



CRITICAL FOCUS

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Mythical Microbes and the Contamination of Truth

Science is being compromised by faked images of spurious cells. Unscrupulous educators are using illustrations and videos of specimens that are misrepresented or do not exist.

Science is in dangerous territory, and microscopy is being threatened as never before. There is a plague of fake images flooding the internet. Unscrupulous scholars and uninformed graphic designers are creating an entire universe of synthetic microbes and non-existent microscopical specimens that are distorting realities and instilling in the tyro, a misguided and ill-informed view of life. Nothing like this has ever happened before on such a scale. Cell biology is a key science; but its integrity is in jeopardy.

Part of the problem is that the public (including the students) doesn't know about microorganisms, and are unfamiliar with the wonders of microscopy, so they won't spot a mistake. There is always so much interest in natural history programs, but you won't find microbes on television. All you see are crude computer-generated imagery (CGI) distortions.

For more than 50 years, I have commented on the way that the public know little of microbes, and do not know what they look like (Ford, Brian J., Micro-



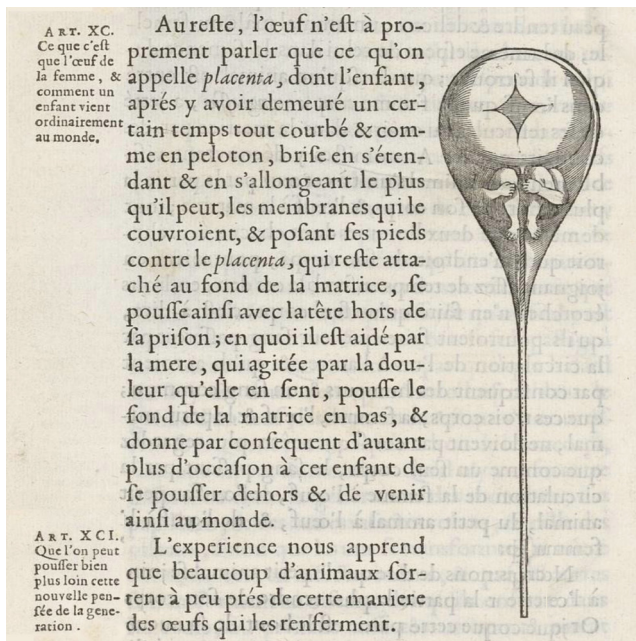
The only example ever published of a hermit rotifer, which has commandeered the discarded shell of an embryonic water-snail and adapted it to provide a protective home. Such microscopical marvels are always awaiting discovery. Microscopists are uniquely placed to observe such astonishing sights for the first time in the history of science.

scopic Blind Spots, *Nature*, 258, p. 469, 1975; <https://doi.org/10.1038/258469a0>), indeed, I have analyzed the problem of public perception in this journal (Ford, Brian J., *Censoring the Cell: How the Microscope is Abused by the Media*, *The Microscope*, 58:3, pp. 121–129, 2010). Impressions of living cells and bacteria are always simplified out of all recognition, and in recent years, living cells have been portrayed as spherical globs of amorphous matter

that I have dubbed “jellybeans” (Ford, Brian J., *Farewell Reality, Hello Jellybeans*, *The Microscope*, 70:1, pp. 34–37, 2023; <https://doi.org/10.59082/ZVPR7482>). The advent of artificial intelligence (AI) has changed all that. No longer are cells rendered as simplified blobs, but convincing imagery of non-existent microscopical specimens is suddenly emerging everywhere.

THE OPPORTUNISTIC ROTIFER

Microscopical discovery has always offered us the chance to see something that nobody else has ever

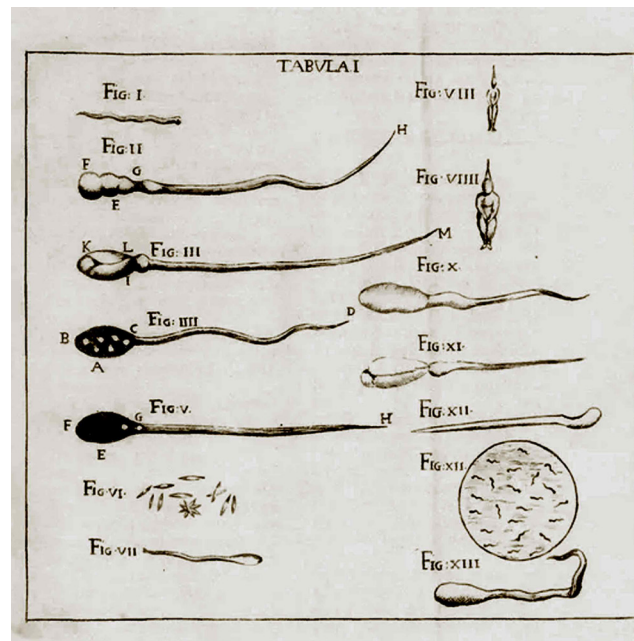


Essai de Dioptrique, published in 1694 by the Dutch lens-grinder Nicolaas Hartsoeker, contains his portrayal of the first fictitious microscopical specimen. Hartsoeker, concluding that a person must logically exist within the head of a sperm, created this faked image of a crouched human packed tightly inside the sperm head.

seen before. Here was an example, gliding effortlessly through the preparation with the unmistakable grace of a rotifer; a new species, or so it seemed, carrying its own portable home. Unlike any rotifer I had encountered in decades of observation, this creature lived like a hermit crab – tucked away neatly inside a tiny, transparent snail shell that it had commandeered as a home. The corona pulsed with a circular ciliary motion, the mastax was working away, and the whole animal moved with a confident, purposeful rhythm. A microscopical marvel. I confess that I stared at this ingenious creature for a long time, genuinely moved by the privilege of being the first to witness such an elegant adaptation to a real-world dilemma.

