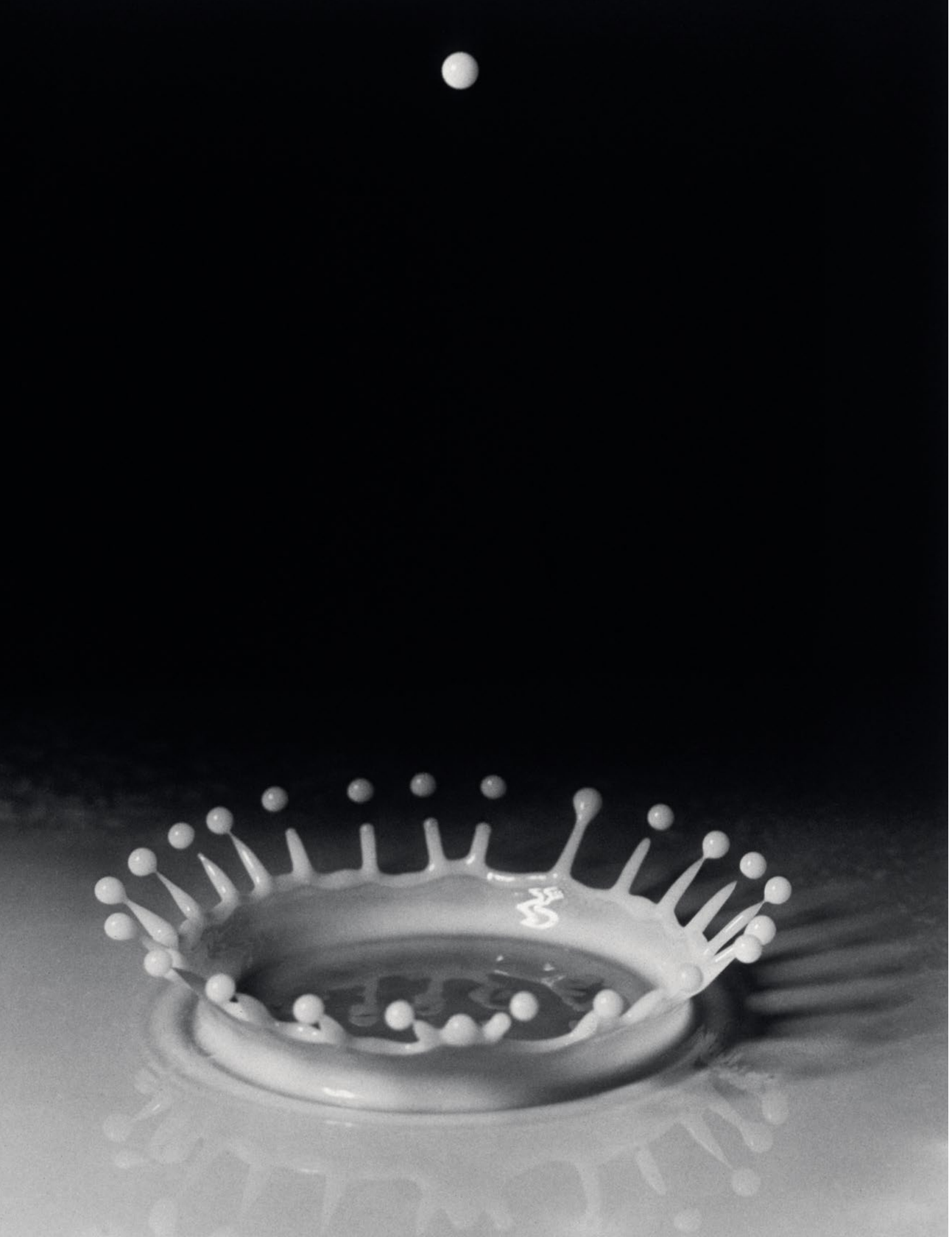


Harold Edgerton's *Milk Drop Coronet*, 1936. Edgerton made numerous studies of the exquisite and barely perceptible splash created by a drop of milk falling onto a thin layer of milk on a plate. Of this image he wrote, "In the land of splashes, what the scientist knows as Surface Tension is a sculptor in liquids, and fashions from them delicate shapes... too ephemeral for any eye but that of the high-speed camera"

