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Feature

Water Story

Issue

05

Graceful like a Ninja, Tracing the Poetic Journey of Water.

Feature

The Fluid World of Kanji: Exploring Water's Circulation through Animation

Constantly changing shapes as it circulates. If we were to express this freely flowing nature of water in kanji...?

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Supporting the Earth's Cycle: The Mysteries of Water

Water: a daily essential we drink, use, and see.Of course, it's also indispensable for the Earth's cycle. Here, we take a closer look at its unique properties.

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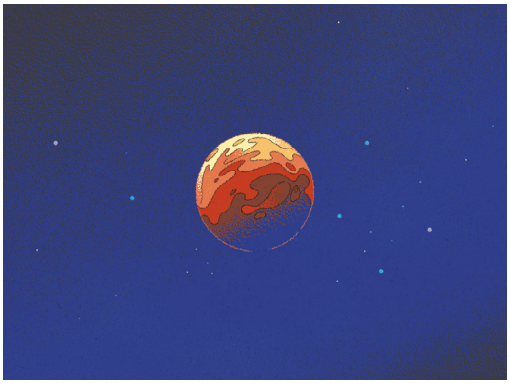

A Whisper from a Martian Meteorite: The Connection Between Space and Life

If you look at the big picture, human being is a very small part of the ecosystem. We are kept alive by others.

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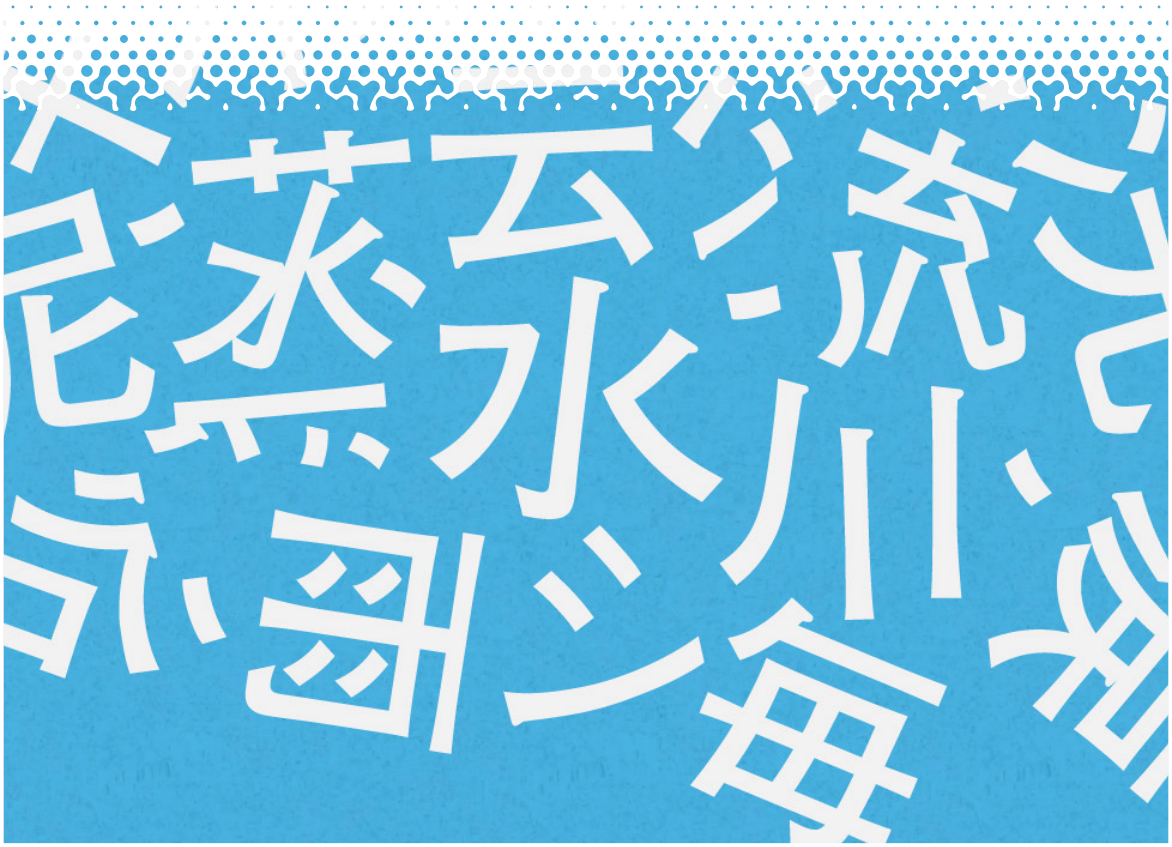
The Fluid World of Kanji: Exploring Water's Circulation through Animation



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Oceans, rivers, clouds, rain, ice—water is ever-present, constantly shifting forms and pervading every corner of our planet. Covering more than 70% of the Earth's surface and making up over 50% of the human body, water is truly essential.