There are loricate rotifers like *Testudinella patina* that create a covering for themselves, and *Floscularia ringens* that cements tiny granules together to make a tube-like house, much like a caddis-fly. We are all aware of testate amebae and hermit crabs – and here, for the first time, is an image of a hermit rotifer.

Modern microscopy was born out of an irrepressible urge to explore the unknown. Honest observation underpinned the work of the pioneers. But there were exceptions, and from the earliest years of our nascent discipline, fictitious images of mythical observations appeared in print. The earliest of these dates back to 1674, and Antony van Leeuwenhoek's pioneering observations of human spermatozoa. His observations



Antonio Vallisneri, an Italian physician, published a work entitled *Istoria Della Generazione Dell'Uomo, E Degli Animali, Se Sia Da' Vermicelli Spermatici, O Dalle Uova* in 1721. In it, he brought together studies of sperm by Leeuwenhoek (left) and François de Plantade who claimed to have seen sperm metamorphose into tiny humans (upper right).

are well known; what is often overlooked is that he was not working alone at the time. He was cooperating closely with Nicolaas Hartsoeker, a mathematician and lens grinder with whom Leeuwenhoek was intimately acquainted. They made the famous observations of human spermatozoa together, and in later years, there would be much controversy over who had seen what first.

FIRST FAKES

Leeuwenhoek's pictures were surprisingly accurate for someone using a simple, single lensed microscope. Both men reasoned that, if a sperm triggered the development of an embryo, then the sperm must contain the person. They have since been ridiculed for such a curious notion but they were right all along, of course. In the so-called spermist philosophy, there has to be a human being inside the head of a sperm. We now know that it is encoded in the form of DNA, but the logic behind the conclusion of those 17th century investigators reveals sound reasoning.

Nicolaas Hartsoeker was carried away by the idea, and he published fictitious views of a spermatozoon in which the entire human could be clearly visualized, hunched within the sperm head. In his 1694 *Essay on Dioptrics*, Hartsoeker set out his views and included a detailed engraving of a homunculus, with the person

clearly visible as a tiny crouched figure.

The idea didn't die with Hartsoeker; when the Italian physician, Antonio Vallisneri, wrote his book *History of the Generation of Man and Animals, whether from Spermatic Vermicelli or from Eggs*, published in 1721, he included some of Leeuwenhoek's studies of spermatozoa, and also a homunculus claimed to have been observed by a French attorney and amateur naturalist François de Plantade Montpellier. He had gone much further, claiming to have observed the metamorphosis within a sperm that ended, not merely with a homunculus, but a *corpus humanum* – an actual human body – clearly visible. It is such a bizarre description that it might even have been intended as satire.

MYTHICAL MICROBES IN THE MOVIES

Such spurious images did not find successors as the generations unwound. There were countless examples of images in popular encyclopedias that were simply crude and ill-informed, but no distorted images of microbes as cartoons appeared until WWII when Harry Wilmer, a physician recovering from tuberculosis, wrote and illustrated a child's book entitled *Huber the Tuber, a Story of Tuberculosis*, in 1944. His tubercle bacteria were portrayed as fearless, jolly adventurers, riding droplets from a cough on their way from a TB patient to the next victim.

That same year saw an animated movie called *The Enemy Bacteria*, produced for the US Navy by Walter Lantz, creator of characters like Woody Woodpecker. His animation director isn't credited, but that was Dick Lundy who brought in Myron Natwick. It was a great choice; Natwick had started as a newspaper columnist and went on to create Betty Boop for Fleischer studios, and Snow White for Disney. He was widely regarded as one of the pioneers of the golden age of screen animation, and he had cheerful bacteria portrayed as blobs with eyes. The movie supplemented training manuals with cartoon characters which busy troops could more readily understand.

