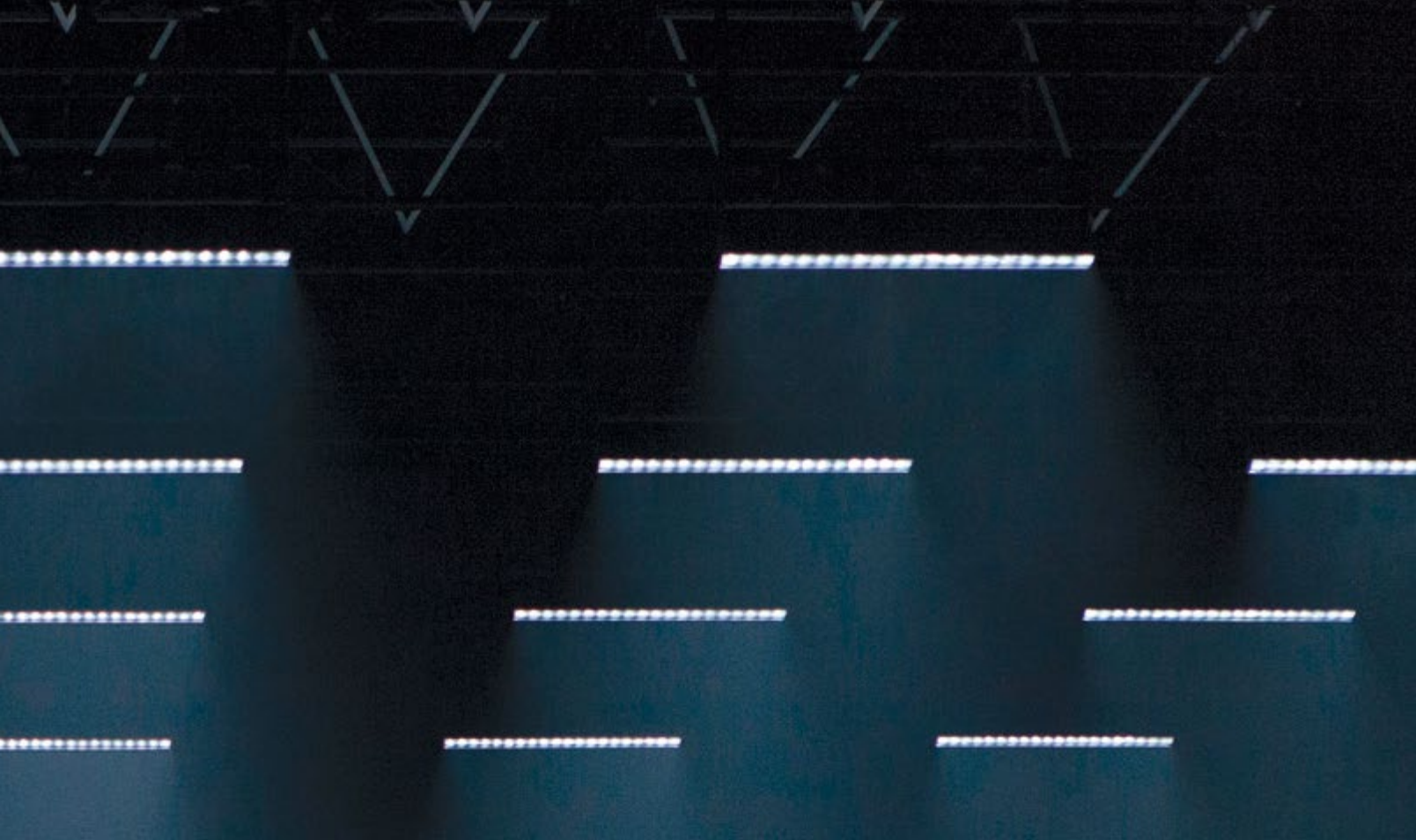

a blueprint for dance

WAYNE McGREGOR'S *AUTOBIOGRAPHY*

BY RICHARD HODGE

AT THIS VERY SECOND, THERE ARE APPROXIMATELY 37 TRILLION LIVING CELLS IN YOUR BODY.

