

Science & Technology Briefs

Experts Recommend that FDA Authorize Novavax COVID-19 Vaccine

In a June 6 [press release](#), the pharmaceutical company Novavax, Inc. reported on a unanimous vote by the Food and Drug Administration's Advisory Committee of some 21 vaccine experts recommending Emergency Use Authorization of its "PREVENT-19" (NVX-CoV2373) COVID-19 vaccine for people aged 18 or older.

PREVENT-19 is a protein-based vaccine engineered from the genetic sequence of the first strain of SARS-CoV-2, the virus that causes COVID-19 disease. It was created using Novavax's recombinant nanoparticle technology to generate antigens derived from the coronavirus spike protein. It is formulated with Novavax's patented saponin-based Matrix-M™ adjuvant to enhance the immune response and stimulate high levels of neutralizing antibodies. PREVENT-19 contains purified protein antigen and can neither replicate, nor can it cause COVID-19. As the two-shot delivery offers antigens directly, rather than having the body make them through a process involving mRNA messages (as with the Moderna and Pfizer/BioNTech vaccines), or adenoviruses (Johnson & Johnson vaccine), it may see use among people who have chosen not to take mRNA vaccines, and it may be useful as a booster by virtue of its having a different approach.

In its Phase 3 clinical trial, PREVENT-19 demonstrated a 90.4% efficacy. It is unknown when (or if) the FDA will grant an Emergency Use Authorization. PREVENT-19 has already received authorization for use in more than 40 countries.

Climate Modelers Were 'Allergic' to Implications of Ancient Pollen Counts

The spreading and receding of vegetation over the past 12,000 years have played a larger role in global temperature change than current models recognize. That is the conclusion of Alexander Thompson, a postdoctoral research associate in earth and planetary sciences at the University of Michigan.

Climate modelers had found a consistently rising global temperature from about 11,700 years ago, when the last Ice Age was ending. They used models that relied heavily on variations in atmospheric carbon dioxide concentration and ice cover. But beginning 5,000 years ago, both marine and terrestrial temperature proxy data (tree rings, ice cores, corals, ocean and lake sediments) indicate a global cooling. Not only did this disagree with the modeled results, but the physical mechanism for such a cooling was unknown.

Thompson argues that significant changes in vegetation cover resolve, or help to resolve this discrepancy. Such changes are measurable through the dating and counting of ancient pollen embedded in geological strata and sediments. Vegetation lowers Earth's reflectivity (albedo), so that more energy from the Sun's rays can be absorbed. Vegetation also warms the Earth by reducing the mobilization of dust by wind; dust shields the Earth from the Sun.

His study, "Northern Hemisphere Vegetation Change Drives a Holocene Thermal Maximum," [appeared](#) April 15 in *Science Advances*. The Holocene is the current geological epoch, which began when the last Ice Age was ending.

Early in this epoch, grasslands covered the region of the present-day

Sahara Desert. Much of the Northern Hemisphere was covered with vegetation that included coniferous and deciduous forests extending from the mid-latitudes to the Arctic.

Thompson took evidence from pollen records and designed a set of experiments with a well known climate model known as the Community Earth System Model (CESM). He ran simulations to account for a range of changes in vegetation that had not been previously considered.

In a "Newsroom" [article](#), published by Washington University in St. Louis, Thompson is quoted:

"Expanded vegetation during the Holocene warmed the globe by as much as 1.5° Fahrenheit. Our new simulations align closely with paleoclimate proxies, so this is exciting, that we can point to Northern Hemisphere vegetation as one potential factor that allows us to resolve the controversial 'Holocene temperature conundrum'."

In light of his correction, the modeling of temperature change in the 19th and 20th centuries, as well as forecasting, need to have the same correctives applied, and cannot otherwise be realistic.

According to his study, "Our results demonstrate that vegetation is an important driver of temperature change during the Holocene, and other mechanisms, such as dust, ice cover, orbital forcing, or greenhouse gases cannot produce early and mid-Holocene warmth without the changes in Northern Hemisphere vegetation. Our findings further highlight the substantial influence of vegetation expansion and contraction on global climate. These results demonstrate that IPCC-class models (e.g., CESM1.2) can simulate a realistic temperature response to exter-

nal climate forcings but only when all relevant forcings are included. Our findings imply that future climate projections that include changes in vegetation are likely to produce more trustworthy predictions of future climate change.”