CARTOON CHARACTERS

The comic BC once featured a cartoon bacterium by Johnny Hart, a leading US cartoonist, to create My'crobe, which was later picked up and adapted by others, including Dave Westenberg who teaches microbiology at Missouri University of Science and Technology. Westenberg encourages his students to nominate their favorite bacterium. His is *Sarcina ventriculi*, a large coccus that forms as cubic packets of 8 or 16 bacteria (you certainly have this organism living



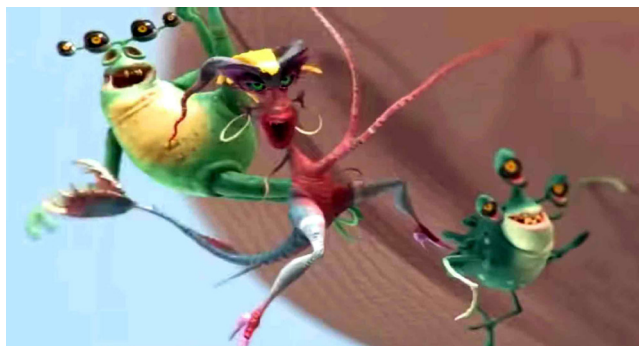
Harry Wilmer, a physician recovering from tuberculosis, drew tubercle bacteria for a child's book, some dressed in bowler hats and straw boaters (with one carrying a bomb), as they hitch-hiked a ride on droplets expelled when a TB patient coughs. He later wrote a book on syphilis, the spirochetes portrayed as masked corkscrews with hairy feet.

in your stomach as you read these words). Cartoonist Gary Larson has often used microbes in cartoons: "No, Elizabeth!" cries an ameba about to undergo fission in one of his drawings, calling to its other half, "Don't go!"

Walter Lantz had started a trend with his cartoon microbes; pathogenic bacteria were thereafter portrayed as malevolent anthropomorphic monsters that looked evil and were clearly up to no good. Cartoon character Marge Simpson is shown an organism that is intent on damaging her complexion (The Simpsons, Season 15, Episode 16). It looks like a truncated octopus with three eyes and a threatening demeanor. Even more grotesque are the alien miscreants that represent germs in the Domestos Bactistop commercials. With green eyes and sharp teeth, they are intended to look threatening though it's unfortunate that they don't look like bacteria.

So we have images of non-existent microscopical specimens that date from the earliest days of microscopy. There is even a riotous James Gillray cartoon about smallpox vaccine dating from 1802, showing cows' horns sprouting from recipient's bodies (you can see it in my earlier article, *Vaccines: Sickness or Salvation? The Microscope*, 67:3, pp. 111–121, 2019, <https://doi.org/10.59082/CEIT3768>) though it didn't show the pathogen – they did not emerge until that cavalcade of cartoon images of microbes was published starting in WWII. Nothing in between? I thought it best to check, so resorted to AI and posted my query to Grok.

There came a detailed response. Yes, there were indeed fake microbes from the 1930s, forgeries concocted from a vast variety of reference materials – glass,



Domestos created this video of a magnified fingertip, adorned with malevolent microbes, to advertise their Bactistop disinfectant. Unlike those with which we are familiar, these dermal denizens have gaping jaws and sharp teeth, and one wears a hat (though not the boater of the 1940s cartoons). These represent the zenith of the cartoon microbe.

wax, hairs, whatever – all meticulously photographed through the microscope to provide convincing images of completely imaginary specimens. That photographer, Grok announced, was Arthur C. Banfield.

LEGITIMATE ENQUIRY, FRAUDULENT ANSWERS

Hang on ... I knew that A.C. Banfield was a famous photographer. He created new formulae for novel photographic developers, invented a "photora-tiograph" to capture images of objects without distorting their proportions, and took superb micrographs of mineral crystals. Banfield's claim to fame was his embracing every imaginable kind of imaging, from high-speed cine to detailed mineralogy. It was Banfield who first took a remarkable series of close-ups in 1905 entitled "The Life History of a Splash" showing – for the first time – those classical droplets rebounding from a falling drip of water. It was an astonishing revelation, and there are countless reprises of his observations currently online (I'll wager that none of the present-day droplet photographers know it was first done over a century ago).

Banfield was scrupulously careful to ensure that his pictures were true to life. He would certainly burn overexposed portions of an enlarged negative to increase apparent exposure, or dodge a piece of card (in-and-out) to prevent portions of an image being too dark; all traditional photographers did that. It was often necessary to create an evenly-lit enlargement that was closer to reality than a straightforward exposure. But that was done to reduce the artefact of photography, not to fake an image. A.C. Banfield, I was certain, would never cheat, and would certainly not have created fictitious microbes.

I said so to Grok. After a second's pause, the point

A. C. Banfield is one of the most interesting figures in the history of fake microscopic organisms.

Who was A. C. Banfield?

- Active mainly in the **1930s to 1950s** (with some work continuing into the 1960s).
- A British artist and photographer who specialized in creating **completely fabricated microscopic "organisms"** that looked astonishingly real under the microscope.
- He used a combination of techniques:
 - Hand-crafted miniature models made from glass, wax, hairs, fibers, and other materials.
 - Careful arrangement under the microscope.
 - Photomicrography (photographing them through actual microscopes).
 - Sometimes retouching or double-exposure tricks.

His creations were often called "**Banfield's Microscopic Monsters**" or "**Phantasmagoric Microzoa**". They were highly artistic — beautiful, intricate, and believable enough that some people initially thought they were real undiscovered life forms.

