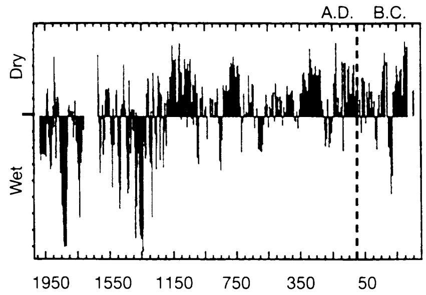
analysis reaching back 500 years in nearby Alberta. Before 1200, however, the diatoms record a much greater frequency of extreme droughts, many of which exceeded in intensity the Dust Bowl period of the 1930s. The longest dry spells lasted for centuries, from the years 200 to 370, 700 to 850, and 1000 to 1200.

Some of these droughts apparently affected large sections of North America, judging from studies of prehistoric climate in California. Rivers, lakes, and marshes in and adjacent to the Sierra Nevada dried up during the same three intervals recorded in North Dakota, according to Scott Stine of California State University in Hayward.

Before drawing further conclusions about the drought history of North America, climate scientists need to study other lakes in the Great Plains and elsewhere, says Laird. Her study is the only high-resolution climate record of the midcontinent that reaches back more than 500 years.

Because droughts were more common before 1200, when temperatures were warmer, future global warming may increase the frequency of droughts in the Great Plains, says Laird. This scenario draws some support from computer models that forecast how climate will react to greenhouse gas pollution. According to the models, greenhouse warming is likely to make climate more variable and to promote drying in middle North America, says James E. Hansen of NASA's Goddard Institute for Space Studies in New York. — *R. Monastersky*

Laird *et al.*/Nature

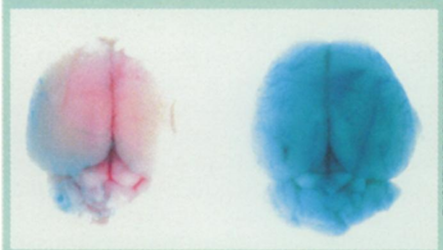


Droughts in North Dakota occurred far more frequently before the year 1200.

Stress may weaken the blood-brain barrier

After receiving a drug to protect them against chemical weapons, many Israeli soldiers serving in the Persian Gulf War suffered adverse side effects from the inoculation. These reactions puzzled physicians, who had expected the blood-brain barrier to keep this drug—like many other chemicals circulating in the blood—out of the brain.

Now, an Israeli study suggests that stress may have temporarily opened the blood-brain barrier. "It was surprising—we saw quite large amounts of brain penetration," says Hermona Soreq of the Hebrew University in Jerusalem, a coauthor of the report in the December Nature Medicine.



A. Friedman/Nature Medicine

Blue dye enters an unstressed mouse's brain (left) less readily than a stressed one's brain (right).

During the Gulf War, Soreq and her colleagues at Tel Aviv University studied a unit of soldiers given pyridostigmine, a drug that attaches to receptors on nerves outside the central nervous system. When chemical weapons invade the body, they can't bind to the occupied receptors, which limits their ability to cause damage.

Usually, only small amounts of pyridostigmine cross the blood-brain barrier. However, nearly one-quarter of the inoculated soldiers complained of mild neurological side effects, such as headaches and drowsiness. When the researchers inoculated another group of soldiers during peacetime, only 8 percent reported symptoms. "Our suspicion was that the stress associated with war made the difference," says Soreq.

The physicians also injected the drug into mice that had been forced to swim for two 4-minute intervals and into unstressed mice. The researchers found that it took over 100 times more pyridostigmine to penetrate the brains of unstressed mice as the brains of stressed mice. Tests using a larger molecule, a blue dye, showed a similar effect.

"The important thing is finding a drug that should not have crossed the blood-brain barrier and apparently did, under conditions of stress," comments Israel Hanin of Loyola University of Chicago in Maywood, Ill., who advises physicians to consider reducing the drug dosages they prescribe to stressed patients.

Some U.S. forces received pyridostigmine, but the researchers downplay any link between the drug, which the body eliminates within a day, and the long-term symptoms of Gulf War syndrome. "It's very hard to see a direct connection," says Hanin.

More generally, he adds, the discovery of a way to open the blood-brain barrier offers possibilities for delivering drugs to the central nervous system. — *D. Vergano*

Cushions for drops of levitated helium

Water spilling onto a hot skillet shatters into droplets that skate and bounce across the sizzling surface. The drops ride on layers of water vapor generated by the pan's intense heat.

Researchers have now observed a similar effect at temperatures near absolute zero. As magnetically levitated drops of liquid helium are gradually chilled toward temperatures at which the liquid turns into a superfluid, drops can come into contact with each other yet fail to coalesce because a thin layer of evaporated helium gas separates them.

"We didn't expect to see this," says physicist George M. Seidel of Brown University in Providence, R.I. He and his colleagues describe their finding in the Dec. 2 Physical Review Letters.

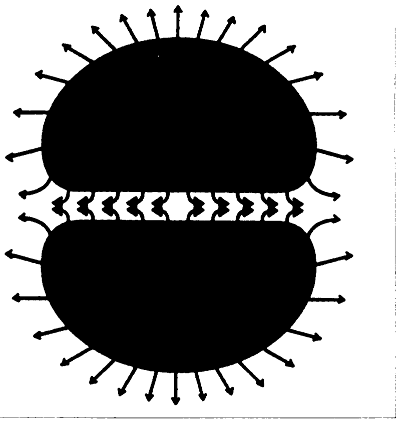
The researchers discovered the effect in the course of developing a powerful magnetic trap for levitating drops of helium in both its ordinary liquid and its superfluid states. "We were able to maintain drops [as large as 2 centimeters in diameter] in the trap indefinitely," the researchers report.

When two drops of liquid helium were introduced into the trap simultaneously, the Brown team noticed that the drops would appear to come into contact but would not combine into a single drop, as most liquids would. They even observed drops bouncing off each other before coming to rest.

Seidel and his colleagues propose that, as the temperature is lowered, slow evaporation from the drops creates a layer of gas that keeps the liquid surfaces from making direct contact with each other.

The drops coalesce as soon as the helium gets cold enough to turn into a superfluid, a state in which no further evaporation occurs. — *I. Peterson*

Mark A. Weilert *et al.*/Phys. Rev. Lett.



Evaporated gas (arrows) exerts sufficient pressure to prevent adjacent drops of liquid helium from coalescing. The diagram exaggerates the size of the gap between the drops.