Its diverse roles and meanings are reflected in the vast number of kanji characters associated with it. According to Dai Kan-Wa Jiten, there are an impressive 1,816 kanji featuring the radicals 水 (mizu) and 氵 (sanzui). Water is not only crucial in our daily lives but also prominently featured in the language.

Art director and graphic designer Takuto Okamoto will bring this dynamic cycle of water to life through his innovative animations.

Shifting Forms Freely

水 → 蒸(蒸気) → 氷 → 水
water → steam → ice → water

—

As temperatures rise, water vaporizes and disperses into the air. When temperatures drop, it solidifies into ice, shimmering in the cold.
Water continually changes its form, adapting to both nature and our daily lives.

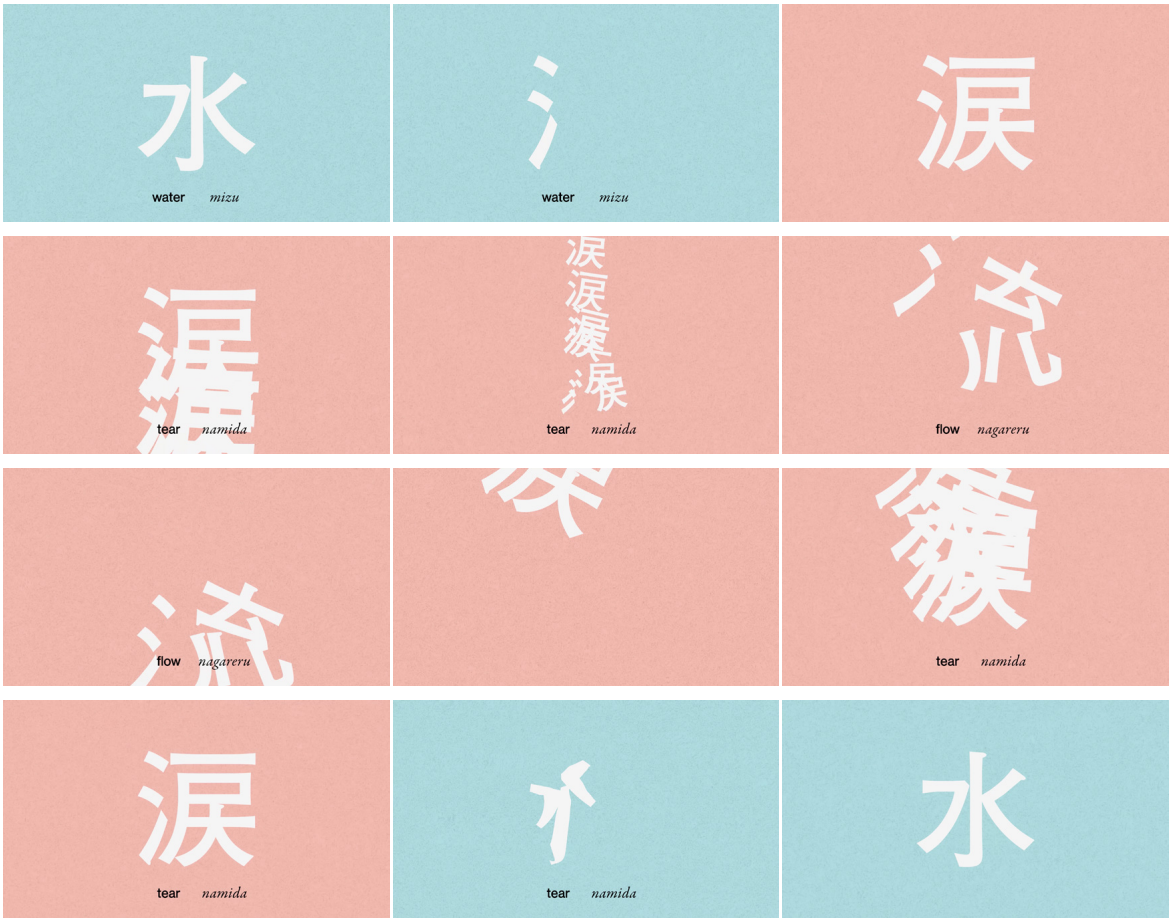
Circulating and Traveling the Earth

水 → 川 → 海 → 雲 → 雨 → 浸(浸透) → 水
water → river → ocean → cloud → rain → soak → water

—

Rivers flow towards the sea.
Seawater evaporates, forming clouds that drift across the sky.
Rain returns to the ground and eventually makes its way back to the rivers.
This global water cycle is endless.

Emotions Flow Out



水 → 涙 → 流 → 涙 → 水
water → tear → flow → tear → water

—

The radical 氵 symbolizes the flow of water.
Tears, composed of water, are a physical manifestation of our emotions.
As we cry, tears carry away our sadness and joy.
But where do these emotions go once they leave the body?

Fascinating People Since Ancient Times

水 → 沸 → 湯 → 浴 → 水
water → boil → warm(water) → bath → water

—

The kanji 浴, meaning bath, represents water stored in a basin.
The bath, originating in Mesopotamia around 4000 BC, continues to captivate people today.
It's a remarkable invention that transforms water into a source of comfort and happiness.

