

Major Communicable Fish Diseases in Europe and Their Control, EIFAC Tech. Pap. 17 Suppl. 2: 67-70), to our knowledge this is the first reported isolation of the virus from wild Arctic char. The possibility that the virus was contracted from infected stocked trout is extremely remote. Salmonids have never been cultured in the Northwest Territories (Moshenko, pers. comm.), and, although both rainbow trout (*Salmo gairdneri* Richardson) and brook trout (*Salvelinus fontinalis* Mitchell) have been stocked intermittently in the Northwest Territories since 1971, the stocking has been limited to a small, closed-system lake situated south of

Great Slave Lake (Falk and Low, 1981, Can. Manuscr. Rep. Fish. Aquat. Sci. 1578: 1-20) which is geographically distant (approximately 1,300 km) from the Fish Creek spawning grounds.

The isolation of IPNV from Arctic char is of significance because it extends the North American range of the virus into the Arctic Ocean and the Mackenzie River that drains into it. This finding also illustrates the importance of national fish health protection regulations that require both fish and eggs to be certified specific pathogen-free prior to their movement into another region.

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Simultaneous Transmission of a Piscine Piroplasm and Trypanosome by a Marine Leech

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American plaice, *Hippoglossoides platessoides* (Fabricius), off the coast of Newfoundland harbor infections of piroplasms and trypanosomes (So, 1972, Can. J. Zool. 50: 543-554; Khan et al., 1980, Can. J. Zool. 58: 770-781). High prevalences of natural infections with both parasites were observed in all size groups (12 to 62 cm) of plaice taken 10 km from the shoreline. The marine leech, *Johanssonia arctica* (Johansson, 1898), was reported as the natural vector of *Trypanosoma murmanensis* (Nikitin, 1927) in Atlantic cod, *Gadus morhua* L. (Khan, 1976, Can. J. Zool. 54: 1840-1849). Moreover, evidence was provided that *J. arctica* was the experimental vector of the piroplasm *Haemohormidium beckeri* So, 1972 (Khan, 1980, Can. J. Zool. 58: 1631-1637). Be-

cause the same leech has been collected from the body of plaice (Khan et al., 1980, op. cit.), feeds readily on it in the laboratory and transmits *T. murmanensis* (Khan, 1977, Can. J. Zool. 55: 1235-1241), it was hypothesized that transmission of the piroplasm could occur simultaneously.

To test this hypothesis, recently emerged *J. arctica* were permitted to feed on a plaice harboring chronic concurrent infections of *T. murmanensis* and *Haemohormidium terraenovae* So, 1972. The leeches were held subsequently at 0 C as reported previously (Khan, 1976, op. cit.) and following digestion of the blood meal were allowed to refeed (5 leeches/fish) either on immature (16-19 cm) or adult (>25 cm) winter flounder, *Pseudopleuronectes americanus* (Walbaum). Each experimental group consisted of five or six fish. An equal number of flounder, upon which uninfected leeches fed, were held

simultaneously in an adjoining tank as controls. Water temperatures of the tanks, through which ambient, filtered sea water flowed, varied from 6 to 9 C. These fish had been determined previously over a 6-mo period to be uninfected with hematozoa by examination of Giemsa-stained blood films which were prepared twice weekly.

In the first trial, involving five immature flounder, both trypanosome and piroplasm infections were observed in one fish 24 days after refeeding of the leeches and in the remaining four at 26 days. Parasitemias of both hematozoa were low grade from the time of appearance until 72 days after infection. In a second group of six juvenile flounder (14–18 cm), following a similar experimental protocol, both species of parasites were observed in one fish at 11 days and in an additional five from 14 to 53 days postinfection. Again, parasitemias were all low grade during the patent period. A total of 65% (22) of 34 juvenile flounder became infected with both parasites. Moreover, all fish harboring trypanosomes were infected concurrently with piroplasms, whereas about 23% (8) harbored only piroplasm infections. Neither of the two parasites was observed in control flounder.

