THIS WEEK

EDITORIALS

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Power of one

New tools that allow biologists to explore the characteristics of individual cells are bringing collaborators from other disciplines into the field of single-cell analysis.

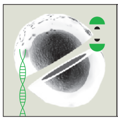
The street-light effect is often used as a criticism in science, because it introduces an observation bias. The concept is based on the old joke about the night-time drunk who looks for his house keys under the light, even though he lost them somewhere else, because that's the only place he can examine.

But if nothing is lost and a street light shines scientific light on a new place, then it would be perverse not to peer underneath. Because that's one of the attractive features of science: discovery and the joy of the unknown. So it is difficult to criticize those scientists who rush to exploit new tools that allow the analysis of single cells. As we describe in a special series of articles this week, advances in the past few years at this technical and computational frontier offer an unprecedented view of what goes on at the cellular level, with implications for everything from genomics and ageing to the treatment of disease (see page 19).

Some of this science is descriptive and discovery-led. It's nearly 180 years since the cell was first proposed as the most basic individual unit of all life on Earth. Yet most of what we know about how cells work at the molecular and biochemical level comes from studying them not as individuals but as groups. This is problematic: researchers know that tissues, and even apparently homogeneous collections of identical cells, can carry significant differences. These ups and downs are missed when cells are mashed together and assessed. It's a classic downside of the tyranny of the average. But that was where the light was, so that's where scientists looked. And now the unexplored territory inside the cell is ripe for adventure.

As the street light of science starts to focus on individual cells and individual characteristics, so it also becomes a spotlight. For the study of the single cell is not just the territory of discovery — it also enables problem-based research. Take cancer. We know that tumours comprise a multitude of vastly different cells, not all of them explicitly cancerous (think of blood and lymph vessels and immune cells). To unravel the ways in which they interact and either fight or maintain tumours has been a major challenge. One way of addressing that is to get more data on all the players, and to extract information from cancer cells about how they developed and what weaknesses they may harbour. And that takes single-cell analysis.

The illumination of this biology of individual cells also shines a light on some interesting cultural differences. To explore this new frontier demands new skills, and so mathematicians and computer scientists are teaming up with cell biologists, developmental biologists and the various systems specialists: immunologists, neuroscientists and others. As they do so, they are bringing with them the more collaborative and open approach seen in their native disciplines. As a result, and unusually for a dynamic and fast-moving field in the life sciences, single-cell biology has seen data, tools and results being shared more readily before publication.



SINGLE-CELL BIOLOGY
A *Nature* special issue
go.nature.com/singlecell

This is hugely positive, and is perhaps a benefit of the otherwise-maligned street-light approach to science. The better the search tools, and the more that scientists work together to improve them, the greater the chance of everyone striking lucky. When the goals and rewards of science are less clear, then perhaps the benefits of cooperation outweigh the risks.

It will be instructive to see whether this interdisciplinary ethos continues, and whether it spreads to other subfields as the impact of big data forces biologists to rethink their approaches and broaden the expertise in their groups and laboratories. One indication might be the open submission and sharing — or not — of the computer code used to crunch the data presented in journal papers. As this publication pointed out in 2014, the delivery of such code from scientists lags behind that of other forms of data (*Nature* **514,** 536; 2014). The lack of standardization makes it difficult to mandate open sharing of code, but scientists shouldn't use this as an excuse to keep it to themselves.

"Single-cell biology has seen data, tools and results being shared more readily."

One sign of how far the field of single-cell analysis has come is that it has its own ambitious — some say too ambitious — mega-project. The Human Cell Atlas aims to identify the number of cell types and cell states that comprise a person. That ambition, of course, raises a similar question about the street-light effect. People are as individual as cells, so what if a map of cells in one human says little about the cells' representation in other humans? At some point we're going to have to spread the light around. The effect could be blinding. Or it could be dazzling. ■

Flash machine

In the 50 years since their discovery, pulsars have proved their scientific value.

As scientists know only too well, nature often delivers a scruffier, more inconvenient version of reality than the one they wished for. But there are rare occasions when the Universe presents a real treat. One arrived 50 years ago, with the discovery of pulsars. In the decades since, these extremely precise 'ticking' stars have allowed astronomers to test gravity and explore deep space. They may yet form the Global Positioning System of the future.

Jocelyn Bell Burnell, the first person to detect a pulsar, said it emerged as a "bit of scruff" in the scribbled output from a