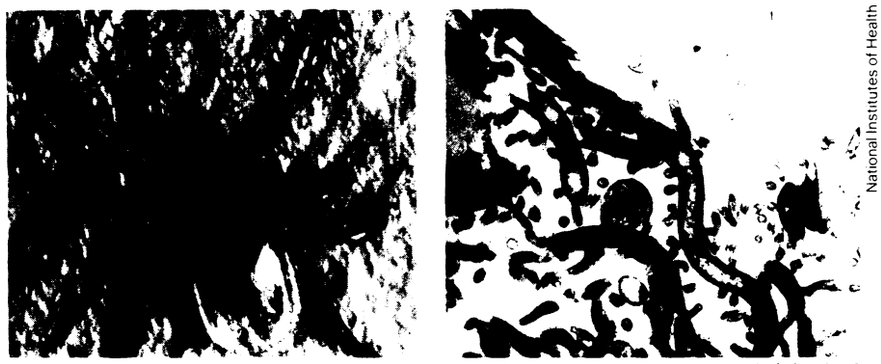
Spirochete Traced to Cause of Lyme Disease

After several years of intense and often cooperative study, scientists from a number of institutions appear to have found the cause of Lyme disease — an inflammatory ailment first noted in the Connecticut village of Old Lyme in 1975 and since recognized in 13 other states, Europe and Australia. The search has led to the discovery of a bacterium of the order Spirochaetales, dubbed the *I. dammini* spirochete because it appears to be conveyed to a human victim by a tick called *Ixodes dammini*.

The first symptoms of Lyme disease — skin rash, fever, chills, muscle aches and pains — may be self-limiting, or they may be followed by intermittent or chronic arthritis, which, like rheumatoid arthritis, can erode joints and bones. Sometimes patients with the disease experience neurologic or heart abnormalities as well. The fact that the disorder was first discovered among children living in the same geographic area suggested that it might be caused by an infectious agent. And the fact that the victims lived in a rural setting implied that the agent might have been passed on to them by an insect or arthropod (SN: 6/19/76, p. 389).

During 1977 and 1978 evidence emerged that the disease was transmitted by a newly identified tick, *Ixodes dammini,* or by related ixodid ticks (SN: 6/10/78, p. 375). Next, scientists found that giving patients penicillin shortly after they came down with Lyme disease could lessen or prevent the danger of subsequent arthritis (SN: 7/5/80, p. 13). This finding suggested that the causative agent was a penicillin-sensitive bacterium, probably one belonging to the order Spirochaetales, which was already known to cause syphilis. Then last year, a previously unrecognized spirochete was isolated from *I. dammini* ticks. And when this *I. dammini* spirochete was injected into rabbits it caused a Lyme disease kind of skin rash.

But the strongest evidence indicting the *I. dammini* spirochete is now reported in the March 31 NEW ENGLAND JOURNAL OF MEDICINE by two separate research teams — one headed by Allen C. Steere of Yale University School of Medicine in New Haven, Conn., and the other by Jorge L. Benach of the State University of New York at Stony Brook. Steere and his co-workers have isolated the *I. dammini* spirochete from the blood, skin rash or cerebrospinal fluid of three Lyme disease patients. They have also found antibodies against the bacterium in 90 percent of 40 patients in the early stages of Lyme disease and in 94 percent of 95 patients with advanced Lyme disease, yet in none of 80 control subjects. Benach and colleagues have isolated the bacterium from the blood of two Lyme disease patients and have also found antibodies against the bacterium in the same patients.



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Lyme disease now appears to be caused by two culprits —the I. dammini *tick (l.) which passes* I. dammini *spirochetes (r.) to a human victim.*

When all these findings are taken together, Edward D. Harris Jr. of the University of Medicine and Dentistry of New Jersey-Rutgers Medical School in New Brunswick concludes in an accompanying editorial, the *I. dammini* spirochete must be considered the "probable cause ... of Lyme disease." "These findings," Frederic C. McDuffie, medical director of the Arthritis Foundation in Atlanta, says, "are a good example of the progress being made in arthritis research. Ours is the first generation in which most forms of arthritis can be controlled. With findings such as the one about Lyme disease we are now movng toward causes and cures."

Still, questions remain about the putative culprit. For instance, Steere and his colleagues managed to recover it from only 3 of 56 Lyme disease patients, and Benach and co-workers from only 2 of 36 patients. The reason for this scant recovery isn't known. Both teams of scientists speculate that it might be because the number of bacteria in affected tissues is generally small or because their isolation techniques weren't sophisticated enough to cull the bacterium from more patients. Yet two other questions, Steere and coworkers point out, are how the *I. dammini* tick afflicts a human with the *I. dammini* spirochete and whether the spirochete causes disease directly or indirectly by triggering an autoimmune response.

—J. A. Treichel

Warm welcome for the return of the trades

To reverse a popular adage: What goes down must come up. In this case it is trade winds in the equatorial Pacific that are on the rise, reviving after their collapse last June. The precipitous drop in the trade winds was a critical signal that a major ocean warming, called an El Niño, was under way (SN: 2/26/83, p. 135). By late November, trade winds in the Western Pacific were back to normal while in the Eastern Pacific the winds only recently have returned to their customary levels, reports Eugene Rasmussen of the National Weather Service's Climate Analysis Center in Camp Springs, Md. Still, he cautions, the event — possibly one of the strongest in history — is far from over.

El Niño usually begins in the Pacific near Christmas and peaks in April through June and again near the end of the year, after which it begins to abate. This event got off to a weak start in April 1982, and peaked in September, remaining strong until the beginning of 1983. Then, Rasmussen says, it appears to have eased into the more usual cycle.

Though the current El Niño may not persist for a "normal" 18-month period, it has caused warmer waters from the coast of South America west to the international date line, and as far north as British Columbia. Measurements of sea surface temperatures show that during the peak of the warming event, some waters in the equatorial Pacific were 5°C to 6°C warmer than normal. Strong El Niños typically cause warming of about 3°C.

While some measurements indicate abnormally warm waters in the equatorial Atlantic, researchers say that the change is slight compared with that observed in the Pacific, and does not constitute an El Niño. The term "El Niño" refers to a disturbance in ocean and atmosphere that may occur at intervals of a few years to several decades. It suppresses cold, nutrient-rich water from welling up to the surface. It may involve strong internal waves, and displacement of winds and patterns of air pressure and water circulation. El Niño has never been reported in the Atlantic Ocean.

—C. Simon

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