

# REALITY TV

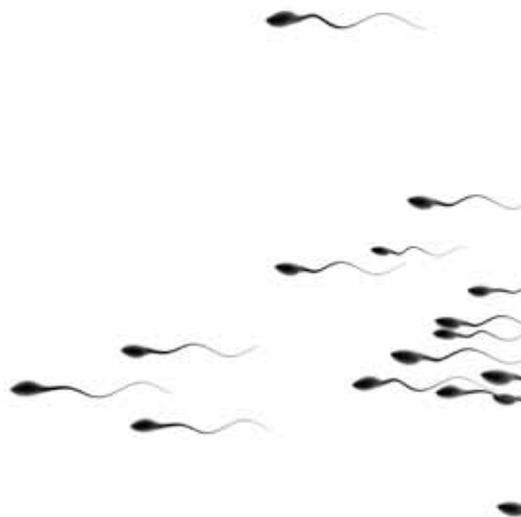
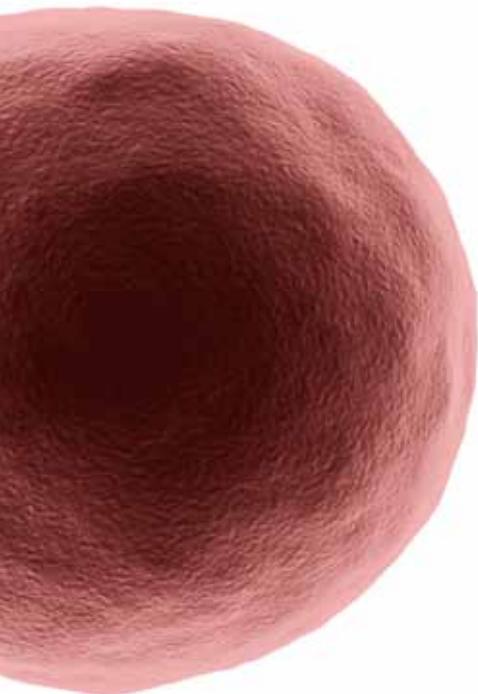
**Professor Brian J Ford** asks why television broadcasters spend huge sums on computer-generated scientific simulations when the real thing is so much better

**P**olar bears give birth to their young in only two places on earth – the Arctic and in zoos. Confuse the two on television and you are in trouble: when the BBC's *Frozen Planet* series included a sequence of newborn bear cubs captured by cameras concealed in a cage, in a programme ostensibly filmed in the Arctic, there was an outcry.

These programmes, broadcast in December last year, bore the hallmarks of integrity and excellence, and the unacknowledged switch of location was bound to raise hackles. I concede a certain sympathy for the producers; it may simply be that the script implied more than it should. The art of television lies in the skill of the director and creative licence is sometimes necessary to tell a scientific story visually.

Many conventions are accepted and we understand how they work. Sequences of fish filmed in the wild may be intercut with details of behaviour that can be observed only in a studio aquarium. Capturing reality with a camera involves such conventions all the time. Fruit may be sprayed with glycerine to add





an extra lustre, so it gleams as the public might expect (but as it never does in life). Cloud formations are sped up to make them interesting; collapsing buildings are slowed down to command our attention.

Some are lesser known. Beautifully lit images of human embryos can give the impression that they have been observed alive in the womb, when they are actually aborted specimens in a tank of preservative on a slab in the laboratory. Glass marbles may have been added to pond-water so that elusive organisms, swimming under the lens, remain visible rather than sinking in the liquid and being lost to sight.

We know these visual sleights of hand happen, and for most of the time we accept it. Microscopic life, by contrast, is subject to far more brutal and misleading portrayals. Living cells are rarely seen on television and programmes can go to great lengths to avoid mentioning that they exist. A gardening programme discusses diseases of plants, though you never see the organisms that cause them. Reports on pollution control claim that reed-beds can purify water, without mentioning the microorganisms that actually process the waste. This is like reporting an election without mentioning the candidates.

### Crude cartoons

As a result, the public are unfamiliar with microscopic life and their

**Misleading and unrealistic images of biological processes are commonplace on our TV screens.**

understanding of medicine, health, human biology and cell science is restricted. The media regularly screen programmes on nebulae and the elusive Higgs boson, neither of which directly influence our lives, yet the captivating universe that the microscope alone can disclose remains unseen.

Programmes that frequently feature the inner workings of a cell often use computer generated imagery (CGI), which has given us a rich litany of images of chromosomes, DNA and enzymes. Whenever we see documentaries on living cells, the CGI convention spills over and replaces reality. Soft, succulent cells are portrayed as hunks of rock; a delicate living tracery is represented by shiny plastic cylinders. The subtle exchange of ions is transmuted into a violent discharge of electricity. Real cells are nowhere to be seen.

Television companies spend huge sums of money on digital simulations, even when the real subject is readily available on video. The BBC television series *Inside the Human Body*, presented by Michael Mosley, contains CGI sequences purporting to exemplify the first divisions of a human zygote. It is wrong from beginning to end: the sperm cells are modelled from sputtered scanning electron microscope images, and look like rusty nails; the ovum is opaque and lacks the translucence of human ova; the TV version looks like a corroded cannon ball, and the

dividing cells resemble marbles jostled in a sock. Living human cells are nothing like that.

