Ringo Starr has been almost universally liked for decades as probably the most affable member of the Beatles, the nicest guy in the universe who might have benefited from that incredible stroke of luck of being in the picture when the band decided to look beyond Pete Best. Every now and then you would read about him being one of the most underrated drummers in the history of rock, but he was rarely praised beyond his niceness and sense of humor.

But take a stroll down memory lane on the Internet nowadays—look up something like “Ringo genius”—and you’ll be surprised not just by the sheer number of entries defending the proposition, but mostly by the depth, detail, and, indeed, passion of the arguments. Take, for instance, the analysis of Ringo’s creativity in the song Tomorrow Never Knows, as presented by George Hrab. He describes the drumming as a “pattern” that provides “space” and something solid “upon which the song could be built.” Hrab makes no mention of Richard Starkey’s childhood, but the man himself does in an interview with fellow musician Dave Stewart, of Eurythmics fame. Recounting the year and a half spent as a sickly child in a hospital, Ringo recalls that when a drum kit arrived in his room, “I wanted to be a drummer from that day.”

Lovely as the anecdote may be, the truly interesting revelation came a few seconds earlier: “I learned to knit in the hospital.” It appears that the future master of drum-
deeply move those still fortunate enough to be able to regularly enjoy the night sky. We admire the sky and the light reflected from the wings of insects, and historically societies have come up with “creators” to admire for these “designs.” But, what if we accept the premise that there are no such creators... and indeed no design at all? What if these amazing things, and very many more, happened just..., well, just because? At some level the question is philosophical, but it can also be addressed taking advantage of scientific reasoning. In the book *Fronteras de la Física en el Siglo xxi* (Frontiers of Physics in the Twenty-first Century), UNAM physicist Octavio Miramontes argues that the evolution of matter was inevitable. In other words, even if we started —conceptually— from the absence of matter, this *vacuum* is not *nothing*, for it is impossible to get rid of all manner of fields (electromagnetic, gravitational) and, crucially, fluctuations within these fields. “Quantum vacuum contains no particulate matter,” writes Miramontes, “but it does contain fluctuations which cause virtual particles to materialize, only to disappear at once, in mutual annihilation.” These fluctuations produced the Big Bang, and only a few microseconds later, while the Universe underwent a rapid initial expansion, “matter condensed in its first manifestations,” goes the text.

Still, from there to the wings of butterflies, there is a lot of explaining to be done, and quantum field fluctuations can take us only so far. For the purposes of this story, let’s make a titanic fast forward to when planet Earth already exists,6 properly equipped with the required inanimate context (oceans, some atmosphere, solid ground, climate) and perhaps a healthy dose of organic molecules floating about. Life is not there... not yet; but it will soon appear as the ultimate patterned structure: the living cell. The thing to keep in mind at all times, though, is that what followed happened spontaneously, without agency, as a result of no intervention, with no purpose at all. It was desired by no one, it was designed by no one.
Self-organization is an emerging order, generating without an intervening central control or a predefined plan. This new order usually manifests itself as the spontaneous formation of space-time patterns where there were none before.
Increasing levels of complexity rendered patterns of cells we now call tissue, which is itself a word etymologically related to the Latin texere, meaning “to weave.”

Animate to one in the realm of the living is an informative transition. The molecule becomes capable of storing and subsequently transmitting information.” This happens at the molecular scale, lower than the cellular scale of the membrane problem, but, for it all to occur spontaneously, thermodynamics dictates that an increase in overall entropy must occur. Entropy is a rather uncomfortable variable, probably because it can be defined in different ways. Its original form was close to the more intuitive concept of energy, but most recent treatments define entropy precisely in terms of information. Moreover, seminal work from the 1980s aims at linking entropy with evolutionary theory. According to Edward Wiley (University of Kansas) and Daniel Brooks (University of Toronto), “The addition of information to any system increases the entropy of that system” (a crucial condition for spontaneous phenomena); and, since “evolution may be described as a nonequilibrium process involving the conversion of information from one form to another,” they propose a biological interpretation of entropy to account for the theory of evolution in terms of thermodynamics.

Much of the theoretical framework seems to be still in construction. We do know, however, that organic macromolecules found themselves enclosed within membranes of living cells. These membranes were the result of the spontaneous assembly of smaller molecules in patterns with favorable properties. The cells they allowed for eventually merged into multicellular organisms, which in turn produced more complex patterns capable of responding to stimuli from the environment and, in evolutionary time, adapting to it. Eventually, increasing levels of complexity rendered patterns of cells we now call tissue (muscle, connective, etc.), which is itself a word etymologically related to the Latin texere, meaning “to weave.”

In a sense, the circle is then closing. Physics and biology from the last couple of centuries give us hints of how it could possibly be that the relatively simple pattern of molecules we call the cell membrane spontaneously formed, desired by no one and designed by no one. To better understand this foundational process, and the explosive chain of events that followed for eons up to the biological tissue that is somehow we, the scientists we read from and talked to point in the direction of new frameworks in the realm of the science of complex systems.

But the potential goes beyond explaining un-designed, amazing phenomena. Humankind has had some success making new designs by learning from nature. Lorena Caballero, a professor at the UNAM School of Sciences where she studies skin patterns on animals, entertained these ideas in an interview. “Systems that mimic nature must be adaptive and energetically optimized.” She insists on identifying and analyzing the interactions of the component parts of the system of interest, saying, “Emerging spaces and bio-inspired processes will be possible from the angle of complexity.”

Ringo explains the uniqueness of his drumming style on the basis that he was a left-handed individual playing drums set for right-handed people. This put him in situations in which patterns emerged as adaptive solutions of least effort. “I can’t struggle like that,” he told Dave Stewart. “It comes naturally to me or it doesn’t come at all.”

Un-designed, functional patterns obviously have come naturally to this world. Making sense of them, however, will probably demand novel forms of scientific research.

Notes

1 George Hrab is a drummer with The Philadelphia Hunk Authority. His take on Ringo can be found at https://www.youtube.com/watch?v=7CBxToc-CU.
2 https://www.youtube.com/watch?v=3fbjHQxOZUU&t=201s.
4 A virtual visit is possible at https://www.escherinhetpaleis.nl/.
6 Pun very much intended.
7 Interview with the authors.