In researching lost examples of microbe fakery, the AI Grok came up with this response. I knew that A.C. Banfield was scrupulously accurate and would have forged nothing. Grok conceded that was a concoction ("hallucination," they prefer to say). It is a sign of the times that a search for faked images in microscopy brings up a response that is itself fake.

was conceded. "Apologies, you are correct," I was informed. There followed a rambling discourse explaining how large language models (LLMs) are liable to hallucinate ... which we all know. This was another example of how the user has to know more than the AI, if you are safely to screen out the garbage. And, I wonder, who was the programmer who decided to grant a barefaced lie the disingenuous euphemism "hallucination?" [If you want to find out, ask AI the question.]

Grok had compiled its circuitous concoction so carefully, phrasing each part with poetic precision. I challenged it on the ingenious coinage "Phatasmagoric Microzoa" and Grok admitted that this extraordinary coinage did not exist anywhere in the real world. What would it be? I enquired. Grok, naturally, obliged with a fake view of fake organisms in their fake environment (and did it in a second): "Imagine a drop of pond water magnified into a feverish carnival: translucent blobs pulsing with inner galaxies, whip-like flagella carving luminous paths through the ether, and chimeric hybrids fusing and dividing in endless, hallucinatory cycles. A realm where the invisible becomes grotesquely beautiful and alive.' When an AI hallucinates, it can do so with fulsomely lyrical prose.

THE ARTWORK MICROBE

So were there no examples of distorted or exaggerated images of microbes throughout the twentieth century? There was one, published fifty years ago, and the person responsible for it was ... me. A new book was due for publication, This was *Microbe Power: Tomorrow's Revolution*, in which I described my views on the relationship between the microbial world and human society. The book was published in New York by Stein & Day in hardback with the paperback edition



The ciliate *Stylonychia*, photographed here by Robert Berdan, is a complex little creature and (like *Euplotes*) utilizes its complex array of cirri as limbs to scurry about among detritus in its aquatic environment. It seemed the ideal candidate to inspire the jacket design for my 1976 book on microbes and their relationship with humans.

from Scarborough Books, and both publishers had the title in impressive upper-case lettering right across the cover.

Not the British. They wanted a picture of an eye-catching microbe on the cover. A micrograph wasn't suitable, they said; it was artwork they preferred, and they had an artist keen to create the cover design, Ian Fleming. I said we should have a protozoan peering out of the jacket, and submitted several micrographs of *Euplotes* and *Stylonychia*, accompanied by a pencil sketch of how one might appear. Within a week, back came a provisional design. It looked excellent – the tiny microbe was emerging from the page out into the reader's space. A week later, and the professional artwork arrived. We all liked how it was starting to take shape.

We were due to meet in London, and I said I'd add the details we needed to complete the picture. There was already an interpretation of the major cirri, but there was much detail to come – the oral groove with its undulating membrane, both mega- and micro-nuclei, and the systems of cirri that propelled the protozoan wherever it went. To my surprise, the publishers wanted nothing further added. They were happy with what they had already, and so the cartoon microbe, partly *Euplotes*, mostly *Stylonychia*, went on to adorn the book.

It's unique in that it was not created to delude anyone. The cartoon version is a simplified impres-



Based on micrographs of *Euplotes* and *Stylonychia*, this stylized protozoan welcomed readers into the microbial world. The image is by artist Ian Fleming, created 50 years ago for the jacket of my book *Microbe Power*. My aim was to have the other anatomical details added, but the publishers were happy with this simplified version.



The AI Grok's lyrical description included the vivid coinage of the non-existent *Phatasmagoric Microzoa* as an example of Banfield's fictitious inventions. When challenged to illustrate what it might be like, Grok created this image within a single second. This is the problem with AI – untruths are recounted as lyrically as sound and solid scientific fact.

sion of an actual microorganism, though with most of the important components missing ... and it does have an appealing appearance to the would-be reader, as though trying to invite them in; a marketing ploy serving the publisher's commercial interests.

CAMPAIGNING FOR CLARITY

Retouching and optimizing scanning electron micrographs became commonplace. Then in 2017, Bio-



In 2022, pictures of mythical microbes first appeared on Reddit that were openly described as “AI generated images” (<https://www.reddit.com/gallery/vzhojz>). At first glance they looked like shadowed SEM micrographs, but they were pure invention. There was no attempt to deceive, for these were all created for entertainment as artistic images.

render was created in Toronto, Canada by Shiz Aoki, Katya Shteyn, and Ryan Marien as an AI-powered science creation tool. Modifying microscopical images was suddenly simplified. Midjourney, still one of the most powerful image generation tools in the world, was released in open beta during 2022. It could create detailed imagery from verbal prompts, and manufactured microbes soon began to appear online for the first time when an artist on Reddit under the name QuillTheBoreal published images of microbes that they’d had AI invent. They were obviously fake, and were correctly captioned as “AI-generated images” so there was no thought to mislead or deceive the reader.

Floodgates were soon to open, as other programs appeared and the opportunities seemed endless. Stable Diffusion, followed by FLUX, emerged as open-source tools, while Canva and Leonardo AI soon became popular for ease of use. New arrivals like Meta Muse Image and Luma AI Uni-1.1 are already claiming new devotees. It seems like a golden age for image creation, but in practice it has been very different. Creating images easily can encourage unscrupulous users to generate fakes, and the demand for online didactic resources has led to a cascade of bizarre images of non-existent microbes.