Every single one contains a molecule called deoxyribonucleic acid—also known as DNA. In each cell, DNA is very tightly packaged into a structure known as a chromosome. There are 23 unique pairs of chromosomes in each of your cells. If you were to unwind and link together all the DNA in your body into one continuous line, it would stretch over 100 billion miles in length. In other words, it could make literally hundreds of round trips around the sun.

Every single cell in your body carries the same DNA—it is as uniquely yours as a fingerprint, a specific blend of what your mother and father passed on to you at the moment of your conception. The reason so many scientists care so

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Photo by Richard Davies

"McGregor has taken 23 different influences, artifacts, or memories that have each played an important part in his life and turned them into choreography."

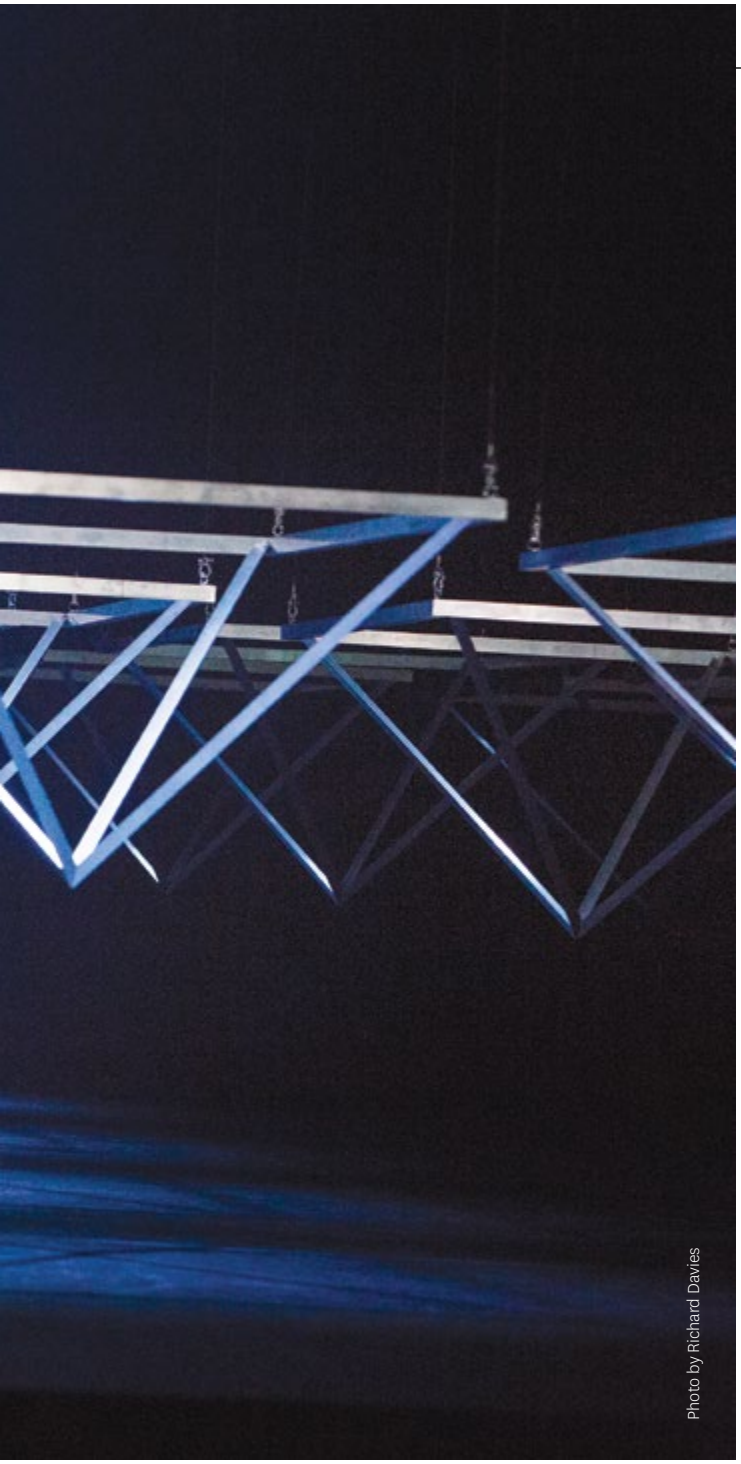

Photo by Richard Davies

much about DNA, and the reason you have most certainly heard of it before reading these words, is that DNA carries all the information that is required for life. Your unique DNA code determines the color of your eyes, your height, your complexion, and your biology. This is why scientists from all over the world have been studying how DNA works for decades, trying to understand not only how it shapes us but how we can use it to help treat disease.

