

***Halicephalobus* Infection in a Fatal Case of Encephalomyelitis**

Cynthia S. Goldsmith¹, Mark L. Eberhard², Julu Bhatnagar¹, and Clifton Drew¹

¹Infectious Diseases Pathology Branch and ²Parasitic Diseases Branch, Centers for Disease Control and Prevention (CDC), Atlanta, GA 30333.

Halicephalobus is a free living soil saprophytic nematode which can infect horses, zebras, and rarely, humans. Five cases of human infection with *Halicephalobus* have been reported in the literature [1 – 5], but no electron microscopic (EM) results have been published. We report here the first EM findings from a fatal human case of infection with *Halicephalobus*.

A female with encephalitis died 29 days after hospitalization. Histological examination of the brain revealed several nematodes, mostly larva, although a later stage larva/early adult worm was found and was morphologically consistent as being in the genus *Halicephalobus*. *Halicephalobus* specific and cephalob nematode specific PCR assays were performed on DNA extracted from unfixed frozen tissues, and sequence analysis of positive amplicons showed 99% identity with *Halicephalobus* spp. A formalin-fixed paraffin-embedded section was processed for EM, and EM examination was consistent with the finding of a nematode. The worm was up to 190 µm in length and up to 20 µm in diameter, with a long intestine, muscle fibers, an anus, and developing eggs and germinal cells (Figures 1-4). There was an area of vacant space between the cuticle of the worm and the parenchyma of the brain.

Some of the morphologic features which distinguish *Halicephalobus* from other nematodes such as *Ascaris* or *Strongyloides* include size and absence of lateral alae.

There is no antemortem test to detect this infection, and all human cases of *Halicephalobus* have been diagnosed postmortem. Regardless, anthelmintic treatments have been unsuccessful in other animals possibly due to a lack of sensitivity, or because the drugs cannot cross the blood-brain barrier [5].

References

- [1] J Hoogstraten and G. Young, *J Cand Sci Neurol* **2** (1975) p. 121.
- [2] JA Shaddock, *et.al*, *Am J Clin Path* **72** (1979) p. 640.
- [3] CH Gardiner, *et. al.*, *Am J Trop Med Hyg* **30** (1981) p. 586.
- [4] SL Ondrejka, *et. al*, *Arch Pathol Lab Med* **134** (2010) p. 625.
- [5] B Papadi *et. al*, *Am J of Trop Med and Hyg* **88** (2013) p. 1062.

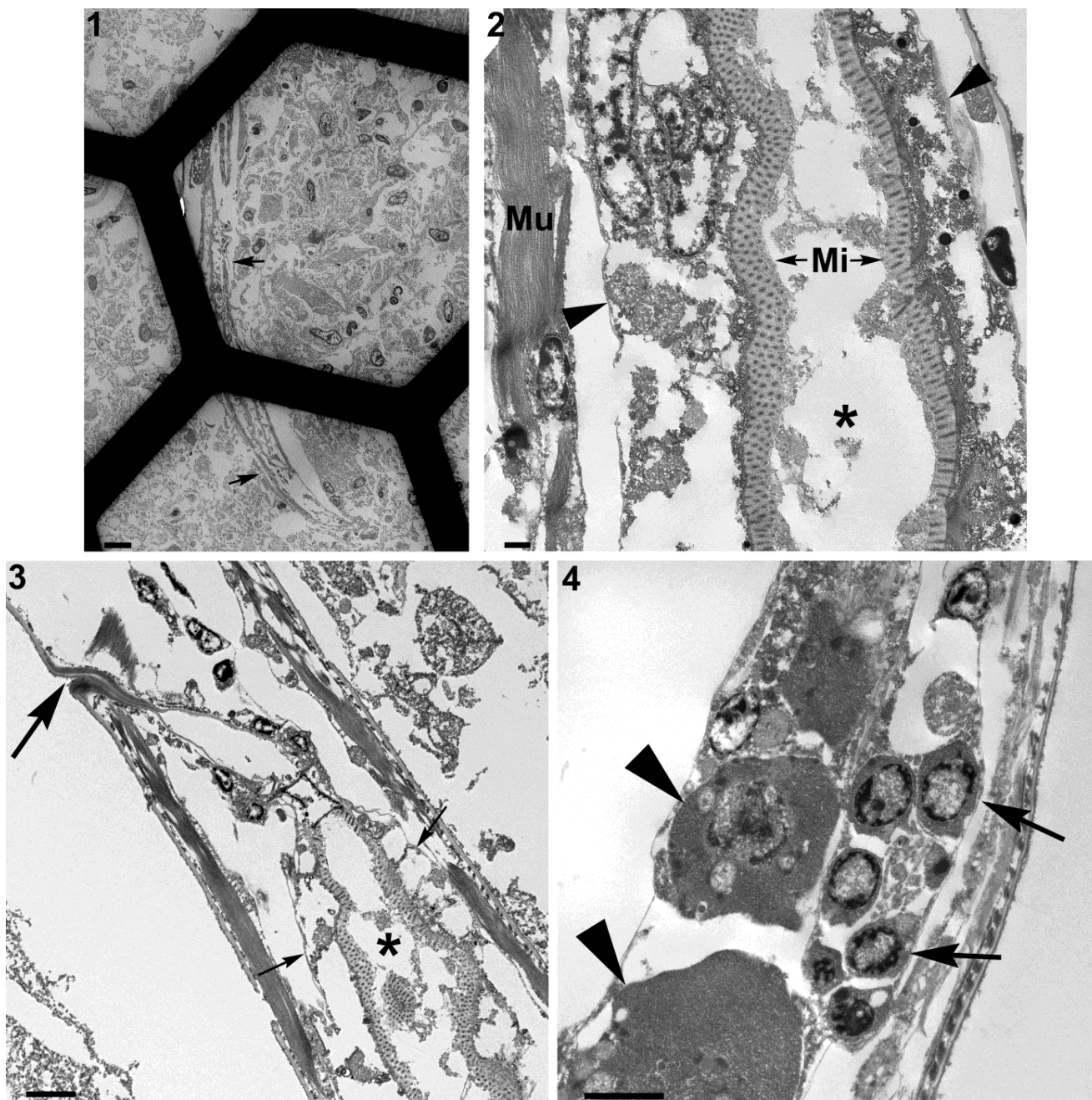


Figure 1. *Halicephalobus*, between arrows, having a crescent shape. Bar, 10 μm . **Figure 2.** Internal structures, including intestine (*) with microvilli (arrows), intestinal cells (arrowheads), and muscle fibers (Mu). Bar, 2 μm . **Figure 3.** Anus (arrow), intestine (*), and intestinal cells (small arrows) of the worm. Bar, 2 μm . **Figure 4.** Germinal cells in ovary (arrows) and developing cells *in utero* (arrowheads). Bar, 2 μm .