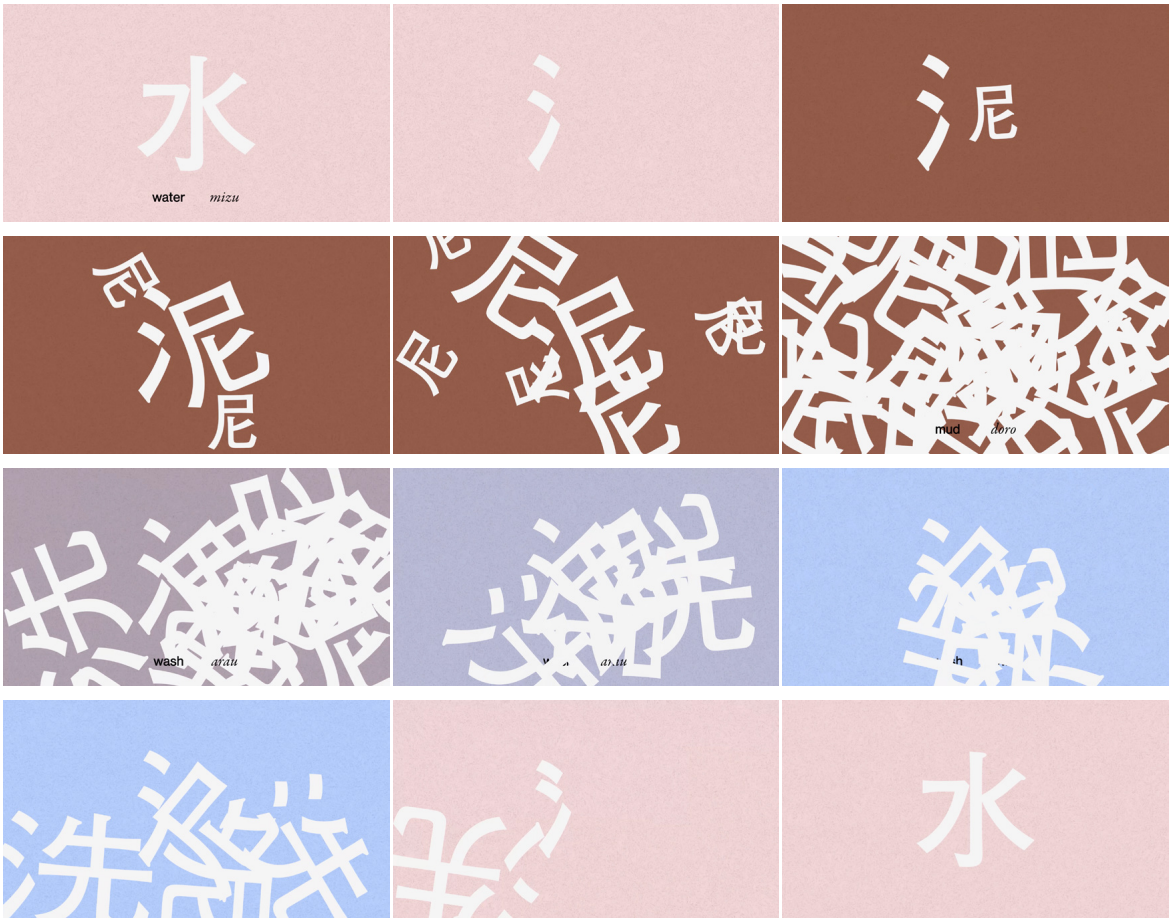
Nourishing Our Bodies

水 → 汗 → 渇 → 潤 → 水
water → sweat → thirst → moist → water

—

Sweating makes us thirsty, signaling our bodies' need for water.
Our bodies are largely composed of water, which we constantly replenish.
The kanji 潤 depicts treasures overflowing within a gate, symbolizing "moisturizing" or "containing moisture."
To us, water is indeed a precious resource.

Dirtying and Cleaning



水 → 泥 → 洗 → 水
water → mud → wash → water
—
Mud is essentially soil saturated with water.
Water exerts its power in various ways, whether it's to make things dirty or to clean them.
It remains a colorless, transparent presence with a neutral impact—neither adding nor subtracting.

When Water Takes on Color

水 → 濃 → 淡 → 滲 → 消 → 水
water → dark → light → blur → fade → water

—

Place a drop of water on paper.
The liquid seeps in, spreading and blurring the edges.
What starts as a clear, colorless liquid eventually takes on a hue, creating a fleeting and ephemeral color that soon fades.