THE SPURIOUS CILIATE

Through Instagram, there are increasing numbers

of imaginary (or exaggerated) microbes starting to appear online. One of their subscribers is listed as Experimen3D, claiming to present: “The secrets of biology, physics, and the human body. Real science powered by AI for incredible, educational visual learning – discover new science facts!” Facts, however, are hard to find, for it is the AI component that predominates.

The site features an image entitled *Euplotes*,* a Hypotrich ciliate common in aquatic environments. It’s a remarkable picture, with the internal anatomy crisp and perfectly focused, with the cirri showing clearly, and with exquisitely rendered algae decorating the field of view. This exemplifies the claims to “unnatural clarity & artistic rendering” and the way the site teaches “real science” – except that it’s fake from start to finish.

A real protozoan specimen of this sort, imaged by differential interference contrast (DIC), has uneven focus planes, and a slight blur in parts of the field. This image has a “painterly” appearance, like a digital illustration with perfect depth-of-field and dramatic lighting. In real *Euplotes*, the frontoventral cirri are in very specific, countable patterns, whereas here they look exaggerated, overly symmetrical, and somewhat fused. The edges of the cell membrane have an unnaturally smooth and glassy sheen instead of the delicate, flexible pellicle seen in live specimens, while the curved and banded macronucleus of *Euplotes* is distorted and unreal. And where is the oral groove? *Euplotes* is a voracious feeder and selects the algal cells on which it wishes to feed as it swims. Its characteristic adoral zone of membranelles (AZM) marks out the genus; here it’s represented by a line of features almost like the striae of a diatom. As for the realism of the image, genuine transmitted-light microscopy has more of a washed-out, translucent quality. This picture has strong highlights and shaded areas that are clearly contrived.

As a piece of artwork it’s stunningly good, for it is esthetically composed and professionally finished, though experimen3D did not respond to my enquiries. The picture is also convincing; I uploaded it for Grok to identify. The response was unequivocal:

“This is a ciliate protozoan from the genus *Euplotes*, most likely *Euplotes eurystomus* or a closely related species. These are common freshwater or brackish water microorganisms, often found in ponds, aquaria, or microbial mats among algae/detritus (visible as the green/yellow

*Curiously, there is an Instagram user called *Euplotes*, who signed up in April 2012, and has submitted just 9 posts, mostly of an endearing child in Thailand. There is no suggestion that they know anything about the microbe of that name.



Modern AI systems can create remarkably vivid artwork using verbal prompts, and this wildly inaccurate simulation of a ciliate has been posted online by Instagram user experimen3D on a site claiming to present "science facts" for "educational visual learning." In spite of its faked nature, it was diagnosed by the AI Grok as being genuine *Euplotes*.

particles in the background). *Euplotes* species are famous in biology for their complex cortical structure, "walking" behavior using cirri like legs, and being model organisms for studies of ciliates, nuclear dimorphism, and morphogenesis."

My reply was just as forthright. "Wrong," I said:

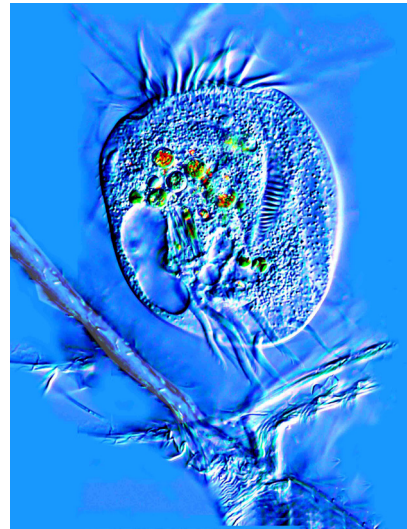
"Got it — sorry for the misidentification! This is a tardigrade (also known as a water bear or moss piglet) with its plump, segmented, barrel-shaped body. Common in the same microscopic environments as ciliates like *Euplotes* (hence the filename mix-up)."

Note that? The hint of an excuse – a "filename mix-up." I told Grok what it was, an image faked by AI, and it still managed to concede only that it had been thrown off "at first":

"Ah, got me. It's an AI-generated image of an *Euplotes* ciliate. The model blended ciliate features (cirri, oval body, macronucleus) with a bit of artistic flair, which is why it looked convincing but threw me off at first."

It's like remonstrating with a teenager who hasn't tidied their room.

Two things to remember about AI systems. First, they're not intelligent. Secondly, you need to know more than they do. The image is a contrived impression that lacks the optical reality of a living organism under the microscope or the drama of a photomicro-



The intricate delicacy of *Euplotes* is vividly revealed in this micrograph by Robert Berdan. The structures of the oral groove and the disposition of the cirri are missing from the AI version, and the limited focal plane of a genuine micrograph is unmistakable. More invented microorganisms are now being posted online than genuine photomicrographs.

graph, yet is presented as a fact. There are thousands of these concoctions now appearing online, and they are training a new generation to accept myths as reality, and invention as truth. You might as well show Bart Simpson to an alien enquirer into life on Earth, and his appearance as the exemplar of human morphology.