PHOTOGRAPHS: HAROLD EUGENE EDGERTON/COURTESY OF MIT MUSEUM CALEB CHARLAND BERENICE ABBOTT/GETTY IMAGES

SCIENCE, ILLUSTRATED

Since the first Victorians picked up a camera, photography has been shedding light on the natural world. In turn these images advertise the very technology that makes them possible. Corey Keller explores the symbiotic relationship between science and photography

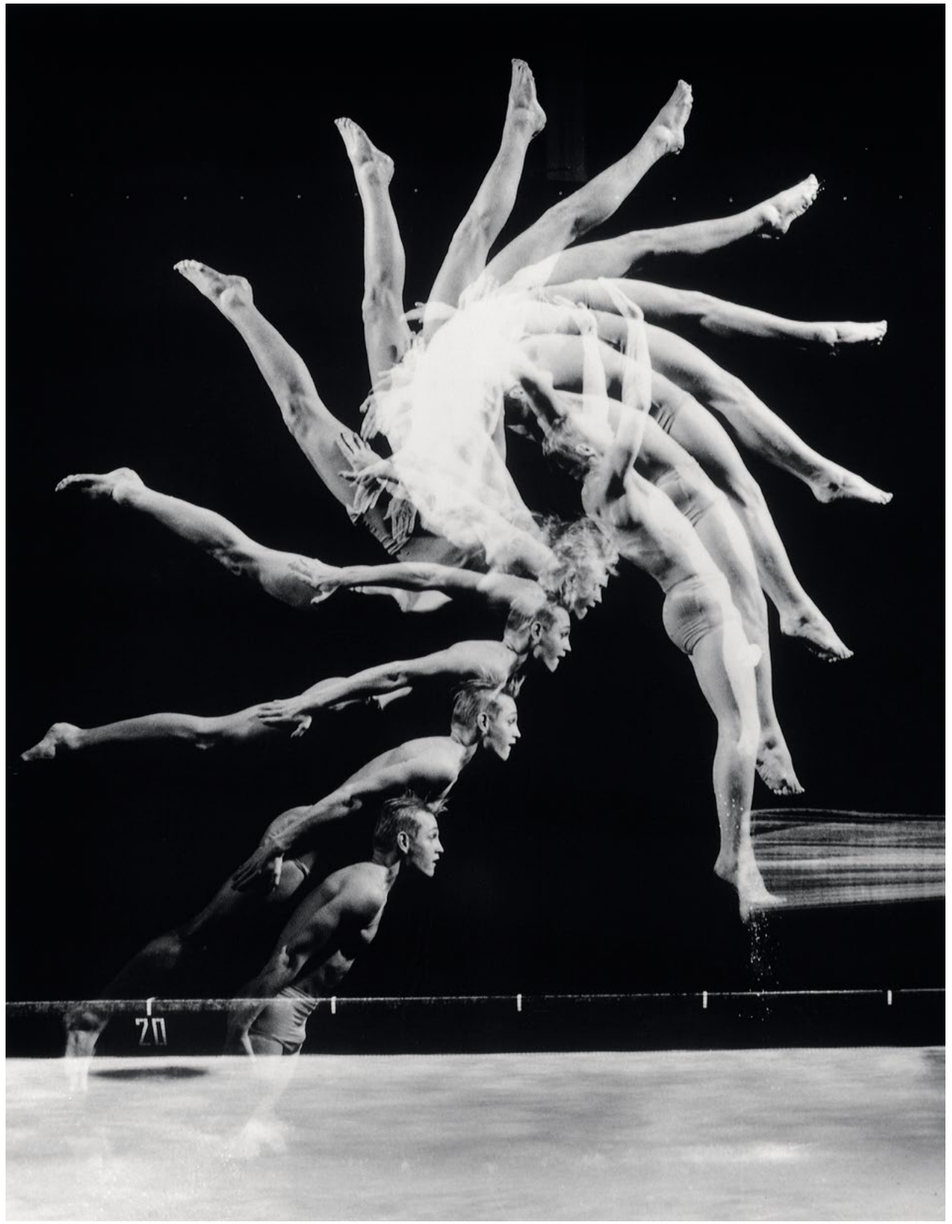
How do you photograph something you cannot see? We tend to think of photographs as simply recording the visible world in front of the lens, but from the very beginning photographers wrestled with the challenge of making pictures of things too small, too distant, or too fast for the eye to perceive. For the pioneering photographers of the nineteenth century, motion posed a particular hurdle: moving objects showed up in pictures as ghostly blurs or – more eerily – not at all. In the 1870s and '80s, men such as Eadweard Muybridge and Etienne-Jules Marey conducted radical experiments to stop time with a camera, experiments that upended conventional understandings of physiology and bodily mechanics. Muybridge's stop-action motion studies of a running horse, for example, revealed that painters had incorrectly represented the position of the animal's legs for centuries. Seeing was no longer believing: these pictures revealed the limits of the human senses and hinted at the mysteries beneath the threshold of perception.