Animation: Takuto Okamoto

Supporting the Earth's Cycle: The Mysteries of Water

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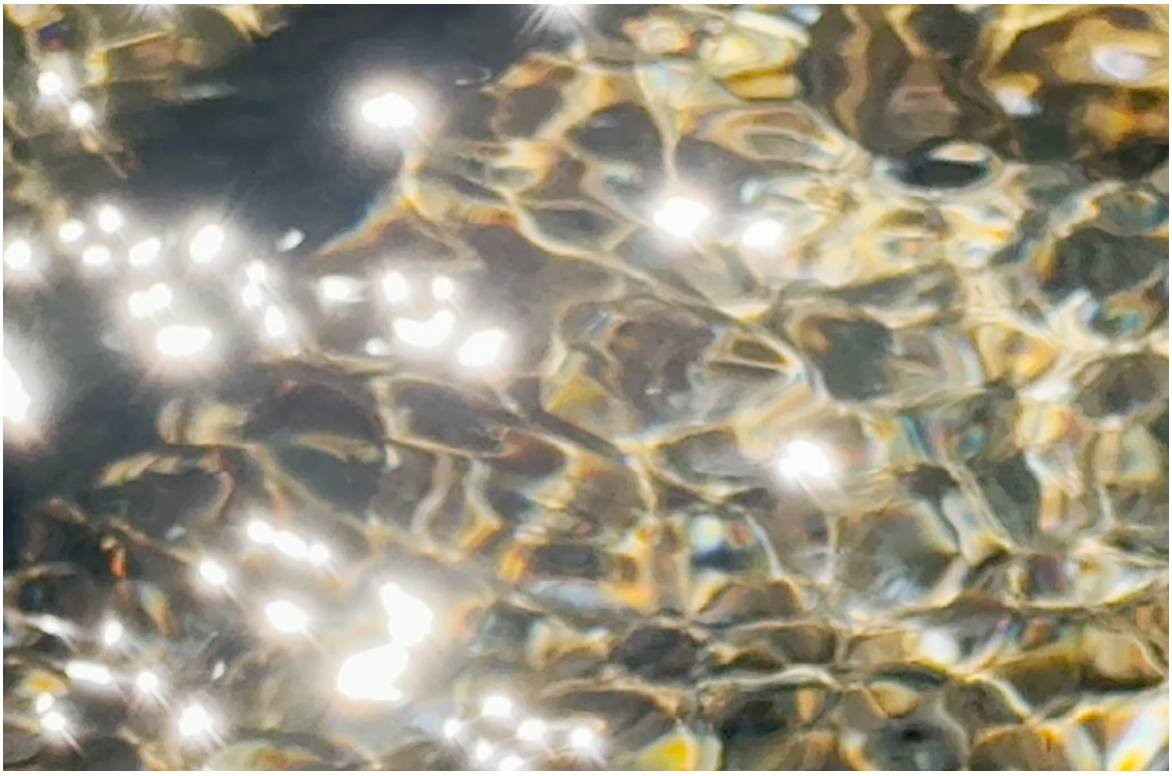
Water, which supports the Earth's cycle as it moves from underground to the atmosphere, is an integral part of our lives. We drink it, use it, and take its presence for granted. But without water, we wouldn't exist. Utilizing and coexisting with water is one of humanity's great challenges. This article explores the various "mysteries" of water. It might slightly change your perception of this everyday element.

Water Has Been Circulating on Earth Since Ancient Times

Water evaporates to form clouds, falls as rain, and flows through various routes like groundwater, springs, rivers, and lakes, eventually reaching the ocean, only to evaporate again into water vapor. This is the fundamental water cycle. On Earth, water constantly circulates in different forms, with its total volume remaining nearly constant. In other words, the water we have today, like the water that flows from our taps, is the same water that has existed on Earth for eons, undergoing changes and movements over time. This is a fascinating way to understand the water around us.



Water Can Contain Various Substances

Pour water into a glass filled with ice, and the ice naturally floats. But this phenomenon is actually quite rare. Generally, substances shrink when cooled and expand when heated. As a liquid cools and solidifies, it becomes denser and heavier. However, water behaves differently—it becomes less dense and lighter when it freezes, allowing ice to float. If ice were heavier than water, oceans and lakes would freeze solid, halting the water cycle, and Earth might have become a "planet of ice" instead of a "planet of water."

Water Contains More Than Just Water

Water has a unique ability to dissolve many substances. Although four-fifths of Earth's surface is covered by oceans, which are primarily composed of water, almost all elements found on Earth are dissolved in the oceans. Sodium, chlorine, magnesium, as well as metals, organic compounds, and gases... although present in trace amounts, water's ability to dissolve such a wide range of substances makes this possible. Doesn't the saying "the ocean is the mother of all life" seem even more convincing now?

Speaking of Which, Alcohol is Also a Solution

In the past, alcohol was consumed more frequently than water in many European cities. Alcohol is an aqueous solution of ethanol, and its flavor is determined by "what is dissolved in the water." Take whiskey, for example. When the clear, raw whiskey is aged in barrels for a long time, components from the wood dissolve into the liquid, giving it an amber hue and rich aromas. The process of "distillation," which increases alcohol concentration and aroma, utilizes the property of water transforming into vapor when heated and returning to liquid when cooled. In this way, whiskey's complex flavors are a product of water's properties.

