

Abstract

Surveillance for viral and parasitic pathogens in an isolated African lion (*Panthera leo*) population in the Northern Tuli Game Reserve, Botswana

Kimberly McDermid¹, Michael J. Yabsley², John P. Carroll³, Andrei Snyman³, F.J. Verreyne⁴

¹University of Georgia, Warnell School of Forestry and Natural Resources, ²University of Georgia, College of Veterinary Medicine & Warnell School of Forestry and Natural Resources, ³University of Nebraska, School of Natural Resources, ⁴Vet and Agric Consultants, Gaborone, Botswana

African lion (*Panthera leo*) numbers are decreasing rapidly and extant populations are becoming smaller and more fragmented (~40% populations contain <50 individuals). Diseases are one reason for population declines and low density populations are particularly vulnerable to disease epidemics. This study focused on viral and hemoparasite prevalence and characterization in a threatened lion population in Botswana. Blood and serum samples were collected on 50% (n=13) of the adult/sub-adult lions in the Northern Tuli Game Reserve. Antibody prevalences to feline panleukopenia virus (7%), canine distemper virus (15%) and feline calicivirus (15%) were low, whereas higher rates occurred for feline immunodeficiency virus (76%) and feline herpesvirus (84%). All lions were seronegative for feline coronavirus. No *Trypanosoma*, *Anaplasma*, *Theileria* and *Ehrlichia* spp. were detected using molecular assays; however, all lions were positive for *Babesia*. Cloning and sequencing of amplicons from five lions thus far revealed four *Babesia* spp. including genetic variants of *B. felis*, a variant of *B. lengau*, a *B. canis vogeli* and a *Babesia* sp. which is only 96% similar to other sequences and likely represents a novel species (related to *B. microti* and other mesomammal *Babesia*). In otherwise healthy lions, most of these pathogens do not typically cause clinical disease; however, clinical signs can occur during stress, sub-optimal environmental conditions or when they have co-infections. These data provide a baseline for future health assessments of this population and can be utilized to identify management and conservation strategies as there is an initiative to incorporate this population into a larger metapopulation.

Prevalence rates of select viruses in all known-sampled African lion populations

AREA	SAMPLE DATE(S)	Antibody Titers CDV	Antibody Titers FEC	Antibody Titers FCV	Antibody Titers FHV	Antibody Titers FPV	Antibody Titers FIV-Ple
West Africa Etosha National Park, Namibia	1989-1991		2/66 (3%)	0/66 (0%)	44/66 (67%)	0/66 (0%)	0/66 (0%)
Southern Africa S. Luangwa & Liuwa Plain NP, Zambia	? 2013	0/21 (0%)				1/21 (5%)	
Khutse & Central Kalahari Game Reserves, Botswana	2003-2005	1/21 (5%)		2/21 (10%)	21/21 (100%)		15/21 (71%)
Northern Tuli Game Reserve, Botswana	2013-2014	2/13 (15%)	0/13 (0%)	2/13 (15%)	11/13 (84%)	1/13 (7%)	10/13 (76%)
Okavango Delta & Chobe NP, Botswana	1999-2006						47/64 (73%)
Kruger National Park, South Africa	1987-1990		0/32 (0%)	0/32 (0%)	29/32 (91%)	27/32 (84%)	50/55 (91%)
Eastern Africa Queen Elizabeth NP, Uganda	1998-1999	11/14 (79%)		11/14 (79%)	9/14 (64%)	5/14 (36%)	10/14 (71%)
Serengeti NP, Tanzania	1984-1991	?/309 (85%)	149/254 (58%)	170/254 (67%)	252/253 (99%)	192/253 (75%)	221/243 (91%)
Ngorongoro Crater, Tanzania	1984-1991	?/37 (%)	28/51 (55%)	1/51 (2%)	51/51 (100%)	14/51 (27%)	41/44 (93%)
Lake Manyara, Tanzania	1984-1991		1/5 (20%)	0/5 (0%)	5/5/ (100%)	3/5 (60%)	4/5 (80%)

Table 1. Canine distemper virus (CDV), Feline coronavirus (FEC), Feline calicivirus (FCV), Feline herpesvirus (FHV), Feline panleukopenia virus (FPV), Feline immunodeficiency virus (FIV-*ple*)