

Leads on the Causes of Legionnaires' Disease

As with New York City's Son of Sam, the microbe known as Legionnaires' disease is a discriminating killer, surfacing mainly in group settings and afflicting primarily the aged and infirm with pervasive lung disease (SN: 8/14/76, p. 102). Yet, eight months after the isolation of the guilty bacterium by researchers at the Center for Disease Control in Atlanta, epidemiologists have yet to identify precisely what its habits are, or the conditions under which it strikes.

It is true that more than 30 incidents of the disease have been documented since it turned an American Legion convention into a tragedy in the late summer of 1976. But these cases erupted at various intervals and at scattered locations throughout the United States, so CDC epidemiologists have had trouble using them to learn more about the conditions under which the disease occurs.

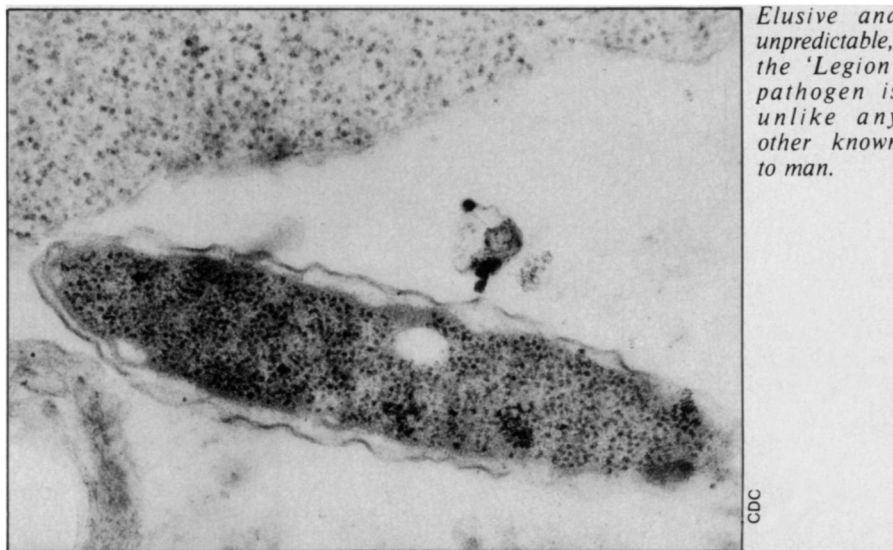
On Sept. 4, however, five more cases of Legionnaires' disease were reported by Ohio State Health Director John H. Ackerman at the Columbus, Ohio, Riverside Methodist Hospital. This new clustering of cases is giving CDC disease detectives some leads as to the sources of the disease, particularly when this clustering is viewed in the context of past group outbreaks. Even with new evidence, provocative questions remain.

The Ohio outbreak was discovered when Ian Baird, director of Riverside's infectious diseases division, noticed "very striking" anomalies in two pneumonia patients. Neither was responding to penicillin-related antibiotics, and their X-rays showed diffuse lesions atypical of conventional pneumonia.

Baird immediately notified health authorities at CDC, who arrived on Sept. 5 to begin an intensive investigation. Thomas J. Halpin, chief of preventive medicine for the Ohio State Health Department, said state and federal epidemiologists are pursuing three lines of inquiry: medical records of four area hospitals are being reviewed to determine whether other cases of Legionnaires' disease have gone undetected; Riverside employees complaining of respiratory ailments in the last two months are being interviewed, and intensive scrutiny is being focused on the victims' activities of the last six weeks, as officials try to find some common thread.

At this point the clues are scanty. The patients seem to have nothing in common except that all are middle-aged to elderly women. Five of the six women had been at Riverside less than a month prior to the outbreak.

However, authorities may have more luck linking the four locations (of five outbreaks, two occurred in Philadelphia, one each in Washington, Columbus and Pontiac) where the presence of the bac-



Elusive and unpredictable, the 'Legion' pathogen is unlike any other known to man.

CDC

terium has now been confirmed. The earliest documented incident dates back 12 years to an inexplicable fever at St. Elizabeth's Hospital in Washington. Victims' blood sera, saved for later analysis, now show high levels of an antibody specific to the Legionnaire bacterium. Guinea pigs exposed to the ambient air of a Pontiac, Mich., state health building where fever struck also show evidence of the ubiquitous microbe's presence. In September 1974, three Odd Fellows attending a convention at the now-notorious Bellevue-Stratford Hotel died from unknown causes. Their blood sera were not kept; survivors of that convention, however, exhibit antibodies that form conjugates with bacterial material.

The similarities among the various outbreaks are intriguing. All five outbreaks occurred among the chronically ill or elderly during the mid- to late-summer months. All three health-related complexes (Washington, Pontiac and Columbus) adjoined construction sites. The most provocative clue lies in air conditioning peculiarities: a breakdown in the air system at Pontiac accidentally recirculated air blowing over a water cooling tower; the air systems at the aging Bellevue-Stratford were added piecemeal as the hotel grew, with shafts independent of the rest of the hotel servicing most of the Legionnaires; and, at Columbus, an air intake vent overlooks a construction site.

But, as Riverside Hospital spokesperson Jon Christensen was quick to point out to SCIENCE NEWS, the facts beg more questions than they answer. Why did no employees at the Bellevue (particularly bellhops and limousine drivers) contract the disease? And why just five outsiders at Riverside, which houses 900 patients, employs over 2,500 support personnel and grants visiting rights to thousands

weekly? And then there is the problem of all the isolated cases—a Florida trucker, a West Coast laborer, a Michigan woman who contracted the disease in mid-winter—that defy the demographic patterns found in the larger outbreaks.

For the epidemiologists working in Ohio, the pathogen's mode of attack is merely confusing; for their laboratory colleagues in Atlanta it is a biological non sequitur. "It's unlike anything we've ever seen before," admits Charles C. Shepard, who first identified the agent along with Joseph E. McDade. Shepard says the microbe is like other bacteria in that it is average-sized, rod-shaped and stains pink in Gram's solution. Unlike other bacteria, its sides are not parallel and its ends "tend to be pointed instead of round or squared." Taken as a whole, Shepard says, the evidence indicates the agent cannot be related to any other known to science, and he refuses to give it a scientific name until he knows more.

Meanwhile, other laboratories at CDC are testing antibiotics to see which are more effective in killing the microbe, and analyzing soil samples taken from the Ohio hospital's construction site.

The most pressing problem now, however, is finding the bacterium's natural source. The burden for that proof remains on the disease detectives in Columbus. "Any theories we may have are tentative," cautions Baird. "At this point, our working hypothesis is that newly-turned soil may expose the agent to the air, which transports it via air conditioning systems into the buildings . . . The Ohio State Health Department has ordered the vent adjoining the construction site closed off, and the air system here is being examined . . . We're still collecting data, interviewing everyone possibly connected with the cases and very carefully analyzing what we've got so far." □