Taking Responsibility for the Water Cycle

Producing whiskey, which relies on water's properties, requires high-quality water. In Hokuto City, Yamanashi Prefecture, where the photos for this article were taken, is Suntory's Hakushu Distillery. Here, single malt whiskies like "Hakushu" are made using groundwater rich in minerals, nurtured deep within the surrounding forests that support diverse life. However, simply drawing this water could lead to depletion. How can we sustain the groundwater cycle? Suntory has made its "Natural Water Sanctuary" a core business activity, carrying out reforestation and biodiversity conservation efforts in the forests that serve as water sources for its domestic factories. The company also actively works on visualizing groundwater flow, claiming to nurture more than twice the amount of water it draws through these efforts. Looking 50, 100 years ahead, protecting the "water cycle" is becoming an increasingly vital theme in corporate activities.

The Miracle of Earth's Abundant Water

Let's shift our perspective to outer space. Research has shown that water existed on other planets as well. For example, numerous traces of past water have been found on Mars's surface, confirmed by planetary probes that have landed on the planet. Meteorites from Mars that have reached Earth also contain clay minerals, substances that could not exist without water. Meanwhile, analysis of Venus's atmosphere has revealed that it is enveloped in water vapor.

However, there seems to be no other planet like Earth that still retains large amounts of liquid water on its surface. On Venus, high surface temperatures cause water to evaporate rapidly, while on Mars, temperatures are too low and gravity is weaker than Earth's, resulting in the loss of liquid water from its surface. The unique combination of conditions that allow Earth to hold vast quantities of liquid water has created its expansive oceans, making it a miraculous planet that supports rich life.

In Search of Sustainable Water

As mentioned at the beginning of this article, according to the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) website, the total amount of water on Earth remains nearly constant, but only about 0.01% of it is accessible fresh water for human use. Various factors can also contaminate this limited resource. Fresh water is essential for sustaining life, yet people are becoming aware that it is a "scarce resource" globally. Currently, efforts to secure "sustainable fresh water" are underway worldwide, with new technologies emerging. For example, technologies that extract water from atmospheric moisture or advanced filtration membranes that desalinate seawater are expanding the potential for "sustainable fresh water" supplies.
Japanese companies are also stepping up. Kurita Water Industries, which specializes in water treatment systems, has begun developing a "next-generation water recycling demonstration system" for use in space. This system purifies recovered urine to a level suitable for drinking, and has already cleared demonstration tests in space, paving the way for future manned space missions. Even as humanity ventures into space, the "water cycle" remains a crucial theme.

Water is a familiar and essential element for humanity. Therefore, understanding its properties, supporting the "water cycle" in various ways, and passing it on to future generations will become increasingly significant themes for enhancing global sustainability.

