

Science & Technology Briefs

Wastewater Study Shows SARS CoV-2 Mutations

A new [study](#) analyzing the presence of SARS CoV-2 in wastewater at three locations in the New York City metropolitan area indicates that there is still an abundance of mutating in the coronavirus family, and the numbers of more than a few of the lower-profile mutations over the last two years correlate with the waves of higher hospitalizations and deaths. The study was done by Columbia University, led by wastewater expert Kartik Chandran.

While attention to mutations has mostly centered upon those in the *spike protein* area to vector vaccine designs to interfere with the virus's ability to attach itself to human cells, this study focuses on mutations in other parts of the coronavirus as suspects in the seemingly irregular behavior in the spread of COVID-19. Around 60% of the mutations tracked were outside the spike protein, including some whose effects are not yet understood.

Two main results were reported: (1) ten mutations were strongly correlated with rates of positivity, hospitalization, and mortality, and (2) six mutations (two in the spike protein and four in non-spike proteins) seem to enhance transmissibility and infectivity. One particular mutation (T951), one of the two spike protein mutations, was found in both categories. The report's abstract states:

"The results from our study suggest that there are relatively understudied mutations in the spike protein (H655Y, T951) and understudied mutations occurring in non-spike proteins (N, ORF1b, ORF9b and ORF9c), that are enhancing transmissibility and infectivity among human populations,

warranting further investigation."

Correlations are not proof of causality, but this study of viral presence in the wastewater in the greater New York City area suggests that progress is possible if the war against the coronavirus is carried out thoroughly.

Delta and Omicron COVID Variants Have Merged

It has now been confirmed that the almost forgotten Delta variant and the ubiquitous Omicron variant have merged into a hybrid. Rarer than mutations within a single strain, this variant has been dubbed "Deltacron."

On Aug. 6, the Russian federal agency for consumer health oversight, Rospotrebnadzor, [confirmed](#) 6 cases of the hybrid in Russia. It made the data behind its finding available on the VGARus (Virus Genome Aggregator of Russia) database. Scientists at the Smorodintsev Research Institute of Influenza in St. Petersburg first discovered "Deltacron" in early July. Among other surprises, the ability of the "dinosaur" Delta variant to re-emerge was not an obvious development. So far, the six patients have not been hospitalized and do not seem to have suffered severe symptoms.

Afghanistan Is Building Three New Dams To Irrigate 2 Million Acres

Xinhua reported July 16 on the efforts being made to tackle the terrible food and health crises hitting Afghanistan. Three small dams are being built on a river in the mountainous southern province of Kandahar, well known for its grapes, melons, and pomegranates, but where production has been badly affected by years of drought. Local

farmers have dug wells to irrigate their gardens and farmland, but this has led to further loss of subsurface water, causing more problems. The new dams will bring more than 2 million acres of farmland under irrigation.

China's Scientific Community Announces Major Research Areas

On June 28, the China Association for Science and Technology (CAST) announced 30 major science and technology focus areas for 2022, during the closing ceremony of its annual conference, held in Changsha, Hunan Province. CAST received 649 proposals, with more than 30,000 professionals participating in the selection process.

Among the fields chosen were basic science, manufacturing technology, advanced materials science, agricultural science and technology, and aerospace science and technology.

In a short story written in 1947 by German-American space visionary Krafft Ehrlicke, all of the world's top scientists convene every 50 years to discuss the major issues that challenge all the fields of science, and to set research priorities and goals.

Today in the United States, those responsibilities are shouldered by the National Academy of Sciences, which produces decadal reports to give direction to many fields of science. The Academy was established by an Act of Congress in 1863 and was presided over until 1907 by one or another of a group of scientists who called themselves the Lazzaroni, originally headed by Alexander Dallas Bache, great-grandson of Ben Franklin, with the strong support of President Lincoln, to give the scientific community indepen-

dence to set its own agenda for research and to advise policymakers.

