

If this, why not that?

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The plot of Frank Herbert's 1965 novel *Dune* and its prequels, sequels, and adaptations centers on controlling the supply of a potent mind- and body-altering drug called melange or, more familiarly, spice.

Spice is harvested from the desert sands that cover most of the planet Arrakis, the drug's only source. Just how the corresponding molecules are made is unclear, but the process as described in the books involves organisms, fermentation, and possibly photochemistry.

In 1959, six years before *Dune* was first published, Paul Janssen discovered fentanyl, a synthetic opioid that's 100 times as potent as morphine and 50 times as potent as heroin. Heroin itself was first synthesized in 1874. Given how valuable spice is in the world of *Dune* and given that the world features faster-than-light travel and antigravity suspensors, it's remarkable—and I would say implausible—that spice has to be harvested from sand rather than manufactured in a lab.

Science fiction often posits technologies not just that are beyond current capabilities but that violate the laws of nature. Nuclear fusion might one day power spacecraft, but it won't propel spaceships to faster-than-light speeds, as in *Star Trek*. Readers, even physicist readers, suspend their disbelief because implausibly advanced technologies make it possible for authors to explore rich, morally fraught scenarios that a strictly realistic setting could not accommodate.

But what should we make of Herbert's decision to do the opposite—that is, to posit a future technology, spice harvesting, that's *less* advanced than a current technology, drug synthesis? Of course, Herbert devised a natural and scarce source of spice to serve his plot. But I can't help thinking that he was unaware of modern pharmaceutical science.

Military technology is another area that science fiction sometimes underestimates, especially in movies and on TV. George Lucas based the climatic assault on the Death Star in *Star Wars: Episode IV—A New Hope* on a similar scene in the 1964 British movie *633 Squadron*, which is set during World War II.¹ In the advanced world of the Galactic Empire, the appearance of 1940s military technologies (joystick-controlled guns) and tactics (low-altitude bombing) is incongruous.

Remote sensing is another current technology that science fiction underestimates. Instruments aboard orbiting spacecraft are determining the topography, gravity distribution, and at-



mospheric composition of Earth, Mars, and other planets. But in the movie *Prometheus*, which is set in the years 2089–93, astronauts rely on their own eyes to find things of interest on the surface of their destination, the moon LV-223. And they wait until they're in the planet's lower atmosphere to assess whether it's safe for them to breathe.

All this might seem like the quibbling of a science pedant. But it's troubling that authors and directors of science fiction either are ignorant of science or can assume their audiences are ignorant of science. Among the most egregious recent examples is the following: In *Star Wars: Episode VIII—The Last Jedi*, the StarFortress *Hammer* released its payload of bombs that somehow fell toward their target, the Siege Dreadnought *Fulminatrix*, in the microgravity of outer space.

Does it matter that the creators and consumers of science fiction and, by extension, the rest of the general public might be unaware of just how far some sciences have advanced? Yes. It's better for society that the ethical, environmental, and economic implications of new technologies be discussed well before the technologies are ready for deployment. Fortunately, that seems to be the case with CRISPR-Cas9 gene-editing tools. But the combination of two other technologies—facial recognition and cloud-based computation—has received less attention. And we are still grappling with what to do with nuclear waste 70 years after the first nuclear power stations came on line.

Some science fiction writers explore the consequences of just-out-of-reach technologies. William Gibson's Blue Ant trilogy (2003–10) and Charlie Brooker's anthology TV series *Black Mirror* (2011–19) are notable recent examples. But what we really need is a high-quality, unfrivolous popular outlet for science fact.

REFERENCE

1. This YouTube video pairs footage from *633 Squadron* with the soundtrack from *Star Wars: Episode IV—A New Hope*: www.youtube.com/watch?v=4OZq-tlJTrU. 