Movie: Masahiro Muramatsu

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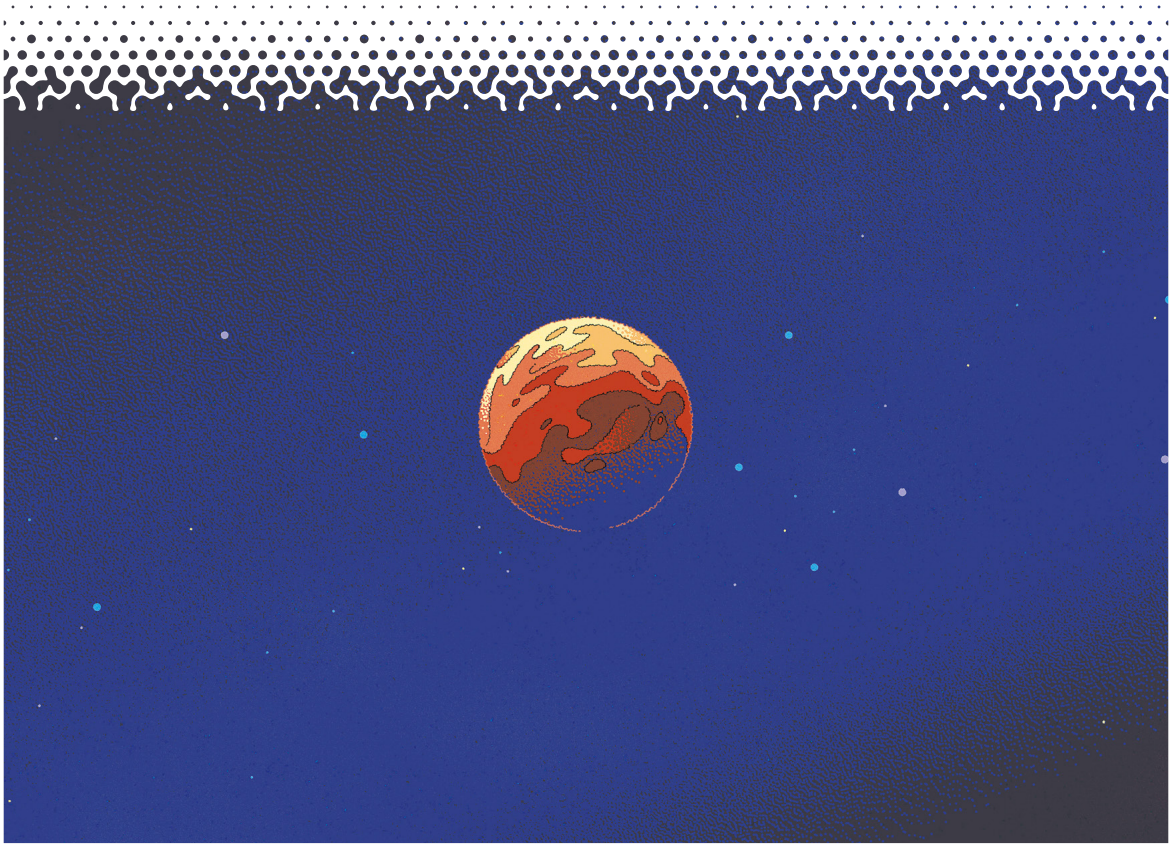
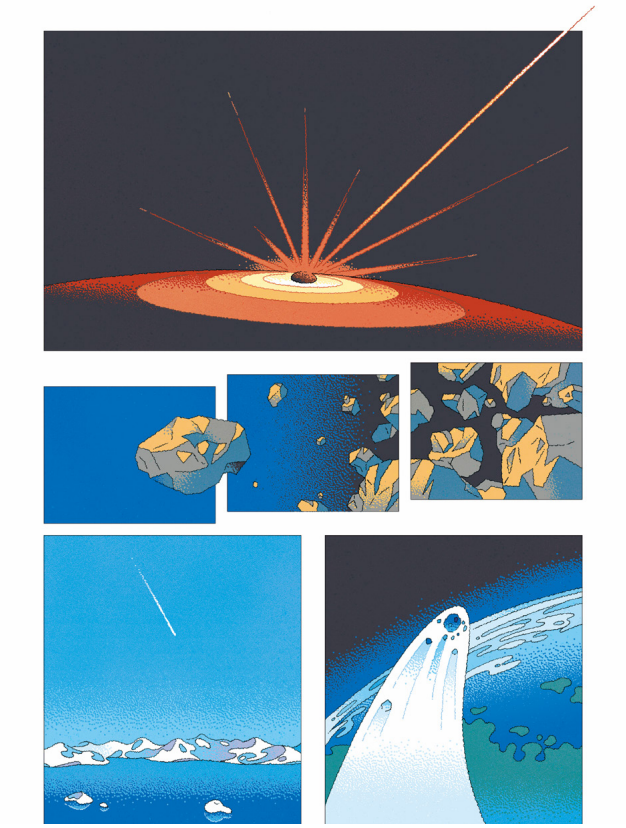
A Whisper from a Martian Meteorite: The Connection Between Space and Life



Mars, often referred to as Earth's brother planet, is the fourth planet from the Sun, orbiting just beyond Earth. Despite being our celestial neighbor, the average distance between the two planets exceeds 200 million kilometers. Even with the most advanced rockets, it would take hundreds of days to reach Mars. Today, we share the miraculous story of a rock from Mars that made its way to Earth and humanity's remarkable encounter with it.



Approximately 10 million years ago, a massive meteorite collided with Mars, sending fragments hurtling into space. These fragments drifted silently around the Sun for an incredibly long time, gradually making their way toward Earth. Tens of thousands of years ago, one such fragment entered Earth's atmosphere. Although the impact caused it to crack and partially melt, it managed to retain much of its original size upon reaching our planet.

Remarkably, this Martian rock did not fall into the vast oceans that cover most of Earth, nor did it land in rain-prone regions. Instead, it came to rest in Antarctica, a continent blanketed by ice and snow. Had it fallen into the ocean, it might never have been found by humans, and if it had landed in a region exposed to wind and rain, it would have weathered away over time. Instead, Antarctica's frozen environment preserved the rock in a near-frozen state for tens of thousands of years.

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● Insight: A 10-Million-Year Journey

Research has determined that the Martian meteorite wandered through space for approximately 10 million years. This figure was calculated using advanced mass spectrometry techniques for precise age measurement. It's important to note that not all celestial fragments entering Earth's atmosphere are discovered as meteorites. Many smaller fragments burn up and disintegrate upon entry due to the immense heat and pressure. The journey of this meteorite is one of incredible endurance, surviving the vast expanse of space and the fiery descent to Earth.

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On November 29, 2000, Naoya Imae of the National Institute of Polar Research, while exploring near the Yamato Mountains as part of an Antarctic expedition, discovered an unusual black rock roughly the size of a rugby ball. A portion of the rock had weathered away, revealing a glossy, greenish mineral inside. Although it was immediately identified as a meteorite, its origin remained unknown. The rock was transported back to the research station and named "Yamato 000593."