Semiconductor Technology Advances in China and the United States

The *South China Morning Post* (SCMP) [reports](#) July 26 that China's Semiconductor Manufacturing International Corporation (SMIC), based in Shanghai, has advanced further and faster than previously thought, likely having learned to produce microchips at the 7-nanometer level, a new milestone for Chinese semiconductor production. While there are two companies that are slightly ahead of SMIC—Taiwan Semiconductor Manufacturing and Samsung in South Korea, which are able to produce at the smaller 5 nm level—SMIC is shocking the industry with the speed of its gains, and is likely only one or two generations of technology behind the others.

SCMP says this likely will lead to increased sanctions against SMIC, which is already on a U.S. entity list that prohibits it from importing machines and equipment used to make such nano-chips. However, as is the case with the current sanctions on Russia, such measures often have an effect opposite to that intended, spurring the victim of sanctions to make a leap and become fully independent.

On Aug. 25, President Joe Biden signed an Executive Order to implement the semiconductor funding in the new CHIPS and Science Act of 2022. The Act also prohibits U.S. government funding of companies expanding semiconductor manufacturing “in China or any other country that poses a threat to U.S. national security.”

Japan Goes Nuclear, Again

In 2011, an earthquake and the ensuing tsunami compromised Japan's

Fukushima nuclear power plant. Japan over-reacted by closing 46 of its 50 reactors and ceased building new ones. Nuclear power, which had provided a third of the nation's electricity before the accident, fell to less than 8%.

Japan has now decided to break free of the Green Deal's death grip of solar and wind power as the alleged only alternative to the combustion of fossil fuels, erroneously alleged to be responsible for raising CO₂ levels in the atmosphere that allegedly will cause the world's temperature to rise to levels allegedly catastrophic to man and the planet.

Prime Minister Fumio Kishida is living up to his campaign promise to restore nuclear power in Japan by restarting 17 idled plants and extending the lifespan of others. And the Ministry of Economy, Trade and Industry has compiled a draft plan for the production of next-generation light water nuclear power plants with intent to start commercial operation in the 2030s.

South Korea's Lunar Orbiter To Look for Water, Uranium, Helium-3, Silicon

On Aug. 4 a SpaceX Falcon 9 lifted off from Cape Canaveral, Florida, carrying the Republic of Korea's lunar orbiter, *Danuri*. President Yoon Suk-yeol described the spacecraft as the “Pathfinder” that will give a boost to South Korea's economy and scientific prowess. “I look forward to seeing images of the Moon ... at the end of the year. Go for it, *Danuri!*”

Danuri will fly to the Moon on a low-energy, fuel-efficient ballistic trajectory, arriving Dec. 16 to begin a year-long mission. Carrying six scientific instruments, including a camera, it will survey for water ice, uranium, helium-3, silicon, and aluminum, and produce a topographic map to facili-

tate future landings. In March 2021, then President Moon Jae-in vowed to launch South Korea's first robotic Moon lander on a domestically developed rocket by 2030. Developing a rocket with that capability had been pursued by South Korea earlier, but was sabotaged by the United States, which claimed it would have consequences for non-proliferation. Now, South Korea is on course as the seventh nation to produce a spacecraft to orbit the Moon.

The James Webb Space Telescope Could Make Your Planet Safer

In addition to the amazing images from deep space captured by the James Webb Space Telescope, NASA has also [released](#) a few of its images of Solar System objects, including Jupiter and three of its moons. Created earlier, while the Webb was going through the commissioning process, they also have astonishing resolution and detail. Not only are the rings of Jupiter and its moons very clear, but so is the shadow on Jupiter's clouds cast by one of its moons, Europa.

NASA experts now anticipate the possibility of watching the signatures of volcanic plumes depositing matter on the surface of Europa or other moons.

Another capability of interest is the speed of Webb's tracking ability, since it can “see” not only planetary moons but much smaller asteroids (as dots). The telescope was designed to have a top tracking speed of 30 milliarcseconds per second, which would be the speed of Mars moving across the field of vision. But it has proven to “get valuable data with all science instruments” at more than twice that speed, up to 67 milliarcseconds per second. It will be able to track comets within the Solar System, for example.