DNA details the blueprint of your life in each individual cell of your body. Of course, DNA is only a molecule—a double-stranded helix that resembles a miniature version of a spiral staircase. However, DNA is special because it has the ability to carry information. Each step of the microscopic spiral staircase can come in one of four variations (or bases), known as guanine, thymine, adenine, and cytosine. These are most commonly referred to in code as G, T, A, and C. The order in which these four variations appear on the DNA helix encodes a message in the molecular equivalent of Morse code. In Morse, a specific combination of dots and dashes stands for a specific letter or number. For instance, dash-dot-dot stands for the letter D. In DNA code, bases encode for a specific molecular building block known as an amino acid. There are 20 amino acids in the cell, each one of which corresponds to a specific sequence of three bases, known as a codon.

Amino acids are the essential building blocks of our cells. Much like Lego bricks, they can be combined in endless combinations to form long chains. Because of the physical properties of these amino acids, long amino-acid chains fold up in very particular ways—forming what is known as a protein. Proteins are the molecular machines that make it all happen inside each cell in the body. There are over 20,000 proteins encoded in the human genome and they carry out every function in the human body, from pumping salt out of your bloodstream and into your urine in the kidneys to making your muscle cells contract in your heart. The section of DNA that codes for a specific protein is known as a gene. While all humans share the same genes (our bodies generally work the same) we all carry around slightly different versions of them. This is what makes everyone unique!

It is no surprise that scientists have been trying to crack the genetic code since the early 1950s, when the DNA helix was first discovered. The entire human genome was decoded in the year 2000, a mammoth project that involved the efforts of over 1,000 scientists across six nations and lasted 15 years. Since then, the science of sequencing has rapidly evolved. Today, we can sequence the whole human genome in a single hour. At the same time, we have learned more and more about the information encoded in our DNA (what all those As, Gs, Cs, and Ts really mean). There are now commercial services that sequence DNA for a small fee and return to its owner information on health risks and even on where our ancestors came from.

One of these commercial sequencing services is called 23andme, so called since every person has 23 pairs of chromosomes. For


Photo by Andrej Uspenski

Autobiography, choreographer Wayne McGregor sequenced his own genome using this service. McGregor then choreographed 23 different dance portraits, reflecting those chromosome pairs. Before each performance, a mathematical equation based on his DNA sequence creates the order of the 23 different dances, reflecting both the randomness and precision of life itself and ensuring no two performances are the same.

McGregor has taken 23 different influences, artifacts, or memories that have each played an important part in his life and turned them into choreography, using the sequencing of his genome as a template. This raises interesting questions about the roles of genetics and a person's upbringing in shaping their biography. In other words, does nature, or nurture, define us? The relative contribution of inherited or acquired characteristics has been a long running debate in the field of psychology. In reality, neither genetic nor environmental factors act independently, and both are essential for any behavior. Indeed, *Autobiography* can be regarded as an analogy for how we interpret life. Our DNA is an initial template that provides a code for our behavior and biology, in the same way that McGregor's sequencing data provides a biochemical blueprint for his dance sections. However, it is our experiences that are shaped through the prism of culture and human interaction that interweave around our genetic codes to make you, you. ▪

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The UNC Science Writing and Communication Club (SWAC) was founded by a group of graduate students who sought to fill a gap in communication training for graduate students and postdocs in the sciences. SWAC publishes *The Pipettepen*, a science blog for general audiences written, edited, and published entirely by graduate students and postdocs. SWAC is proudly supported by UNC TIBBS (Training Initiatives in Biological and Biomedical Sciences).