—

●Insight: A Meteorite Treasure Trove

The National Institute of Polar Research's Showa Station is located on East Ongul Island, about 14,000 kilometers from Japan, along the eastern shore of Lützow-Holm Bay.

Antarctica is known as the most abundant location for meteorites on Earth due to several factors. The vast white ice makes the dark meteorites highly visible, the cold and dry climate helps preserve them in excellent condition, and the movement of glaciers channels meteorites to specific areas known as "meteorite fields." Yamato 000593 was found in such a field. The name "Yamato 000593" reflects its discovery site in the Yamato Mountains ice field (located approximately 350 kilometers southwest of Showa Station). The prefix "00" represents the collection year (2000), and "0593" denotes its sequential number among the meteorites collected that year.

Key factors for the successful discovery of Yamato 000593 can be attributed to the dedicated efforts of the Japanese Antarctic research program. Regular wintering observations at Showa Station, thorough preparation during the winter months, and concentrated meteorite exploration during the summer period contributed significantly to the success. This systematic and sustained approach in Japan's Antarctic research program played a crucial role in achieving this discovery. The longstanding commitment of Japan's Antarctic research efforts played a significant role in this achievement.

—

The following year, the research team brought the rock back to Japan for detailed analysis. Using precision cutting tools capable of slicing through rock and glass, they prepared thin sections of the meteorite to examine under an optical microscope. When light was passed through the samples, distinctive mineral patterns emerged.

“It’s a Nakhlite!” exclaimed the researchers.

Nakhlites are an extremely rare type of meteorite believed to originate from Mars. Further analysis, including studying the gas composition trapped within the rock, provided definitive proof that Yamato 000593 had indeed come from Mars.

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●Insight: The Value of Nakhlite Meteorites

Yamato 000593 was scientifically confirmed to be of Martian origin based on detailed records from previous Mars exploration satellites. Out of the approximately 17,400 meteorites preserved at the National Institute of Polar Research as of December 2024, only 15 have been confirmed to originate from Mars. Nakhlites are even rarer, and Yamato 000593 is only the fourth such discovery worldwide.

Moreover, it is one of the largest nakhlite meteorites ever found, measuring 29 cm in width, 22 cm in depth, 17.5 cm in height, and weighing approximately 13 kg. Despite its fragile structure, which causes it to shed small fragments when handled, it has remained remarkably well-preserved in Antarctica’s icy environment for tens of thousands of years.

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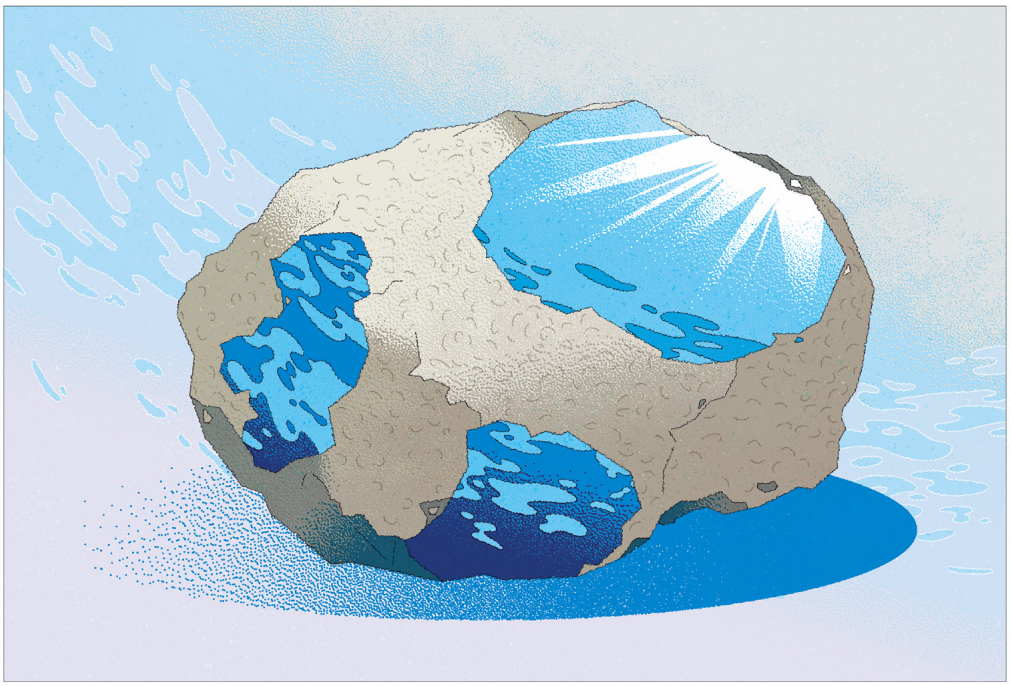

Yamato 000593 has attracted significant attention because it provides crucial evidence that water once existed on Mars. Today, Mars has a thin atmosphere and extreme temperature fluctuations, making it inhospitable to life as we know it. However, just as life evolved in Earth's vast oceans, Mars may have once been home to large bodies of water and even life.