Even as they reveal hidden truths, such images also inject the world with mystery and wonder. Scientific photographs thus often serve two audiences: they provide empirical evidence of things unseen, and they inspire the imagination of the general public about science. No one understood this better than Harold "Doc" Edgerton, a professor of electrical engineering at MIT. His split-second shot of a splash of milk is one of the most recognizable images in photographic history, a perfect marriage of engineering and aesthetics. Yet his photographs were a means to an end, which was to demonstrate the possibilities of his invention, the stroboscope. This electronic flash recharged almost instantly to fire at a thousandth of a second and could be synchronized with the film frames of a camera. Edgerton delighted in concocting dramatic scenarios that would show off its capacities, stopping a hummingbird's wings or a bullet in mid-flight. His theatrical pictures were wildly popular but were more than mere entertainment: he helped revolutionize entire fields of study, from ornithology to deep-sea diving to aerial surveillance. When Edgerton published his first book, *Flash! Seeing the Unseen by Ultra High-Speed Photography* (1939), it was described in *The New York Times* as "a compilation of magic and of things undreamed, calculated to excite the most sluggish mind."

In late 1950s America, the ability of photography to educate as well as enchant was pressed into service: the Soviet launch of Sputnik in 1957 profoundly shook America's confidence in its technological primacy and spurred a national campaign to promote science. As part of this effort, photographer Berenice Abbott was hired by MIT to help develop new ways of teaching. Abbott was not an engineer but an artist who believed photography had a special role to play in a "realistic and scientific age" as a "friendly interpreter between science and the layman." To the art world, she is perhaps better known for the portraits she made during her years in Paris as a student in the darkroom of the renowned Surrealist artist Man Ray, and for her studies of New York City during the 1930s. But she also made a significant body of scientific photographs and served as the photography editor of *Science Illustrated* prior to her work at MIT. Abbott was deeply inventive in her approach, combining artistic vision and technical ability (including some of the avant-garde techniques she had learned from Man Ray) with state-of-the-art equipment (she scoffed at the scientists who believed they could achieve similar outcomes with point-and-shoot cameras). Her visually elegant solutions for illustrating complex scientific principles – ranging from wave interference to magnetism – appeared in many a high-school textbook and helped shape a generation's scientific and visual literacy.

