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Canine Echinococcosis Due to *Echinococcus multilocularis*: a Second Notifiable Case from Mainland Japan

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Echinococcus multilocularis is a zoonotic helminth, and infections in humans caused by its larvae are classified as Category IV of the Infectious Diseases Control Law of Japan; under this category, issuing a notification is mandatory for all cases. Humans acquire the infection by accidentally ingesting eggs shed in the feces of canids that harbor adult parasites. Owing to the potential risk to humans, the infection of dogs with this parasite has also been listed as a notifiable disease since 2004. However, its natural distribution is restricted to Hokkaido: the island is the only region in Japan with documented endemic occurrence of *E. multilocularis* (1). Here, we describe an unexpected case of echinococcosis in a dog found in an area where the disease has not been reported previously.

In March 2014, an adult male mongrel dog was captured in Agui, an inland town on the Chita Peninsula of Aichi Prefecture (Fig. 1). The dog was secretive and highly aggressive toward humans and was thought to have lived independently for a long time. The dog was taken to a public animal shelter, and a fecal sample was collected to check for intestinal parasite infection. The sample was examined using a modified Wisconsin technique with a sucrose solution of specific gravity 1.20 and found to be positive for taeniid and *Trichuris vulpis* eggs (493.5 and 4.0 eggs per gram, respectively). As the eggs of taeniid tapeworms are morphologically similar (2), they were further examined using molecular methods. Egg DNA was extracted by alkaline lysis and proteinase K digestion, and PCR amplification of a fragment of the 12S ribosomal RNA gene was conducted (3). Prior to sequence determination, a portion of the initial PCR product was subjected to an optional amplification using *E. multilocularis*-specific nested primers. This was performed as a rapid test, in order to rule out *E. multilocularis* infection. The subsequent PCR, however, amplified a single band of 250 bp, indicating the dog was infected with *E. multilocularis*. The identity of the infectious agent was further con-

firmed by direct sequencing (GenBank accession No. AB936073), and it was found to be homologous to a Hokkaido isolate of *E. multilocularis*. An examination of the intestinal tract was not performed, as the dog had already been euthanized and cremated. In accordance with the law, the case was reported to the local public health center and was only the second notification for a case of animal infection diagnosed in an area outside the island of Hokkaido.

Because of its limited geographical range, all cases but one of canine echinococcosis submitted to date have been from Hokkaido. The only exception was a stray dog caught in Saitama Prefecture, and that case was suspected to have originated from the northern island (4). Along with that case, a series of epidemiological studies have demonstrated *E. multilocularis* infection in several domestic animal species that have been raised in Hokkaido and then transported to other regions of Japan (5–7). Dogs are thought to be a significant factor in the transmission of the parasite to remote areas, because of their potential role in the life cycle of *E. multilocularis* as well as frequent movements with or without their owners (5,8). However, it has been shown that the intestinal infection with *E. multilocularis* in dogs terminates in about 4 months (9). This fact, along with the observed behavior of the infected dog, implies that the infection was autochthonous. Unfortunately, the dog in this report was neither microchipped nor wearing an identity tag. Therefore, we could not identify its origin or background, nor could we determine whether the finding indicates a new incursion or the spread of already existing parasites in a given area.

Although the infection was found in a dog on this occasion, the life cycle of *E. multilocularis* is predominantly sylvatic. Of the susceptible wild animal hosts, red foxes as definitive hosts and arvicoline rodents as intermediate hosts are known to be distributed in the area, but detailed information regarding their habitat and population size are not yet available. Once its life cycle becomes established in wildlife, the elimination of *E. multilocularis* is quite difficult. Therefore, extensive surveys of potential host animals are urgently needed to confirm the presence of the parasite.

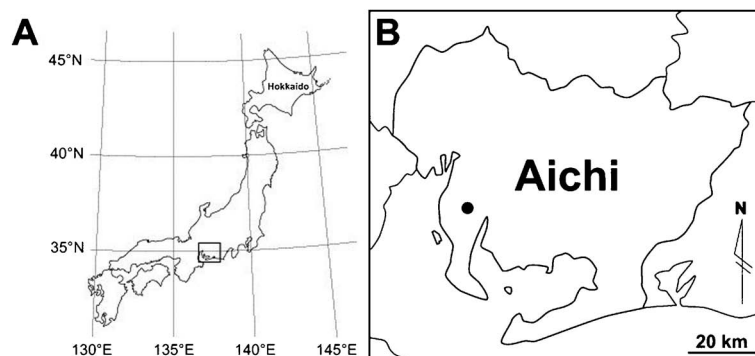This article appeared in the Infectious Agents Surveillance Report (IASR), vol. 35, p. 183, 2014 in Japanese.

Fig. 1. Maps of Japan (A) and Aichi Prefecture (B). The closed circle on map (B) indicates Agui, the town where the *Echinococcus multilocularis*-infected dog was captured.

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