confirm that WNT and FGF gradients were also present in the culture, and whether they have a role in scaling will be an interesting area for future study.

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ORIGINAL RESEARCH PAPER Lauschke, V. M. Scaling of embryonic patterning based on phase-gradient encoding. *Nature* 19 Dec 2012 (doi:10.10.1038/nature11804)