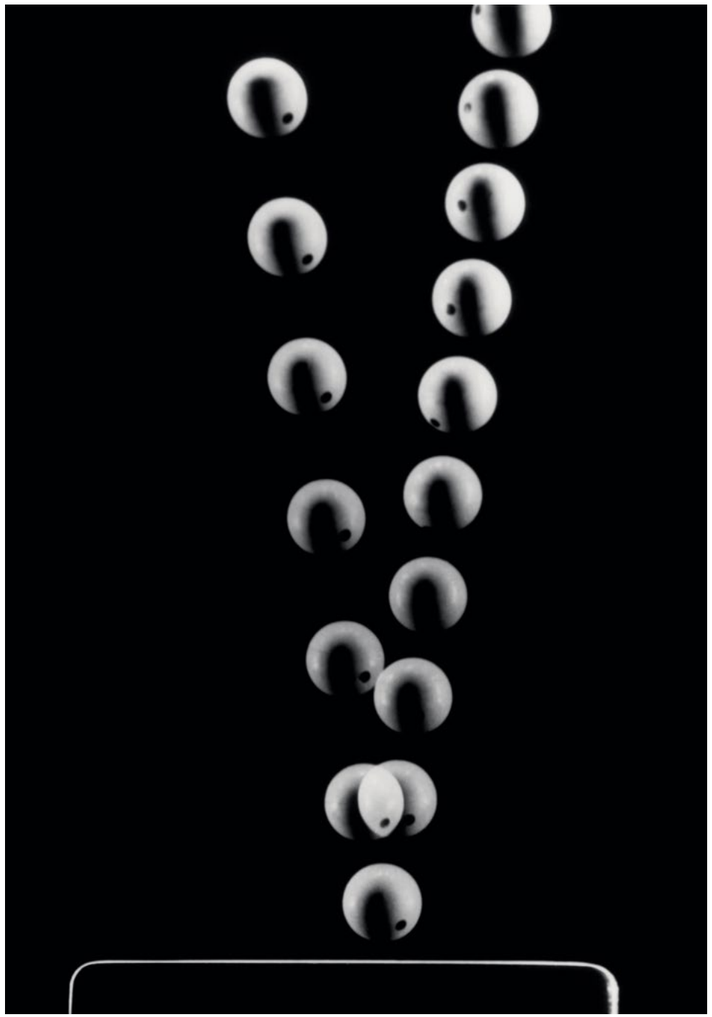
The kind of simple science experiments conducted by school children provide a point of departure for the work of contemporary artist Caleb Charland. These experiments, intended to both inspire and instruct, were transformed in Charland's photographs into exercises in whimsy and wonder. Using apples as electrical batteries to illuminate an orchard or brilliant sparklers to trace the ticking of a metronome, Charland's photographs prove that despite the ever-mounting quantities of scientific knowledge we might amass, it is impossible to reason away the sense of mystery in nature.✥

For more on this subject see the exclusive content on Patek Philippe Magazine Extra at patek.com/owners



Harold Edgerton's *Back Dive*, 1954 (right). To make this multiple-exposure photograph, Edgerton's multiflash fired rapidly – here at a rate of 30 exposures per second – while the shutter remained open. The flash was impeccably synchronized with the pace of the diver's movements, capturing the sequential phases of the dive's arc in a single frame

Caleb Charland's *Bouncing Penlight*, 2008 (far right). Charland's multiple-exposure image of the trajectory of a penlight as it bounces on a table pays homage to the scientific work of Edgerton and Abbott, both of whom photographed bouncing objects. Here, however, it is not a flash but the very subject itself that provides the illumination for the photograph



Left: Berenice Abbott's *Interference of Waves*, 1958-61. Abbott's photogram (a photographic image created without a camera) is an illustration of spherical wave interference as two waves intersect. Using a glass-bottomed water tank and an overhead flash, Abbott captured the shadows of the moving waves on a piece of photographic paper underneath the tank.

Above: *Strobe Photograph of a Bouncing Ball*, 1958-61. Abbott employs Harold Edgerton's electronic flash to show the trajectory of a bouncing ball. Her simple yet elegant images illustrating the abstract laws of physics were taken during her time with MIT. Her work introduced generations of American school children to scientific principles and inspired future artists (see page 53)