population into sub-groups with different fates (Fig. 1a).

Durdu and colleagues took a fresh look at FGFs in their study of the development of the zebrafish lateral line — a sensory organ that lies along either side of all fishes, allowing them to sense vibrations in the water. In this developmental process, about 100 cells (called the lateral-line primordium) start near the head-end of the embryo and, over a two-day period, collectively migrate along the entire length of the developing body under the skin towards the tail[6]. During this journey, subgroups of cells cluster together within the primordium. These are called rosettes, because the cells adopt a radial arrangement in which each cell has an extension towards an apparent central common connection point (Fig. 1b). As the primordium migrates along the body, it drops off these rosettes one by one at regular intervals. Each rosette goes on to develop into a discrete mechanosensory organ.

The authors knew that manipulating FGFs can affect the spacing of dropped organs[7], but not whether this was through a general effect on primordium velocity. They therefore quantified time-lapse movies of developing zebrafish embryos in which Fgf3 levels had either been upregulated by overexpression or repressed by drug inhibition. In both cases, they saw that the migratory velocity of the primordium was unaltered, which means that Fgf3 was affecting the drop-off frequency instead.

Having established a clear link between FGF signalling and rosette drop-off, Durdu *et al.* next explored where the signalling occurs. Fluorescence imaging of Fgf3 attached to green fluorescent protein suggested that it was localized into small, concentrated volumes at the apical centre of each rosette. Correlative microscopy (which combines fluorescence microscopy with electron microscopy) then revealed a striking cell-membrane arrangement: at the apical centre of each rosette was a microlumen formed by the cell membranes of all the cells of that rosette (Fig. 1c).

The researchers again used time-lapse imaging to show that the moment when Fgf3 starts to accumulate in a microlumen correlates with the time when that rosette begins to slow down in preparation for dropping out of the primordium. This pointed towards the intriguing possibility that FGF signalling is used on a very local basis to control the behaviour of just the 20 or so cells of one rosette. Durdu and co-workers went on to use all the advantages of the zebrafish system — ease of genetic modification and micromanipulation, and its suitability for high-quality time-lapse imaging — to test the idea.

They modified a single rosette so that one of its cells had increased Fgf3 levels (using either single-cell transplantation or a stochastic inducible genetic system), and observed that just this rosette was forced to drop out early from the primordium. On average, neither the rosettes before nor after it were prematurely dropped. To perform the opposite experiment, they punctured microlumina with a laser, thereby letting Fgf3 leak out. Satisfyingly, they observed the expected delay in rosette drop-off, again without affecting the previous or subsequent rosettes.

Several questions are not addressed in the study: for example, how the microlumina form in the first place; how levels of FGF expression are controlled; and, perhaps most directly relevant to the authors' findings, how FGF signalling accelerates rosette drop-off. But the strength of Durdu and colleagues' experiments is that single rosettes were manipulated *in vivo*, thus providing evidence that the microlumen can indeed restrict FGF signalling to the cells of just one rosette.

In this system, FGFs do not adopt one of their conventional upstream roles, in which a coherent swathe of different signalling levels splits a responding population of cells. Instead, the microlumen forces FGFs to take on a more downstream role: coordinating the response to a morphogenetic event, and ensuring that all cells of the rosette respond while none of the neighbours do. It is an intriguing case of multicellular architecture feeding back to control molecular signalling directly.

Because FGF concentrations accumulate only when the microlumen is topologically complete, the factors also provide a temporal checkpoint to the process. It thus unites a group of cells both temporally and spatially in a coordinated all-or-nothing response. This is an interesting, and slightly surprising, way to use a highly diffusible signalling molecule, but may turn out to be a widely employed mechanism in nature. ■

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ASTROPHYSICS

Monster star found hiding in plain sight

Massive stars are rare, but they are sources of some of the most energetic phenomena seen in the Universe today. A high-mass candidate has now been found in a star-forming region that has been observed for more than 50 years.

DONALD F. FIGER

The most massive stars in the Universe captivate the imagination of laymen and experts alike. They represent an extreme form of star and produce outsized effects on their environment. Although stars with masses greater than 20 times the Sun's mass comprise only about 1% of all stars in a young star cluster, their ionizing radiation, stellar winds and ejecta from supernovae dominate some of the most observable phenomena in the Galaxy. Massive stars are among the few bodies that can be seen in other galaxies, and they are probably linked to the most massive explosions in the Universe. Finally, they are thought to have seeded the early Universe with heavy elements (those heavier than helium), which are now seen in even the oldest stars. Writing in *Astronomy & Astrophysics*, Wu *et al.*[1] identify the next heavyweight contender — a star with the decidedly unsexy name of W49nr1.

Wu and colleagues claim a mass for this star that would place it among the most massive known, but a sceptic might say "extraordinary claims require extraordinary evidence". Indeed, astronomers have, on further inspection, often thrown such assertions on the rubbish heap of history.

This kind of claim relies on models that translate the amount of observed starlight into an estimate of the mass of the star. Generally, the more massive the star, the brighter it is. As is almost always the case, Wu *et al.* observe light from the star over only a fairly narrow range of wavelengths, representing much less than 1% of the total emitted light. It would be useless to convert that relatively small portion of the total light into a mass estimate were it