What compounds the error is that micrographs of genuine living cells are available. Videos reveal spermatozoa as sleek, undulating cells with an apparent sense of purpose and the living zygote is shown to have a smooth, limpid surface and a delicate translucence. We can show how the dividing zygote convulses as each asymmetrical cell division takes place and there is an attractive juiciness as this meticulously choreographed sequence sets in train the development of an embryo. There is no reason why this should be substituted by crude cartoons. Worse, there is nothing in the commentary that hints at it.

The script exalts the viewer to accept what is about to be unveiled. "Hidden deep inside you," Mosley intones, "is a wonderful dynamic world".

The viewer is presented with a forest of tapering columns, upstanding like bristles on an unshaven chin, and nothing like any cells in existence. "Tiny movements trigger immense electrical storms," insists the commentary, as hissing static discharges leap between lurid metallic rods.

We next encounter "raging torrents of blood" accompanying computer graphic images of discs diving through a duct. They are roughly the right shape for erythrocytes, though they lack the translucence of the real cells. These versions are portrayed as rigid biconcave discs, whereas living erythrocytes are highly flexible and have the consistency of delicate balloons of cytoplasm that easily distort as they squeeze through constricting capillaries. The CGI versions in this BBC programme look more like motor-car wheels, and are similarly inflexible.

### Contrived reality

You might justify broadcasting an artist's impression of a planet that nobody can see, but images of living cells abound and new sequences could easily be prepared. Substituting a CGI version for reality makes no sense; you might as well transmit *Spitting Image* in place of a party political broadcast.

Life under the microscope is so appealing, so revealing, and so easy

### BIOGRAPHY



**Professor Brian J Ford served on Council at the Institute of Biology and is the author of over thirty books, many of them on the microscope. He first appeared on BBC television 50 years ago and has since presented several major series, appearing in television programmes around the world.**

to observe, that the vogue for CGI is bizarre. I have been told that the budget for such computer graphics probably ran into six figures – yet we could watch the real thing at a fraction of the cost.

BBC nature programmes are the best in the world, and the corporation proudly proclaims its ground-breaking uniqueness. A recent documentary examined previous decades and reminded the viewer that, not so long ago, there were so many aspects of life that could not be captured on film. “Now,” runs the script, “we can film everything”. Not so. They cannot effectively film the microscopic world, which is the most important aspect of all life on earth. A tiger may eat you, but only a living microbe can decimate your entire nation. Every aspect of the tiger is familiar to us, from its mating behaviour and voracious appetite to its cleansing mud-baths; yet when did you last see a real living microorganism on television?

Artificial representations are widely used in teaching science, whether it's a drawing on a board or a diagram in a textbook. Models are routinely employed, from plastic balls to show us the structure of DNA to scale models that reveal the proportions of the planets. Not only are they useful, they are vital. We know these are models, and they are the only thing we have to disclose the crucial information.

The problem with the CGI cells we see on television is that these are all we see. The reality is contrived, and sight of the real cells is nowhere to be seen. So fashionable has the electron microscope image become that it has replaced the reality. It is curious the most important aspect of our lives is so crudely misrepresented by the media. Cells need a better press and, if they are unable to say so for themselves, then I am urging reform on their behalf.

Those polar bear cubs may have been filmed in a location that the producers concealed from the viewers, but they were at least real cubs. Were the polar bears afforded the same treatment that producers mete out to microbes, they'd have used clips of Winnie the Pooh. Or Paddington Bear.

*David Barker, the CGI researcher of the BBC's Inside the Human Body, will be responding to this article in the next issue of The Biologist. We'd love to hear your thoughts on the issue too.*

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**Life under the microscope is so appealing, so revealing, and so easy to observe, that the vogue for CGI is bizarre**  
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## EVEN BETTER THAN THE REAL THING?



The cinema film *Look Who's Talking* was written and directed by Amy Heckerling in 1989.

In this vivid fertilisation scene, although not entirely accurate, the translucence of the ovum and the serpentine movements of the spermatozoa are exquisitely well conveyed.



The BBC's version of a human blastula used a toad's egg as its reference. Unlike human ova, those of the toad are opaque and so the result is misleading. The pitted opaque surface, which makes the cell seem rough and textured, does not exist in reality.



Genuine light microscopy reveals the early human blastula as translucent, vital and alive. Digital imagery is now so pervasive that images of living cells are routinely discarded and replaced with CGI substitutes.

The subtleties and intricacy of life are replaced with simplified digital imagery that misrepresents reality. In consequence, the public is denied a realistic understanding of the cell.



Some examples of digital imagery are purely imaginary. On the BBC's *Inside the Human Body*, the description of cells stated that “tiny movements trigger fierce electrical storms.”

It is impossible to imagine what the BBC producer had in mind, for nothing like this exists in nature. The sequence subsequently showed blue sparks flashing as they travel along imaginary columns, like hair being combed in the dark.