

## Human Edwardsiellosis Traced to Ornamental Fish

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Protracted diarrhea in a 2-month-old Belgian infant was associated with *Edwardsiella tarda* as the only potential pathogen. The same organism was isolated from a tropical aquarium fish in the home of the patient. The enteropathogenic role of *E. tarda* and the role of fish as a reservoir of infection are reviewed. Additional observations, volunteer studies, and careful prospective surveys in tropical countries will be needed to produce firm evidence of the enteropathogenic potential of *E. tarda*.

The genus *Edwardsiella* consists of two species: the recently described *E. hoshinae* (9) and the better known *E. tarda*. Only the latter has been implicated in human disease. Although *E. tarda* has been isolated from a great variety of other animals, its chief reservoirs in nature are reptiles and freshwater fish (19, 20, 30). Human infections caused by *E. tarda* are considered rare and have only occasionally been described outside tropical or subtropical areas. The disease spectrum of *E. tarda* is rather broad and has been compared with that of *Salmonella* sp. (11), in which there is an intestinal carrier state, mild to severe gastroenteritis, and deep infections, generally in patients with some underlying disease. Extraintestinal infections with *E. tarda* are easy to document by the isolation of the organism from the blood or other internal body fluids (4). The evidence, however, for its enteropathogenicity is less than adequate and is generally derived from its sporadic isolation in diarrheic patients during routine stool culture. The occasional finding of *E. tarda* in stools from healthy people further obscures its potential for causing intestinal disease. The following clinical observation is therefore considered important. It describes the repeated isolation of *E. tarda*, outside the "endemic" area, from an infant with protracted diarrhea, and its disappearance, together with clinical cure, after chemotherapy. The recovery of the same organism from aquarium fish in the home of the patient could have considerable public health importance.

**Case report.** A male infant, born prematurely (birth weight, 1,600 g) and now 2.5 months old, was seen at the outpatient department, St. Raphaël University Hospital, Leuven, Belgium, with a 2-day history of anorexia and vomiting. The stools were normal, and there was no fever. Clinical examination was unrevealing (weight, 3,750 g; height, 53 cm). The patient was reexamined the next day because, in addition, he had

developed diarrhea. The unformed stools were yellowish and contained some mucus. As the general condition was satisfactory, the patient was followed on an ambulatory basis, and no antibiotics were prescribed. Stool culture yielded growth of *E. tarda* both on MacConkey and *Salmonella-Shigella* agar. Culture on media appropriate for *Yersinia* sp., *Campylobacter* sp., and enteropathogenic *Escherichia coli* was negative. An enzyme-linked immunosorbent assay test was negative for rotavirus. Our patient was followed for 2 months: the diarrhea remained intermittent, not affecting the general condition. Three further stool cultures remained positive for *E. tarda* and negative for other pathogens. After 2 months, the stools became blood stained, and the baby was fretful and cried a lot. In view of the persistent diarrhea and the repeated isolation of *E. tarda*, it was decided to prescribe co-trimoxazole. The drug was taken as a syrup for 2 weeks at a dose of 6 mg/kg per day. After this treatment, the stools normalized, and the baby looked happy again. Three follow-up stool cultures over a period of 1 month remained negative.

To trace the origin of this unusual stool isolate, a careful history was taken. The patient lived in a suburban working-class community. Both parents had a negative stool culture. There were no other children and no domestic or pet animals. When visiting the home, which looked rather unhygienic, we observed an aquarium with ornamental fish. We obtained one specimen, an adult *Pterophyllum scalare*, a tropical species said to originate in Brazil. In the laboratory, the fish was transferred to a jar with tap water, and excreta were taken for culture, which yielded growth of *Citrobacter freundii*, *Aeromonas hydrophila*, and *E. tarda*. The latter organism grew on *Salmonella-Shigella* agar and showed exactly the same biotype as the patient isolates (API 20E profile 4544000; excellent

identification). All isolates were fully susceptible with the standardized disk test and a micro-dilution test to all antibacterials used for the treatment of infections with gram-negative rods, with the exception of colistin (minimal inhibitory concentration > 16 µg/ml; absence of an inhibition zone with a 10-µg disk). Colistin resistance has been described as a rather constant characteristic of *E. tarda* (18).