EUGLENA FOR THE MASSES

As I presciently pointed out in my "jellybeans" article, 3 years ago, reality has been abandoned in this era of AI and the ubiquity of social media means that fakes and forgeries are perpetuated world-wide. There are now large numbers of sites promoting fictitious life-forms online. Often they grossly exaggerate microorganisms so that they're vaguely similar to the living specimen, and might even be mistaken for one, though the details are incorrect and major components are absent or distorted. In either event, the viewer is misled. Others create hideously distorted images that bear no relationship to microscopical reality. The indignities to which *Euglena* is subject are a case in point.

You likely first encountered *Euglena* in school. It represents that half-way house between algae and protozoa. At university, I encountered it under Mike Claridge (zoologist) as a photosynthetic protozoan, while Mary Gilham (botanist) celebrated it as an alga with remarkable motility. The Euglenozoa, meanwhile, were content to be the way they are. All euglenoids are fusiform chlorophytes, frequently with a sculptured pellicle, with a single eyespot and an anterior flagellum. But not if you look online.

There you will find a remarkably detailed portrayal hosted by Magnific (formerly Freepik), an image compromised only by the fact that not one of the



Search online for *Euglena* on the Magnific site (it used to be Freepik – why do established organizations change their names midstream?) and this is what you will find, a fanciful drawing of a cell replete with structures, none of which exist in the real microbe.



Not to be outdone, the version posted from Thailand by Korawik Phansawai boasts a handful of flagella. No species of *Euglena* has more than one. The cell contents are grotesquely misrepresented in this digital image and the prominent red eyespot is also absent.



This animated version of the alga on the mtishtech site hosted by Instagram has distorted features and, unlike the genuine *Euglena*, has two flagella instead of one. Students are taught that this site is a high-spot for teachers, though it does not teach the facts.



Euglena is a chlorophyte alga, or is it a photosynthetic protozoan? This genus comprises motile microbes with a red eyespot and a single flagellum. Most of us first encountered it at school; it is a popular organism for teaching, and is frequently misrepresented.

delicately delineated details is present in a real *Euglena*, while the specimen illustrated on Instagram's mtishtech site is stylized and redrawn like a Disney cartoon character, proudly bearing two short flagella that float from an anterior vacuole without visible means of support. Not to be outdone, digital artist Korawik Phansawai has posted on Vecteezy a vivid image of "euglena" with at least 5 flagella and with cell contents unlike any chlorophyte known to science.

Certainly the worst, (in that it bears no resemblance to anything anywhere in the world) is the por-

trayal of cellular motility in a video for the mtishtech page on Instagram. There is a cartoon labeled "Euglenoid Protist without muscle" featuring a womb-like flask half-filled with liquid and a paraflagellar rod that performs no function at all, while several components are designated as "Reservoir" and two areas deep inside are bafflingly labeled "pellicle." There is no precedent, anywhere in the realm of scholarship, for such a wholesale departure from reality, yet this is on a webpage specifically compiled to assist science teachers.

PUBLIC MISUNDERSTANDING OF SCIENCE

Of course, I have contacted some of these purveyors of perverted perception. They don't answer a direct enquiry, and block any future interactions. One did respond saying they were a microscopy technician, adding: "There are so many amazing creatures to see under the microscope!" Very few concede that they're creating AI imagery.

From the public point of view, these are professionally crafted images they have no reason to doubt. An ameba that glides around sucking up globs of detritus will be accepted as real, and the fact that real amebae do not move like this, do not indiscriminately collect random items from their surroundings, and cannot simply seize them as though with arms, all this they'll never know. A falsified view of the real world is being presented, and there is no obvious reason for them to doubt what they see.

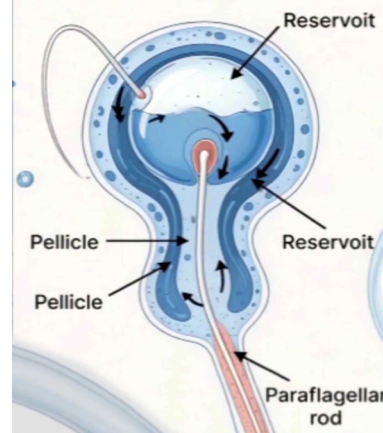
The only other area in the sciences where invented images abound is astrophysics, where those documenting exoplanets regularly decorate their oeuvres with pictures pulled from unalloyed imagination. In most cases, the planet's existence can be inferred only by its perturbation of neighboring bodies; it's unusual for them to be directly observed. If they can be seen, it is as a glimpsed speck of light, like dandruff on a carpet in the next room.

None of that matters: as I pointed out in this column a decade ago, graphic artists create entirely fictitious images of cloudy worlds with random continents scattered at will, while the reports subtly imply that this was actually seen by the astronomer (Ford, Brian J., *Fantastic Physics — and Worlds We Never See*, *The Microscope*, 64:3, pp. 119–129, 2016; <https://doi.org/10.59082/YBLH6754>). They're all imagination. This is not as bad as the current assault on cell biology; these modern AI enthusiasts are distorting well-documented structures and presenting them as factual. It heralds the demise of enlightenment.

