

Lyme Vaccine Proves Highly Effective

As a rule, scientists like to have their work validated by other researchers. On rare occasions, simultaneous studies provide mutual confirmation.

That's the case with two large studies that each find a vaccine against Lyme disease to be a potent weapon against the tickborne ailment. The findings could pave the way for a general immunization program—delivering a blow to the most widespread pest-carried disease in the United States.

Two research groups, including scientists from New England, the Midwest, and the mid-Atlantic states—three regions of high Lyme disease incidence—report in the July 23 NEW ENGLAND JOURNAL OF MEDICINE that anti-Lyme vaccines showed some effectiveness in the first year after inoculation and conferred strong protection after a booster shot a year later.

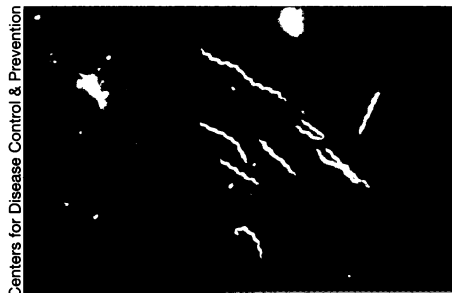
“This vaccine is going to be valuable in those areas where Lyme disease is highly endemic,” says Philip J. Wand, a microbiologist at the University of Wisconsin-Madison.

One of the groups, led by researchers at Tufts University School of Medicine in Boston, recruited 10,936 people age 15 and older in 10 states. About half of the volunteers were injected with the vaccine and the rest with an inactive substance. In the first year after receiving two injections a month apart, 22 vaccinated people showed clinical signs of Lyme disease, as did 43 unvaccinated people. In the second year, after a third injection, only 16 vaccinated people became infected, compared with 66 of those getting the placebo.

In addition, blood tests showed that during the first year of the study, 2 vaccinated and 13 unvaccinated people contracted an insidious form of Lyme disease in which no symptoms show up for months or years. In the second year, 15 unvaccinated people had such asymptomatic Lyme disease, compared with none of those vaccinated.

In the other study, a group led by researchers at the Robert Wood Johnson Medical School in New Brunswick, N.J., gave two injections a month apart to 10,305 people age 18 and older in five states. Half received the vaccine; the rest got a placebo. In the first year, 37 unvaccinated people contracted Lyme disease, while only 12 vaccinated participants did. In the second year, after a booster shot, 26 unprotected people got the disease, compared with only 2 of those vaccinated.

In both tests, researchers fashioned a vaccine from purified outer-surface pro-



The corkscrew-shape bacteria called *Borrelia burgdorferi*, which cause Lyme disease, were thwarted in two vaccine tests.

tein A, a compound that is found on the surface of *Borrelia burgdorferi*—the bacterium that causes Lyme disease. Human antibodies, having encountered the protein in a vaccination, respond immediately when the person is subsequently bitten by a Lyme-carrying deer tick or western black-legged tick.

Sizzling June fires up greenhouse debate

Showing rare ardor, Vice President Al Gore charged that Congress has tried to douse government discussion of global warming even as extreme temperatures have set records in the United States and across the world.

Gore and federal scientists reported last week at a White House press conference that the global average surface temperature for June hit an all-time high, far surpassing all other Junes since 1880. Each month of this year has shattered global temperature records, making the first half of 1998 substantially warmer than that of previous years, even the rest of the 1990s, already the hottest decade on record.

“This is so incredibly unusual—to have 6 months in a row where every single one of those months sets the record for being the hottest,” Gore said.

The administration is currently battling Congress over whether to adopt policies aimed at curbing emissions of heat-trapping greenhouse gases, in accordance with an international treaty adopted last December in Kyoto, Japan. “The evidence of global warming keeps piling up. How long is it going to take before the people in Congress get the message?” asked the vice president.

El Niño helped warm Earth last year and early this year, but conditions in the tropical Pacific cooled off rapidly in June, says Thomas R. Karl, director of the National Climatic Data Center (NCDC) in Asheville, N.C. Nonetheless, global temperatures remained elevated

The new studies show that while the vaccine isn't 100 percent effective, booster shots increase its potency, says study coauthor and rheumatologist Leonard H. Sigal of the Robert Wood Johnson Medical School. Lyme vaccinations may need to be repeated periodically, like tetanus shots, he says.

