TRANSPLACENTAL TRANSMISSION OF NOSEMA CUNICULI IN THE BLUE FOX (ALOPEX LAGOPUS)

S. F. Mohn, K. Nordstoga, J. Krogsrud and A. Helgebostad

Nosematosis (encephalitozoonosis) is a world-wide protozoan disease which is best known in laboratory rodents where the infection is usually inapparent or runs a mild course. Some discrepancy exists as to whether the correct name of the causative organism should be Nosema cuniculi or Encephalitozoon cuniculi (2, 4, 8, 13). In this paper the terms Nosema cuniculi and nosematosis are used, without however preferring one view or the other.

More rarely nosematosis has also been reported in species other than rodents, including man (1, 3, 5-7, 9, 11, 12). During recent years, this infection has been a major problem, and has caused heavy losses, in the breeding of blue foxes in the Nordic countries. This observation probably indicates that the Nosema organisms are more pathogenic in blue foxes than in other mammalia. Only young, growing cubs in the first few months of their life are affected, and as in other animals, the main lesions are found in the central nervous system and the kidneys. A unique finding is that nearly all affected foxes display vascular lesions similar to polyarteritis nodosa (7). An evident hyper-gammaglobulinaemia is a constant finding in severely affected animals (to be published).

The natural mode of transmission is mostly unknown, and although vertical transmission has been suggested by several workers, and congenital infection has been reported in gnotobiotic rabbits (2), the present authors are unaware of any previous experimental data confirming this belief.

The strain of Nosema used in this experiment was isolated from a spontaneously infected fox; the organisms were propagated in the abdominal cavity of Swiss albino mouse (strain NMRI/Bom) and in cultures of canine kidney cells and ovine choroid plexus cells (10). Cell cultures were easily infected by inocula from mouse peritoneal exudate, and the organism was also readily sub-passaged in the cell cultures; further investigations have shown that the agent may be frozen and stored at liquid N₂-temperature.

The transmission experiment was carried out at the Research Station for Fur-bearing Animals, Heggedal, where nosematosis had never occurred. Three vixens were infected during the gestation period. One of the animals did not conceive, and one died during the delivery, in association with obstetric complications. The 3rd animal, which was fed 4 parasitized mice, and 3.5 ml cell culture fluid, mixed with the feed, 8 days after mating, gave birth to 9 pups which all successively developed clinical signs indicative of nosematosis. The first symptoms were observed when the cubs were approximately 5 weeks old. At autopsy all the animals showed advanced lesions characteristic of nosematosis, including polyarteritis nodosa. Urine specimens from the cubs, which either died or were killed in a moribund condition, were obtained at autopsy; all samples contained excessive numbers of individual spores characteristic of Nosema organisms, i.e. of elongated shape, and possessing one or two polar vacuoles. Numerous similar parasitic structures were seen in sections from most organs. Electron microscopic investigation has confirmed their identity. Urine specimens and organ suspensions from the cubs were injected into the abdominal cavity of mice, and Nosema organisms were reisolated in all cases.

As the mothers of the cubs affected with nosematosis always remain healthy, and parasites have never been demonstrated in the organs of adult foxes from farms where nosematosis is widely distributed among the pups, it is most probable that the offspring were infected in utero in this experiment, after oral infection of the mother. It seems likely that vertical transmission is also most common in field cases, although other routes of transmission cannot be excluded.

M., Strano, A. J., Chandra, R., Neafie, R., Blum, 
Takei, H. & Hagiwara, S.: Arch. Path. 67: 181– 
Blažek, K., Lávička, N., Koczkova, I., Kalafa, Š. & 