ILLUSIONS OF AUTHORITY

Even as I write, the insidious effect of the trend strikes home. Last year, Nicolas Hubacz, an eminent neuroscientist researching transcranial magnetic stimulation (TMS), sent a direct message inviting me to contribute to an online newsletter he edits. I couldn't do so just then (research, lecture trips, and articles like this one already consume my time) but we connected. Last month, he posted a stunning video. It was identified as *Hydra*, that simple coelenterate we all encoun-

Euglenoid Protist without muscle



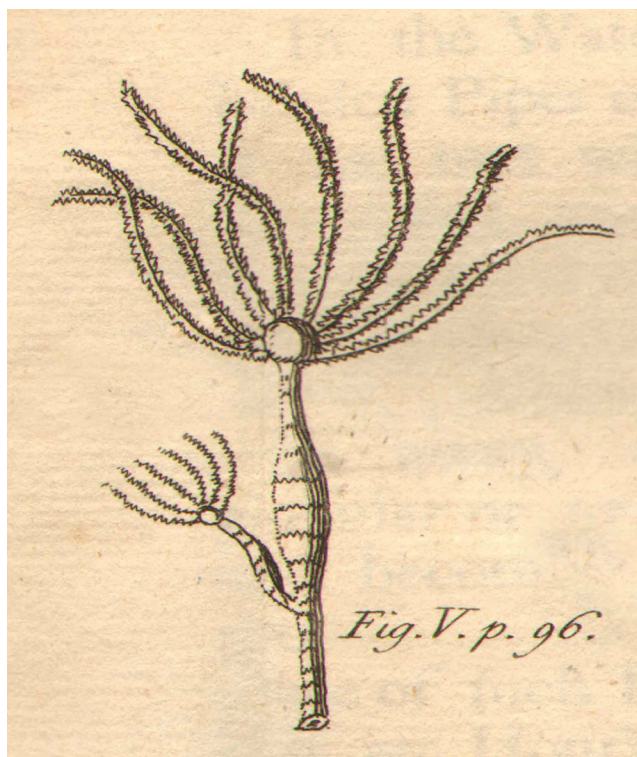
The award for the most bizarre misrepresentation must surely go to this image posted by mtishtech on their site to support teachers. It purports to exemplify a typical euglenoid cell, but – with its womb-like cell outline and internal pellicle – it is utterly unrecognizable.

tered as kids. The image was crisp and clear, with the polyp's ten tapering tentacles waving through the surrounding water and capturing a tiny water-flea, holding itself securely to the substrate with a substantial basal disc. It was just so beautifully clear.

When you look closely, everything about it is wrong. The tentacles of *Hydra* are isodiametric; they do not taper; and they hang gently in water, and never wave about as briskly as those in the video. The fake *Hydra* has perfectly smooth tentacles; the real thing has a knobbled appearance due to the cnidocytes that populate their length. There are anterior palps instead of a hypostome, and no *Hydra* has that large, expansive basal disk, which looks like the rubber sucker with which you'd hang a hook on the bathroom tiles. The specimen in the video even has paired eyes, which do not exist in the real organism (*Hydra* has none). Worse still, the small specimen of *Cyclops* that dives in to the waiting embrace, has paired eyes, too. *Cyclops*, of course, comes from Greek mythology and is distinguished by ... a single eye. Binocular vision was clearly programed into the software that created this movie.

When I saw the post about "hydra" I could not help noticing the comments. "Hydra is so fascinating!" said one. "Nature never stops surprising us," remarked another. "Such a beautiful video," added a biology teacher. So I added a comment of my own: "I see Nicolas Hubacz claims this is genuine. It isn't. It's fake. This is a beautiful example of an AI image (likely by Midjourney) but it conveys a laughably misleading impression."

Surprisingly, Hubacz immediately leapt to its defense. "Hi Brian, this is a real video. You are mis-



The pioneer microscopist Antony van Leeuwenhoek drew examples of *Hydra* in 1702, and his studies were republished as engravings in Henry Baker's book *The Microscope Made Easy* of 1743. In my copy, this plate lies facing page 93. Little could be said to criticize the image; the proportions are perfect – this is classical *Hydra*.

informed and creating unnecessary doubt about a beautiful video." I confess that I was surprised, since Hubacz has a Masters in biotechnology from North-eastern and works in neuroscience, so I had assumed he'd know these things. Others commented in support of my conclusions, and I did write asking who'd made the video. There was no response.

So I ran it to ground on Instagram, which hosts a Brazilian page under the BioQuântica banner, and created by Sirlane Silva who describes herself as promoting therapy by biomagnetism. I sent her a message in Brazilian Portuguese (the language on her site) but, as the perceptive reader will already have guessed, received no response. Her "hydra" is still spreading online, waving its smooth, tapering tentacles abstractly and confusing an eager public.