The vaccine caused few side effects. Any fever or redness at the vaccination site usually disappeared within 3 days, as with an influenza shot, Sigal says.

The Food and Drug Administration is reviewing this and other research on the vaccine. Scientists are currently gauging how long protection lasts, trying to determine the best vaccination schedule, and testing the vaccine in youngsters, says Allen C. Steere, a study coauthor and rheumatologist at Tufts University School of Medicine. “I would expect that it would work in children the same way it works in adults,” he says.

—N. Seppa

throughout June and the first half of July.

“There's absolutely no question. Clearly, we have very compelling evidence to suggest that global temperatures are indeed warming,” said Karl.

In the climate treaty known as the Kyoto Protocol, the United States agreed to cut its emissions of greenhouse gases by 7 percent from 1990 levels by 2012. Before the treaty becomes U.S. law, however, it must be ratified by the Senate, where it is currently stalled in committee. The House Appropriations Committee has sought to stifle public discourse on the issue, says Gore. It directs the administration to “refrain from conducting educational outreach or informational seminars on policies underlying the Kyoto Protocol until or unless the Protocol is ratified by the Senate.”

As the political battle over global warming seethed in Washington, D.C., the southwestern and southeastern United States endured a withering drought and heat wave. The months of April through June were the driest on record for Florida, Louisiana, New Mexico, and Texas, according to the NCDC.

Karl offered snapshots of the extreme conditions. Amarillo, Tex.—less prone to extreme heat than Dallas—had 13 days in a row in June with temperatures topping 100°F. And Brownsville, Tex., went 17 days with the minimum temperature never dropping below 80°F.

Meteorologists cannot determine whether any individual event, such as a

heat wave, can be linked to greenhouse warming because weather can vary quite markedly on its own. Yet the recent events, says Karl, provide a taste of what will happen more frequently as the climate warms. For instance, the string of hot days in Brownsville would be predicted to occur in a stable climate once every 1,000 years. But if atmospheric greenhouse gases build at the present rate until the middle of the next century, such a heat wave would recur every 3 years, he says.

Computer climate models and theory predict that greenhouse warming will lead to more weather extremes, such as droughts and heavy rainfall. Already, U.S.

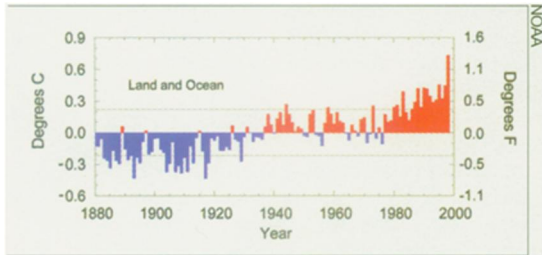
episodes of severe rain have increased since 1910, says Karl.

Other climatologists, however, dispute some of the administration's numbers. "I think many of the temperature records are questionable," says George H. Taylor of Oregon State University in Corvallis. He is Oregon's state climatologist and the president-elect of the American Association of State Climatologists.

"The quality of data in many foreign countries is rather poor and data are sparse in many areas of the world," he says. What's more, as researchers have made their climate models more sophisticated, they have lowered their forecasts of how much temperatures will increase in the future, he adds.

Critics of the Kyoto Protocol say that the treaty lets developing nations continue to emit greenhouse gases without restriction and that it will slow the U.S. economy, costing millions of jobs nationwide. —R. Monastersky

Global temperatures for the first 6 months of each year, shown relative to the average.



Babies get a kick out of serial memories

Many researchers in developmental psychology assume that the human brain is unable to facilitate memory of the order of a few items or actions, presented one after the other, until around age 1. According to new evidence, however, even 3-month-olds can learn the arbitrary order of a list of items and, when given age-appropriate prompts, remember that information a day later.

"Brain mechanisms that mediate the ability to learn and remember serially ordered information are functional beginning very early in life," asserts psychologist Carolyn Rovee-Collier of Rutgers University in New Brunswick, N.J. "I view babies' recognition of serial position as a form of consciousness."