Transmission of the infections by leeches was less commonly effected in adult winter flounder as 48% (13) of 27 fish became infected with piroplasms whereas only 40% (11) harbored both parasites simultaneously. On no occasions was a trypanosome infection observed alone. Prepatent periods of the piroplasm infection varied from 36 to 62 days while patency rarely exceeded 13 days in adult fish.

Results from the present study provide experimental evidence that the leech *J. arctica* can transmit piroplasm and trypanosome infections simultaneously if infected with both parasites, although only piroplasms were transmitted on some occasions. Moreover, simultaneous transmis-

sion occurred more often in juvenile flounder in which prepatent periods were shorter and patency was of longer duration. Transmission of both infections from plaice to flounder indicates a lack of host specificity. However, while *T. murmanensis* will infect a wide range of hosts (Khan, 1977, op. cit.), numerous attempts to infect a gadoid, viz., *G. morhua* and a perciform, *Myoxocephalus octodecemspinosus* (Mitchell) with *H. terraenovae* were unsuccessful (Khan, unpubl. data). Since it was reported previously that *H. beckeri*, a parasite infective to perciforms, failed to become established in *P. americanus* (Khan, 1980, op. cit) and coupled with the observation that a piroplasm in Greenland halibut, *Reinhardtius hippoglossoides* (Walbaum) (Khan et al., 1982, Can. J. Fish. Aquat. Sci. 39: 1317–1322) is similar in morphology and morphometry to that in plaice, possibly *H. terraenovae* is infective only to pleuronectiform fish. Overlapping distribution of these susceptible fish hosts, both hematozoa and the leech vector, *J. arctica* in the northwestern Atlantic Ocean is suggestive of concurrent transmission in nature. Both Baker (1960, Parasitology 50: 515–526) and Jakowska and Nigrelli (1956, Ann. N.Y. Acad. Sci. 64: 112–127) reported piroplasm infections were concurrent with the presence of trypanosomes in naturally infected hosts, while Lainson (1982, Soc. Protozool. Spec. Publ. 1: 150–165) demonstrated that trypanosome and hemogregarine infections were transmitted simultaneously in a fresh water fish by a leech.

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Hepatic Capillariasis in African Giant Rats (*Cricetomys gambianus* Waterhouse)

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Diseases of wild rodents in Africa have not been studied extensively. There are only a few reports on parasitic diseases in the African giant rat (Dipeolu and Ajayi, 1975, *East Afr. Wildl. J.* 13: 85-89; Ikede and Ajayi, 1976, *J. Nigerian Vet. Med. Assoc.* 5: 63-65). Even though hepatic capillariasis has been reported in numerous species of wildlife from many countries including wild rodents (Reynolds and Gavutis, Jr., 1975, *J. Wildl. Dis.* 11: 13), the only report of the parasite in Nigerian wildlife was that of Ikede and Ajayi (1976, *op. cit.*) in a captive African giant rat. African giant rats are easily domesticated and have potential for supplementing the scarce protein supply for humans in Nigeria.

The purpose of this paper is to document the occurrence of and describe the lesions associated with hepatic capillariasis in free-living African giant rats trapped in Zaria, Nigeria.

Twenty-one young and adult wild African giant rats were captured within the

period of 1 yr (January 1982 to January 1983) in live-traps set in various locations in Zaria, Nigeria. Within 12-24 hr of capture, each animal was examined at necropsy. Tissue specimens were taken from the liver and were fixed in 10% buffered formalin. After embedding in paraffin, sections were made at 5 μ m and stained with hematoxylin and eosin and trichrome stain. Portions of the liver were teased, mixed with normal saline on a glass slide and examined with a light microscope.

Seven of the 21 rats showed hepatic lesions of similar pattern which ranged from mild to severe. Gross examination commonly showed an enlarged liver. The lesions consisted of white to yellow nodules which on measurement ranged from 1 to 5 mm in diameter on the liver surface. The areas of the liver showing depressed streaks were firmer and less easily sectioned with a knife than the apparently normal areas of the organ. Portions of the liver teased and examined as a wet preparation under the microscope showed the presence of numerous ovoid-shaped eggs with bipolar caps. The eggs measured between 55 and 57 μ m in length and 30 μ m at the widest diameter and showed radial

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