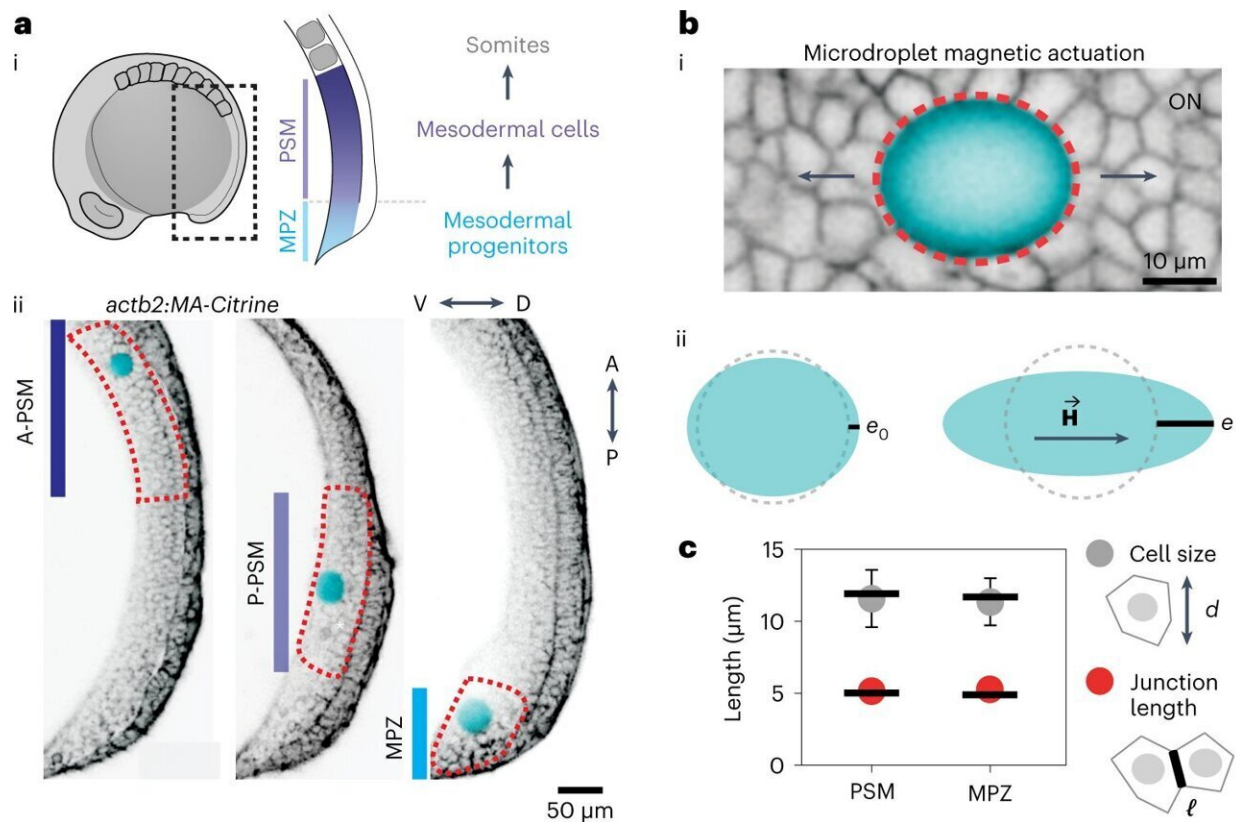


# A glimpse of cells' sense of touch as they build tissues during embryogenesis

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Junctional length establishes the onset of tissue plasticity. a, Sketch showing a lateral view of a ten-somite stage embryo highlighting the posterior region of the body (dotted black rectangle) where mesodermal progenitors progressively differentiate as they transit from the MPZ to the PSM (i). Confocal sections along the sagittal plane of posterior extending tissues in membrane-labeled Tg(actb2:MA-Citrine) embryos (inverted) containing ferrofluid droplets (cyan) in different regions along the AP axis, namely the A-PSM, the posterior PSM (P-PSM) and the MPZ (ii). V, ventral; D, dorsal; A, anterior; P, posterior. The red

dashed contours highlight each region (A-PSM, P-PSM and MPZ). b, Confocal section of droplet (cyan) during actuation (magnetic field ON; membrane label, inverted; i). Red dashed line indicates droplet contour and arrows indicate the direction of forces applied by the droplet. Sketches defining the induced droplet elongation  $e$  along the direction of the applied magnetic field  $H$  and the droplet pre-elongation before actuation,  $e_0$  (ii). Dashed lines indicate the unelongated droplet. c, Mean (dots) and median (lines) values of cell size (diameter,  $d$ ; gray) and junctional length ( $\ell$ ; red) in the MPZ and PSM, reanalyzed from the literature. The inset at the right shows illustrates the parameters. Error bars, s.e.m. d, Examples of the time evolution of droplet deformation (normalized droplet extension,  $e/d^-$ , where  $d^-$  is the average cell size (diameter); induced strain) during actuation cycles (OFF–ON–OFF) for different values of the applied magnetic field, leading to varying  $e_M$  values. Both  $e_0$  and  $e_R$  are defined in the inset. e,f, Residual droplet elongation normalized by average cell size,  $(e_R - e_0)/d^-$  (e) or by average junctional length,  $(e_R - e_0)/\ell^-$  (f), for varying values of the applied maximal droplet elongation  $(e_M - e_0)$  normalized by average cell size (e) or junctional length (f) in the posterior paraxial mesoderm. Vertical red lines in e and f indicate the onset of plastic, irreversible deformation. Median and interquartile range are shown. P values were obtained from one-sample two-tailed t-tests. NS, not significant; \*\*P = 0.0025, \*\*\*\*P

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