Rovee-Collier and her coworkers conducted separate studies of 18 babies who were about 3 months old and of 42 infants who averaged 6 months old. Experimental sessions took place in each infant's home. Babies reclined in sling-seats inside playpens. A flexible metal rod held a mobile overhead. Three mobiles, each containing seven yellow disks that displayed either black, green, or red A's, were presented in a fixed order.

Infants viewed the first mobile for 2 minutes while the researchers established the rate at which they kicked their legs. A ribbon was then loosely tied to one of the baby's ankles and to a hook suspended from the mobile. When the baby kicked, the mobile moved. Prior work has found that babies rapidly and avidly learn to bounce mobiles in this way (SN: 4/18/92, p. 244).

Youngsters had 6 minutes to play with each of the three mobiles. A child's kick-

ing rate during a subsequent 2-minute viewing of the third mobile, after the ribbon had been removed, provided a measure of the extent to which the kicking task had been learned.

The next day, as a memory prompt, each infant passively watched one of the mobiles for 2 minutes while it was moved at the rate at which that baby had ended up kicking the day before. Then a second mobile was presented either in or out of the previous order. Vigorous kicking in response to this item, visible for 2 minutes, indicated that it was recognized.

When mobiles were seen in their original order, infants of both age groups frequently recognized the second one, Rovee-Collier's group reports in the July PSYCHOLOGICAL SCIENCE. Babies exhibited poor memory for out-of-order mobiles.

In an unpublished, follow-up study of 6-month-olds, the scientists also observe good memory for the serial order of five mobiles, again after a 24-hour delay.

These results contradict earlier evidence suggesting that only older infants can recognize order in sequences. This capacity appeared in these studies only when children were presented with related actions that led to a desired outcome. For example, 11-month-olds could remember to unfold a hinged track and then place a toy car at the top of the track's incline in order to "make the car go."

"What's most important about this new study is that it shows that babies can learn and remember the order of totally arbitrary sequences," comments psychologist Herbert S. Terrace of Columbia University. "This capacity is essential for language learning." —B. Bower

New spider: Unusual suspect steals web

The latest crime report, from Orchid Island in Taiwan, describes a new species of spider that snatches and eats pieces of other spiders' handiwork.

Little is known about this novel form of thievery, report I-Min Tso and Lucia Liu Severinghaus from the Academia Sinica in Taipei, Taiwan. Two other species, both South American, are known to steal silk. In the July ANIMAL BEHAVIOUR, the Taiwan researchers describe the third thief, which they have named *Argyrodes lanyuensis*.

"The whole creature looks like a drop of mercury with some appendages attached," Tso says. It shimmers along the webs of giant wood spiders, *Nephila maculata*. These webs stretch more than a meter across.

"When I was sitting under a tree having a break, I found in front of me two tiny silvery spiders doing something weird on one web," Tso recalls. Still munching on a cookie, the researcher leaned over to watch and realized the spiders were eating, too. They wadded silk into a ball to devour while the web owner, a much bigger spider, "seemed to pay no attention."

After observing the spiders' natural behavior and moving them around in experiments, Tso and Severinghaus concluded that the thieves reduced their hosts' webs by 21 percent on average. The thieves also stole prey from the hosts, but only occasionally. Less than 3 percent of the giant wood spider's diet comes from prey small enough for the little spiders to handle, the researchers report.

The thieves get away with stealing silk because they're small and they move stealthily, Tso observes. Some keep taking silk all day long.

Before laying eggs, the silk-stealing spider drops out of her host's web and spins a web of her own. She also covers her eggs with silk that she spins herself.

The report did not particularly surprise Jonathan A. Coddington from the Smithsonian Institution in Washington, D.C. "In general, *Argyrodes*, the genus, is always pestering *Nephila*," he says. Naturalists have documented many parasite-host relationships between the two genera, including prey-napping, egg-stealing, and stalking. "It's kind of like the Serbs and the Bosnians," Coddington says.

Fritz Vollrath of the University of Aarhus in Denmark points out that many spiders eat their own webs, which get tatty after a day of insect collisions, and then spin new ones. He discovered silk stealing in South American *Argyrodes* when he saw a spider dash into a smaller species' web. "I think it was after the owner," Vollrath says. "The owner just rushed out like a rocket," leaving the invader to eat the whole web. —S. Milius