Life Expectancy Declines in Europe

In Europe, the number of years a person can be expected to live (*life expectancy*), has declined almost a year and a half since 2019, according to the Eurostat agency of the European Union. The average life expectancy at birth across the 27 countries of the EU fell from 81.3 years in 2019 to 80.0 in 2021, with another 0.3-year drop in the latter year. “The largest decreases have been estimated in Slovakia and Bulgaria (–2.2 years compared with 2020), followed by Latvia (–2.1) and Estonia (–2.0).” Life expectancy is lower than in 2019 in all EU states except Luxembourg, Malta and Sweden; in all three it has remained the same.

On the other hand, the maximum number of years a human being *can* live (*life span*) has remained relatively constant at 120-125 years, no matter one’s diet, exercise, medical care, or avoidance of dangers. According to *Genesis* 6:3, “Then the Lord said: ‘My Spirit shall not remain in human beings forever, because they are only flesh. Their days shall comprise 120 years.’” We don’t seem to be making any progress on this front, either, since early Biblical times. Why not?

A Fast Rail Line from Bulgaria to Istanbul by Summer 2023

The fast Halkalı-Kapikule rail line, from metropolitan Istanbul, Turkey to the Bulgarian border, is expected to be put into service in Summer 2023 for

both passenger and freight services. The 231 km double-track line will reduce the trip by 3.5 hours, traveling at 200 km/hour for both services.

The railway is part of the New Silk Road, in which Turkey sees a growing role for itself. Because Eurasian transit through Russia has decreased, there is growing interest in a Middle Corridor, and Turkey is one of the gateways to Europe on this corridor. It will connect Turkey’s railway network with the Trans-European Transport Network (TEN-T) through Bulgaria. Transport and Infrastructure Minister Adil Karaismailoğlu said that “Turkey is on the way to becoming a global logistics superpower.”

The section from Kapikule near the Bulgarian border to Cerkezkoy is funded by the EU with a €25 million grant. The section Cerkezkoy-Halkalı that connects to Istanbul is financed by the Turkish government and costs €278 million.

According to Karaismailoğlu, the project will have 53 underpasses, 59 overpasses, 16 railway bridges, 2 tunnels, 194 culverts and 3 viaducts.

NASA Executes ‘Wet Dress Rehearsal’ for Artemis Launch

NASA’s new Space Launch System—the complete Artemis spacecraft topped with the Orion crew capsule—underwent a full “wet dress rehearsal,” June 18-20.

On June 6, NASA moved the tall, 98-meter Space Launch System from the Vehicle Assembly Building to launch pad 39B at the Kennedy Space Center at Cape Canaveral, Florida, placing it in the position it will later have for launch to the Moon.

In the June 18-20 “wet dress rehearsal,” the rocket was loaded with 700,000 gallons of liquid oxygen propellant and went through a complete pre-launch countdown—only stopping

at T minus 29 seconds before launch, when the main engines would be ignited. Then the rocket was completely drained of the pressurized, cryogenic liquid oxygen fuel, also as part of the test (in case a mission has to be scrubbed for any reason). Earlier, during propellant loading, a hydrogen leak at a hose coupling was detected.

During this testing, there was no crew on board the Orion capsule. The rehearsal did, however, include testing Orion’s emergency evacuation procedures, as well as testing communications connections between all relevant control centers.

NASA foresees the earliest launch window in August, but has other dates planned in case of unexpected postponements.

The Most Detailed Geological Map of the Moon

As [reported](#) in the May issue of *Science Bulletin* of Science China Press, China has released the most detailed geological map of the Moon ever. The scale is 1:2.5 million and includes 12,341 impact craters, 81 impact basins, 17 rock types and 14 types of structures.

The creation of the map was led by geochemist Ouyang Ziyuan, who has been the inspiration for, and the chief designer of China’s *Chang’e* lunar exploration program.

A [posting](#) on Leonard David’s “Inside Outer Space” blog contains a useful summary, referring often to coverage by China Central Television (CCTV).

CCTV, as reported on David’s blog, reports that “The new map details information on the Moon’s surface strata, structure, lithology and chronology and charts the evolutionary processes of lunar volcanoes and asteroid impacts. That data will be crucial for future on-site research including exploration planning and landing site selection.”