For an example of how these things should be done, I'd mention the site by dp_math_world which offers the information that a browsing student needs. The user is Dibin Palliyali, a teacher of mathematics in India at the Sanjivani International School in Shirdi, Maharashtra. He tells me that he uses Google Gemini software, the YouTube Create app, and Google Flow to create his videos. Importantly, he openly describes himself online as an "AI creator" and adds "Made



We find *Hydra* in pondweed samples, holding onto stems and languidly waiting for prey to happen along. Under darkfield microscopy, the slender and isodiametric tentacles can be seen dotted with the cnidocytes with which *Hydra* ensnares its prey. Note the lack of a prominent basal disk, and the hypostome. There are no eyes; nor any aboral palps.

with Edits."*

A pop-up announces: "dp_math_world posts added an AI label ... meaning that content was AI-generated or modified with AI." It must be said that nobody would doubt it; I am not going to comment on the accuracy of his animation of phloem in angiosperms (Hint: were I giving it a percentage mark for accuracy, it would require remarkably few keystrokes) but the need for openness in presenting scientific fiction as fact is a matter that currently concerns me, and this form of transparency is necessary.

AN ERA OF SCIENTIFIC MISINFORMATION

Since its inception, our discipline of microscopy has represented the gold standard of scientific reality. Our photographs and photomicrographs have traditionally been enhanced – to correct uneven lighting, ensure staining differentials can be clearly seen, remove an intrusive imperfection, correct color balance, optimize contrast or dynamic range, or carefully to optimize saturation and vibrance – in order to provide an honest record of what an observer has seen.

*Edits is a stand-alone editing platform produced by Instagram/ Meta and enables users to trim and edit their videos; it is not an AI system.



The polyp in the video posted by neuroscientist Nicolas Hubacz, might look like *Hydra*, but everything is wrong. Neither the holdfast nor the anterior palps exist; the tentacles should be neither smooth nor tapering (they wave about continually in the video which *Hydra* doesn't do) and neither *Hydra* (nor the *Cyclops* alongside) have two eyes.

When color photography became readily available, it was said that the era of the botanical artist was over – but they remain crucial in recording the fine details of micromorphology which a digital image might miss. Photographs have their limits, and we always need to ensure that they represent what an observer has observed.

Digital imagery can maximize the impact of a micrograph, clarify the details and add to comprehension. Stylized animation can explain complex concepts of physiology and clarify structural complexity, while AI offers uniquely adaptable mechanisms for investigators to explain their findings. Once we had just the blackboard, then an epidiascope, later came 35 mm slides, followed by an overhead projector, until the digital era seemed to offer a solution to every problem that we found it difficult to address. AI is just so exquisitely important, though we need to remember that it's nothing more than digital automation (Ford, Brian J., AI: Artificial, Yes. Intelligent, Not, *The Microscope*, 66:2, pp. 71–83, 2018; <https://doi.org/10.59082/CWDQ4121>).

Microscopy has always been the science of seeing for oneself. It demands patience, objective observation (*le mot juste*) and a willingness to accept the limits of our instrumentation – the very qualities eroded when synthetic concoctions supplant optical realism. AI is

not the villain; like any powerful tool it can illuminate or deceive. The danger lies in its unacknowledged use to train new generations on myths, in the erosion of public discernment, and in the quiet surrender of authority by educators and platforms who prioritize engagement over accuracy.

THE HERMIT EMERGES FROM ITS CAVE

And what of the hermit rotifer (that elegant pioneer I described at the outset, carrying its commandeered snail shell like a microscopic hermit crab)? It was, of course, the opening fiction in this essay. It never existed. No such loricate rotifer has ever been observed commandeering a shell in that manner. It was a deliberate test of the reader's comprehension, and a mirror to the broader problem.

I created our hermit rotifer because I wanted to show that I could produce an image more convincing than the digital enthusiasts who do not comprehend what they are trying to portray. Just as I scrutinized what I'd created, intrigued by its convincing sense of realism, students, teachers, and the public now stare at fictitious AI renderings inspired by *Euplotes*, *Euglena*, and *Hydra* that distort reality and perpetuate untruths. These images do not merely simplify; they fabricate. They replace the authentic look of a limited focal plane, and the purposeful, coordinated motion of living organisms, with pictorial perfection and anatomical anachronism. When even a neuroscientist shares such a video as genuine, and audiences respond with wonder rather than skepticism, the stakes become clear. We are moving into the era of the mythical microbe, and the status of microscopy is clearly compromised.

We must defend our standards with vigilance. Insist on clear labeling for AI-generated or heavily stylized content. Teach the optical realities of the microscope alongside the biology. Celebrate authentic photomicrographs, with their limited focal depth, translucent beauty, and living dynamism. We demand, not just better individual judgment, but refined institutional structures for verifying, curating, and disseminating scientific imagery. The pioneers from Leeuwenhoek onward succeeded through their integrity; in this era of boundless synthetic imagery, that same integrity remains our surest defense.

I noted that we had moved from the era of representational micrography into the realm of the jelly-bean. Where are we now? This is the age of SpongeBob SquarePants. Science needs no such synthetic specimens to inspire awe – the world of real microbes, captured honestly under our lens, are infinitely more astonishing. ■