In 2024, discoveries suggested the presence of liquid water deep beneath the Martian surface. If water exists on Mars, it could open possibilities for future human habitation. Studies of Martian meteorites, including Yamato 000593, continue to uncover Mars' past and present, potentially holding the key to shaping humanity's future.

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● Insight: Mars' Water

Clay minerals, which can only form in the presence of water, have been found in Martian meteorites. This indicates that the rock was once part of a water-rich environment on Mars. Geological formations on the Martian surface suggest the presence of ancient lakes and rivers, supporting the theory of a warmer and wetter climate in the past. While Mars today holds only trace amounts of water vapor and ice, in 2024, NASA announced findings of substantial underground water reservoirs.

The presence of water on Mars carries profound implications for humanity. It not only hints at the possibility of past or present extraterrestrial life but also serves as a vital resource for future exploration and colonization efforts. These discoveries provide essential clues for ongoing missions searching for signs of life on the Red Planet.

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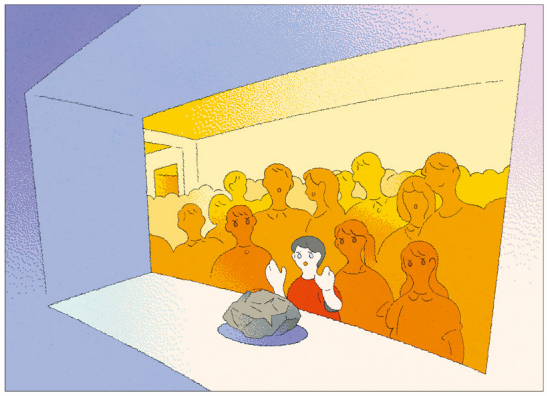

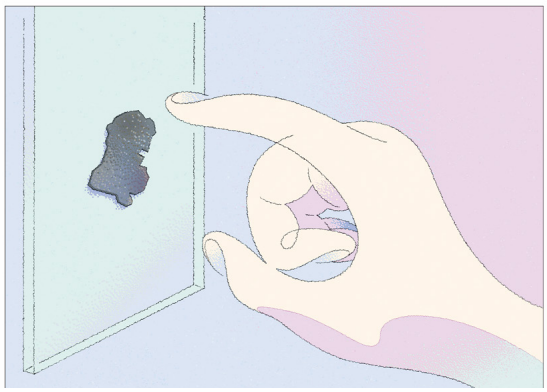

In the spring of 2025, Yamato 000593 will be exhibited at the Japan Pavilion of the Osaka-Kansai Expo. Visitors will not only be able to see it but also touch a portion of it. This ancient rock, which embarked on its interplanetary journey 10 million years ago, represents the boundless potential of space exploration.

—

●Insight: Moon Rock and Mars Rock

At the 1970 Osaka Expo, the Apollo 12 moon rock fascinated visitors and symbolized the era's ambitious space exploration. Half a century later, Expo 2025 will display a Martian rock, offering a new glimpse into space discovery. While the Apollo program paved the way for lunar exploration, today's Artemis program aims to take humanity to Mars via the Moon.

The United States has set its sights on manned Mars missions, while visionaries like Elon Musk advocate for human colonization of the Red Planet. Japan's JAXA also plans to retrieve samples from Phobos, Mars' moon. Though Yamato 000593 fell to Earth as a meteorite rather than being brought back by astronauts, it is a powerful reminder of humanity's future ambitions to set foot on Mars.

Both the moon and Mars rocks embody the spirit of their respective eras, symbolizing humankind's unyielding quest to explore the cosmos. With each discovery, we inch closer to a future among the stars.

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Whether by chance or fate, this Martian rock has taught us profound lessons. Even if humanity ceases to exist one day, the water in our bodies and the vast waters covering Earth will continue their journey, perhaps reaching another distant star. Future civilizations might decipher our way of life, our intricate bodies, and Earth's vibrant ecosystem through these remnants.

Human life is but a fleeting moment in the vast timeline of the universe, yet matter continuously circulates, leading to new forms of life in the distant future.

Doesn't the world before us appear different when we reflect on our place in the cosmos? As we contemplate our existence as part of the vast universe, we conclude with a poem "The Body" by the late Shuntaro Tanikawa from his collection Chagall and Leaves:

—

The body – inner darkness ....
That's me.
The only me.

A forest of swaying cilia ....
a well of squirming stomach
linings ....
a canal of spurting blood ....

The body – an unknown planet
afloat in darkness ....
That's you
who smiles at me.

Life is hidden
even in single molecule.

But however hard we search
we cannot discern the secret.

What we discover, always, is
the joy of our own surprise and
awe.

Such faint stirring
of such tiny shapes ....
No one can hear the roar
of that explosion.

The quietness of life
is deeper than the silence of
death.

That which never fails of
resurrection today
which is the outcome of death
repeated ——
that is the body.

Special Thanks to: National Institute of Polar Research
Illustration: Mizuki Miyaoka
Story text: Kon Ito
Poem: Shuntaro Tanikawa