Representative subcultures of our isolates were submitted to C. Richard, Pasteur Institute, Paris, France, and he kindly confirmed them as typical *E. tarda*. Two months after obtaining the last positive stool culture, the serum of the baby agglutinated a living suspension of its own isolate in a dilution of 1:80.

**Discussion.** The importance of *E. tarda* as an intestinal pathogen in humans has attracted less attention than its role in deep-seated infections. The occasional isolation of *E. tarda* from diarrheic stools has been described from many countries, generally in the tropical world: India (1, 14, 23), Singapore (24), Vietnam (19), Thailand (2), Tahiti (6), Australia (10), Zaire (16), Chad (22), Madagascar (6), Spain (8), Cuba (21), Panama (15), and the United States (3, 5, 11, 13). Such observations do not suffice to correlate conclusively the isolation of *E. tarda* with gastrointestinal illness, although a few authors (1, 2, 15, 16) stress the absence or extreme rarity of *E. tarda* in healthy people. Frequent isolation of *E. tarda* from diarrheic feces has only been described in two countries. In the West Malaysian jungle, *E. tarda* has been isolated from 30% of patients hospitalized with bloody diarrhea, compared with less than 1% in a control group (7). Our survey in Mopti (Northern Mali) showed *E. tarda* in 9.7% of diarrheic stools and in only 5.4% of healthy people. The population of Mopti being chiefly composed of fishermen, it was hypothesized that fish could be the source of human infection (27). The wide dissemination of *E. tarda* in an urban population made it highly unlikely that snakes, toads, or other poikilotherms could act as a reservoir.

When first isolated from fish, *E. tarda* was considered as an etiological agent of epizootic disease (12, 17, 29). Later studies in Vietnam (19), the Dominican Republic (20), and the United States (30) and particularly our own investigations on Zairese freshwater fish (26) made it clear that the recovery rates of *E. tarda* were extremely high and that the organism should be considered as a part of the commensal flora of fish.

Little attention has been given to the carriage of *E. tarda* by aquarium fish, which are largely of tropical origin. Trust and Bartlett in Canada (25) first drew attention to the presence of *Edwardsiella* sp. in water samples from aquari-

ums containing goldfish or tropical ornamental fish. In a more recent Belgian study (28) on the bacteriology of goldfish, there was no mention of *Edwardsiella*, but a high isolation rate of *A. hydrophila* was reported. Both groups of investigators, however, insisted on the possibility that fish and aquaria may serve as vectors of human pathogens. The introduction of ornamental fish into pediatric hospitals presents a potential hazard for neonates and young infants, who, according to our own observation and the experience of others (2, 8, 21, 24), seem to be particularly susceptible to intestinal disease caused by *E. tarda*.

It has been suggested (11) that trivial gastrointestinal disease with *E. tarda*, as with *Salmonella* sp., should not be treated with antibiotics. In our patient, however, a clinical and bacteriological cure was obtained only after chemotherapy.

Our observation constitutes the first description of human edwardsiellosis in Belgium and indeed in this part of Europe.

The mere fact that strains of *E. tarda* with exactly the same biotype and sensitivity to antibiotics were isolated from a baby and a fish in the same home does not automatically prove a causal relationship. However, it seems more than coincidental that the first human isolate of *E. tarda* in our country occurred in a child indirectly exposed (through the hands of its parents?) to fish carrying the same organism. Neither is it possible to provide more than anecdotal evidence for the enteropathogenicity of *E. tarda* from a sporadic observation. The final answer should await the results of volunteer studies and prospective epidemiological surveys in endemic countries like Mali and Malaysia.

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